FLANAGAN CONSULTING GROUP
Trusted Advisor to Northern Australia

Ports North

CAIRNS SHIPPING DEVELOPMENT PROJECT

Revised Draft Environmental Impact Statement

Chapter B8: Terrestrial Ecology

TABLE OF CONTENTS

List of Figures

List of Tables

List of Photos

B8.1 Introduction

B8.1.1 Scope

This chapter presents the results of baseline studies and impact assessments undertaken for terrestrial ecology, carried out as part of the Cairns Shipping Development Project (the CSD Project) EIS. It is based on a number of detailed technical studies undertaken specifically for this Revised Draft EIS (see **Table B8-1**).

As described in **Section B8.2**, there is an unavoidable overlap of terrestrial and marine ecological issues at the tidal interface, with the result that for some matters readers will need to also refer to **Chapter B7** (Marine Ecology). However, this Revised Draft EIS includes summary chapters on Nature Conservation Areas (**Chapter B2**) and EPBC Act issues (**Chapter B19**) where issues spanning several technical chapters are integrated.

B8.1.2 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 terrestrial ecology, the 'local scale' is considered to be appropriate. Elements of the local scale (**Figure B8-1**) 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 B8-1** (and on more detailed figures throughout this chapter where relevant) and encompass:

- Channel Project Area including the shipping channel, the preferred marine placement area for maintenance material – described as Option 1A Dredge Material Placement Area (DMPA) 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 DMPA, delivery pipeline corridor, tailwater ponds, and tailwater outlet works).
- Tingira Street Stiff Clay DMPA Project Area.

The Channel Project Area is discussed in **Chapter B7** (Marine Ecology) and other marine studies. Although located on land, no assessment has been made in this chapter of the Land-side Works Project Area as construction and operational activities in this area are confined to existing disturbed / developed areas within the Port of Cairns and are limited in scope and area. Specifically, the Land-side Works Project Area does not contain any terrestrial ecology values. In this chapter the following terminology is used:

- the Northern Sands DMPA is the soft clay placement site within the Northern Sands properties (see **Section B8.3.1.b**)
- the Northern Sands Project Area includes the above and the delivery pipeline corridor and tailwater pipelines corridor (see **Section B8.3.1.c**)
- the Tingira Street DMPA is the stiff clay placement site within the Tingira Street property (see **Section B8.3.1.d**)
- the Tingira Street Project Area is the DMPA plus the immediate surrounds where direct impacts may be experienced.

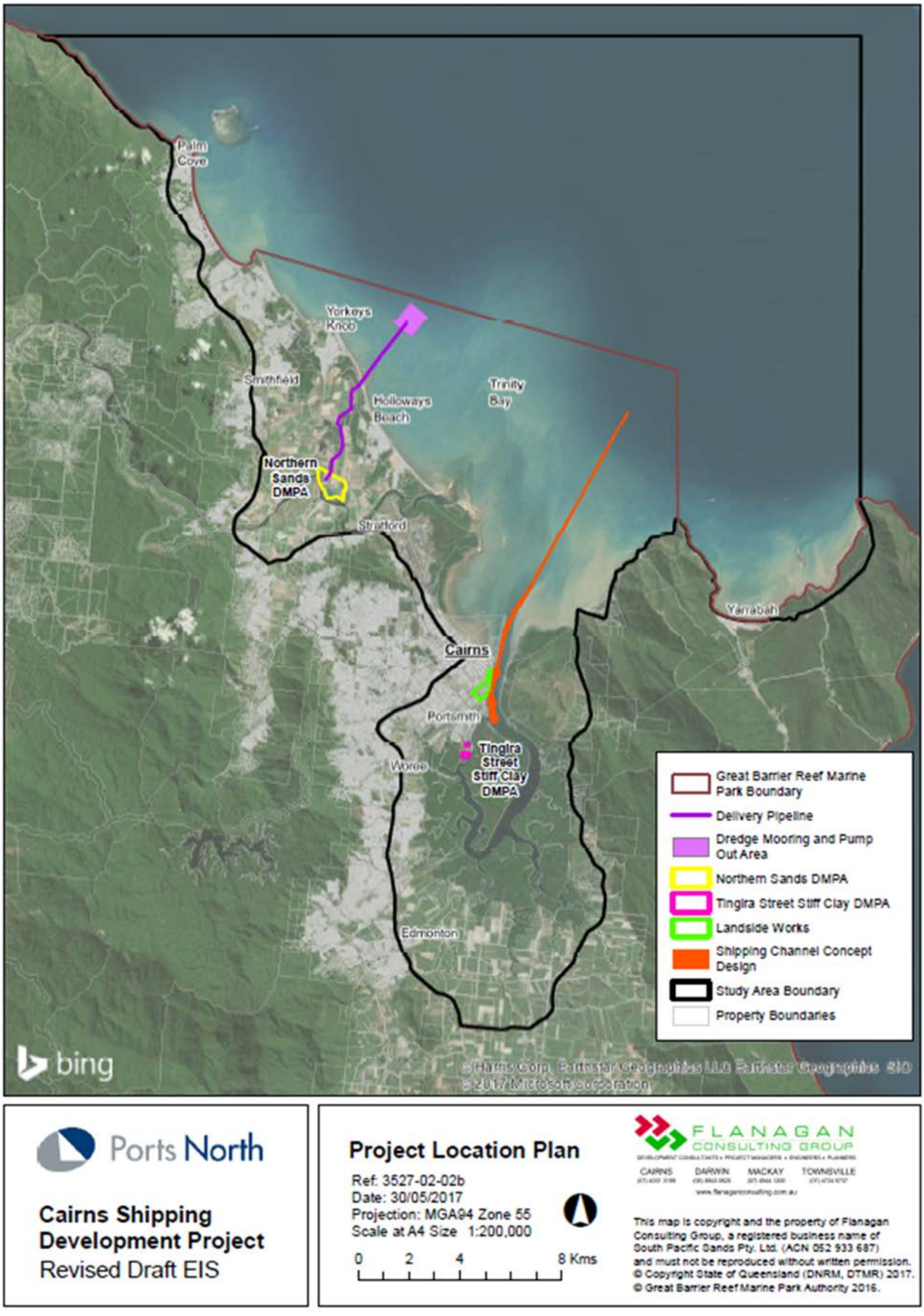


Figure B8-1 Study Area and Project Areas.

This chapter focuses on potential impacts on terrestrial ecology values at the local scale which is essentially the two DMPA project areas described above and their immediate surrounds. Further discussion of impacts at regional and whole of Great Barrier Reef (GBR) scale are outlined in **Chapter B18** (Cumulative Impacts Assessment).

B8.1.3 End use of DMPAs

B8.1.3.a End Use – Northern Sands Project Area

Northern Sands DMPA

The Northern Sands DMPA contains an operating sand mine and a 25 ha water-filled void 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.

The soft clay placement campaign will fill all or most of the void over a period of some three months after which it will settle over one wet season. 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.

Delivery Pipeline

After the completion of the soft clay placement campaign, the delivery pipeline 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. This level of rehabilitation is greater than that assumed in **Appendix AM**, meaning that in some cases the assessment of impacts may be slightly conservative.

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).

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. No rehabilitation will be necessary.

B8.1.3.b End Use – 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 industrial hardstands and other infrastructure. This project has been under consideration for many years and most of the necessary approvals have already been obtained.

Of relevance to the consideration of terrestrial ecological impacts is the fact that no rehabilitation will be possible following the stiff clay placement. No permanent impacts will occur outside the DMPA footprint. Site landscaping will be undertaken on the DMPA once placement is complete and future site use is better defined. In the interim, the area will be maintained as per existing Ports North management, including mowing.

B8.2 Methodology

B8.2.1 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 B8-1** below. The final column shows where these reports are located in this Revised Draft EIS.

TABLE B8-1 DETAILED TECHNICAL ASSESSMENTS

STUDY	DETAILS	APPENDIX NO
Cairns Shipping Development Project Revised Draft EIS Dry Season Terrestrial Flora and Fauna	Existing situation - dry season of the Northern Sands and East Trinity DMPAs and the Northern Sands pipeline corridor	**Appendix Q**
Cairns Shipping Development Project Terrestrial Ecology Assessment Technical Report	Existing situation – wet season of the Northern Sands DMPA and pipeline corridor. Assessment of Impacts – Northern Sands DMPA and pipeline corridor and Tingira Street DMPA	**Appendix AM**
Values and Constraints Assessment – Groundwater Report Northern Sands Cairns	Groundwater modelling in the Northern Sands Project Area	**Appendix AK**

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 assessments based on Commonwealth and state databases
- field surveys undertaken in the 2016 dry season and the 2017 wet season, along with details of survey methodology, staffing, and limitations
- groundwater modelling to assess the impacts of soft clay placement on groundwater dependent ecosystems and other ecological matters.

Summaries are provided below. In addition, many of the maps used in this chapter are extracted from **Appendix AM**.

B8.2.2 Assessment Structure

Both the existing situation description (**Section B8.3**) and the impact assessment (**Section B8.4**) are based on terrestrial ecological values defined as:

- Matters of National Environmental Significance (i.e. the relevant controlling provisions of the EPBC Act) broadly as required by the Commonwealth EIS guidelines for the CSD Project
- Matters of State Environmental Significance (as defined under the State Planning Policy) broadly as required by the Queensland Government Terms of Reference for the CSD Project
- other Commonwealth matters
- other state matters
- various general ecological aspects and processes that support terrestrial ecological values.

These are collectively referred to as ‘matters’.

B8.2.3 Nomenclature and Terminology

Within this chapter, the conservation status of a species is described as 'Critically Endangered', 'Endangered', 'Vulnerable', 'Near Threatened', 'Least Concern' 'Migratory' and 'Marine', in line with the provisions of the *Native Conservation Act 1992* (Qld) (NC Act) and/or the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act). The term 'marine plant' includes species of plants that normally grow on or adjacent to tidal lands, and is used in this chapter pursuant to the definition in section 8 of the *Fisheries Act 1994* (Qld).

Vegetation type descriptions used (e.g woodland and low open heath) are based on the structural types described by Neldner *et al.* (2012). Names of flora follow the Census of Queensland Flora (Bostock and Holland 2013) while names of fauna follow listings as per the NC Act, EPBC Act and Pizzey and Knight (2003).

As there are both terrestrial and marine ecological values between the highest and lowest tide marks (i.e intertidal and subtidal areas), there is some overlap between this chapter and **Chapter B7** (Marine Ecology). For this chapter, 'terrestrial habitat' is defined as land above lowest astronomical tide (LAT) or more generally, low water'. In summary, the following clarification is made regarding matters discussed in this chapter and in other parts of the Revised Draft EIS at the terrestrial / marine interface. This chapter (Terrestrial Ecology) deals with:

- mangroves, salt couch, and mangrove associates and associated terrestrial fauna above lowest astronomical tide (LAT)
- all terrestrial flora and fauna including birds, frogs and other wetland fauna
- terrestrial protected areas including Fish Habitat Areas above LAT
- wetlands.

The following allied ecological matters at the terrestrial / marine interface are dealt with principally in **Chapter B7** (Marine Ecology):

- seagrass and aquatic fauna etc. below LAT
- marine protected areas including Fish Habitat Areas below LAT (there is some unavoidable overlap)
- fringing vegetation and riparian habitat survey in receiving environment waterways
- fish and fishing

Other matters are dealt with as follows:

- nature conservation areas – **Chapter B2** (Nature Conservation Areas)
- cumulative (and consequential) impacts – **Chapter B16** (Cumulative Impacts)
- EPBC Act issues – **Chapter B19** (EPBC Act Issues).

Cross references to these other chapters are provided below where relevant.

'Non-aquatic EPBC Act migratory species' are defined in this chapter as those EPBC Act listed migratory species that do not live in water. Migratory birds are an example of non-aquatic migratory species, even though many of these species live and use marine or riverine areas. Conversely, turtles and whales are an example of aquatic EPBC Act Migratory species. These and other aquatic migratory species are discussed in Chapter B7, Marine Ecology.

Within this chapter, the term 'database search results' refers to results from the Protected Matters Search Tool results, Wildlife Online Search results, and Atlas of Living Australia Search results. Original searches are included in Appendix 3 of **Appendix AM**.

B8.2.4 Literature Review

A comprehensive literature review was undertaken in the preparation of the three Biotropica Australia studies listed in **Table B8-1**. The key studies referenced are:

- Aquis Resort at the Great Barrier Reef Terrestrial Ecology (Biotropica Australia 2014)
- Birds of East Trinity Inlet – Acid Sulphate Remediation Project (Queensland Herbarium 2014)
- Coastal bird habitat near Trinity Inlet – Identification, assessment and mapping of the habitat of selected bird species (Fisk 2013)
- Common User Barge Facility Flora and Fauna Assessment (GHD 2012)
- Draft EIS and associated technical reports (Ports North 2014).

The principal value of these studies is in expanding the records of observed species to supplement the targeted searches undertaken in the preparation of the CSD Project studies. The Draft EIS was of limited relevance as the CSD Project at the Draft EIS stage did not involve terrestrial placement of dredge material and terrestrial ecology was only a minor consideration. However, extensive work was undertaken on shore birds and migratory waders and findings are accessed in this chapter.

Details of relevant findings are included in **Appendix AM** and in this chapter where relevant.

B8.2.5 Desktop Assessment

The desktop study involved review of Geographical Information System (GIS) mapping, database information, reports and literature relevant to flora and fauna values in the study area. This included the sources listed in **Table B8-2** (see also **Appendix AM**).

TABLE B8-2 DATABASES / DATASETS UTILISED FOR DESKTOP ASSESSMENT

DATABASE/SET	RELEVANT LEGISLATION / PURPOSE OF DATASET REVIEW
Queensland NCA Wildlife Online	Nature Conservation Act 1992 / Nature Conservation (Wildlife) Regulation 2006
EPBC Protected Matters Search Tool (PMST)	Environment Protection and Biodiversity Conservation Act 1999
Regional ecosystem and remnant map – Version 8.0 (RE)	Vegetation Management Act 1999
Matters of State Environmental Significance –Version 4.1 (MSES)	State Planning Policy / Sustainable Planning Act 2009
Protected plants flora survey trigger map – Version 4	Nature Conservation Act 1992
Regulated vegetation management map – Version 1.32	Vegetation Management Act 1999
Directory of Nationally Important Wetlands	Non-statutory
Queensland waterways for waterway barrier works	Fisheries Act 1994 and Sustainable Planning Act 2009
Queensland DCDB 2016 (Tenure)	Land Act 1994
Great Barrier Reef Coast State Marine Park Zoning Map	Queensland Marine Parks Act 2004
Wetland Protection Area wetlands and trigger zones	Environment Protection Regulation 2008
Wetland Management Areas	Environment Protection Regulation 2008
Atlas of Groundwater Dependent Ecosystems (BOM)	Non-statutory

Source: Appendix AM (Table 9).

B8.2.6 Field Surveys

Details of field surveys (flora and fauna and specialist bird surveys) are included in **Appendix Q** and **Appendix AM**. In summary, these involved:

- August 2016. Northern Sands DMPA as well as the then- proposed East Trinity DMPA (now of no relevance to the current project other than regarding bird habitat).
- March 2017. Northern Sands Project Area and Tingira Street DMPA, including specialist bird surveys at the Tingira Street DMPA.

At the time when the August 2016 surveys were undertaken, the location of the delivery pipeline corridor and other 'plumbing' had not been determined and the use of the Tingira Street site as a stiff clay DMPA had not been identified. Accordingly, no specific dry season surveys were completed in these areas. However, existing recent and relevant work from other projects was used to supplement the wet season surveys, and in particular (see also **Section B8.2.4**):

- Northern Sands Project Area. The Aquis surveys by Biotropica Australia (2014) included wet season and dry season work plus detailed seasonal monitoring on the Pappalardo farm / mouth of Richters Creek (i.e. where the delivery pipeline corridor transitions from underwater to overland and where the first several kilometres of the pipeline will run) and several sites in Richters Creek representative of the proposed crossing point.
- Tingira Street DMPA. The study undertaken for the Common User Barge Facility Flora and Fauna Assessment by GHD (2012) included additional observations. In addition, the specialist bird studies undertaken by Fisk (2013) and the Queensland Museum (2014) for the Revised Draft EIS both extend knowledge of wading birds in the Trinity Inlet by several years.

B8.2.7 Likelihood of Occurrence

In several cases below an assessment is made regarding the likelihood of occurrence of particular species. In general the methodology involved starting with searches of relevant databases based on spatial boundaries and then making an assessment of whether or not the species are or may be present. This is an expert assessment by the authors of **Appendix Q**, **Appendix AM**, and **Appendix AK** based on the following:

- knowledge of the results of ecological field surveys
- results of the literature reviews
- knowledge of the study area and the preferred habitat of listed species.

Likelihood of occurrence was classified using the following descriptions, where relevant to the lifeform in question (i.e. plant, animal, type of animal) and the site / study area / project area as defined:

- Confirmed: The species has been definitively recorded within the area during surveys undertaken for the CSD Project.
- Previously recorded on site: The species has been recorded during previous studies undertaken by the CSD Project study team or other competent researchers.
- Likely: The species is known to occur based on previous records, and/or there is core habitat present, and/or there are analogous local area habitats.
- May over-fly the site: The species is wide-ranging over a large territory and may over-fly the area when hunting across more optimal habitats, but the species is unlikely to use the area for hunting, nesting, resting, or escape.
- Unlikely: The species is considered to have a low likelihood of occurring in the area, or occurrence is infrequent and transient. There may be habitat for the species; however, it is marginal or not considered core habitat. Existing database records are considered historic, invalid or based on predictive habitat modelling. Despite a low likelihood based on the above criteria, the species is known from the wider region and could potentially occur within the area.

B8.3 Existing Situation

B8.3.1 Study Area and Project Areas Overview

B8.3.1.a Study Area Overview

The Study Area as defined in **Section B8.1.2** is located in or adjacent to the Wet Tropics World Heritage Area (WTWHA) and the Great Barrier Reef World Heritage Area (GBRWHA) (Cairns Regional Council (CRC) 2012). Both the areas are recognised as outstanding examples of biodiversity, habitat for threatened species, species endemism and intact ecological processes (SEWPaC 2013).

On land, there is a diverse array of vegetation communities across the Cairns region, supporting a high level of faunal and floral diversity. Various types of mesophyll, notophyll and microphyll vine forest (rainforest) dominate eastern parts of the region where large remnant forests exist, whilst sclerophyll forests and woodlands dominate in the western parts across the Great Dividing Range (CRC 2012).

There are also high levels of habitat fragmentation across the Cairns region, particularly in lowland habitats due to the concentration of buildings, agriculture, forestry and transport infrastructure (CRC 2012). The Northern Sands and Tingira Street project areas lie in what is the most fragmented landscape in the region due to the concentration of urban, industrial, agricultural, and residential development.

The two project areas do not lie within WTWHA or the GBRWHA, although the latter runs to low water adjacent to both DMPAs and is crossed by the Northern Sands delivery pipeline corridor.

B8.3.1.b Northern Sands DMPA

The Northern Sands DMPA is located on Lots 2/RP712954, 5/SP245573, and 6/SP245573. This parcel covers an area of about 84 hectares of the Barron River floodplain adjacent to the Barron River. The parcel contains an operating sand mine and the water-filled void resulting from sand extraction is licensed to receive inert construction and demolition waste, and up to 5000 m^3 / annum of potential acid sulfate soil, both of which are placed into the void below the water table. The current void covers an area of about 25 hectares and contains fresh water from groundwater seepage and rainfall. This waterbody is known locally as ‘Lake Narelle’.

The Northern Sands DMPA site is characterised by cleared lands with two small areas of remnant vegetation bordering the Barron River. Only these areas contain native vegetation with the remainder of the site dominated by anthropogenic grasslands, dredge ponds, and sand handling and other infrastructure (see **Figure B8-2**). The native vegetation that remains on site is edge-affected and retains limited natural value.

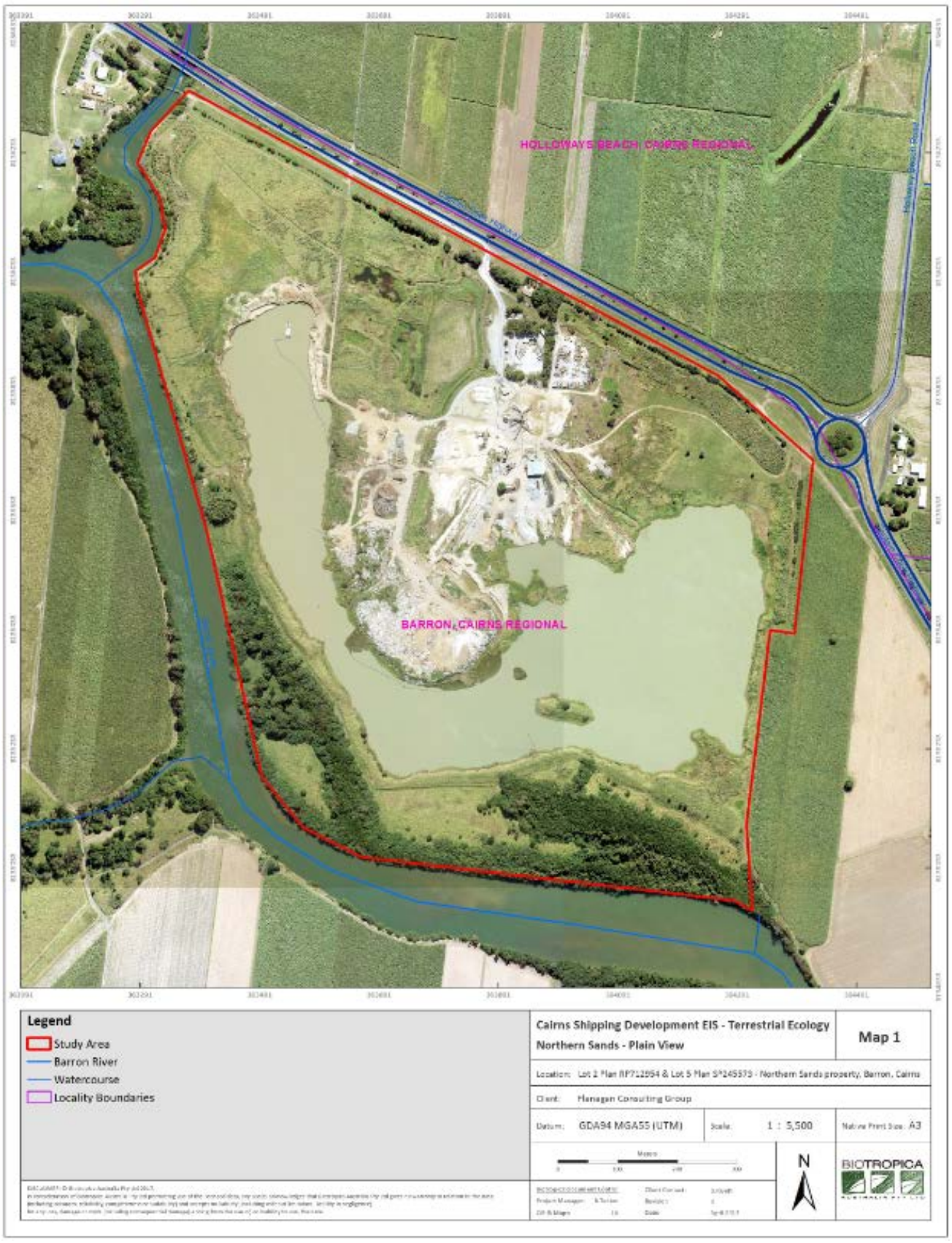


Figure B8-2 Northern Sands DMPA.

Source: Appendix AM.

The site occurs on an alluvial substrate with high silt / sand content at low elevations, with the exception of the modified portions which consist of sand soils. Any variation to topography at the site is man-made and relates to the voids from previous and on-going sand extraction and waste / stockpile areas. Within the mangrove communities bordering the river, minor undulations occur which shape the tidal channels. These channels, along with the banks of the river, consist of mud soils with poor drainage. On areas of higher relief, organic matter increases and soils becomes better drained allowing establishment of a more diverse range of species and life forms.

The Northern Sands DMPA is largely surrounded by disclimax vegetation, sugar cane, cultivation and industrial development. The highly disturbed and ecologically isolated nature of the site suggests it retains minimal natural values and makes a minimal contribution to nature conservation within the local landscape.

The remnant riparian vegetation along the Barron River provides a semblance of ecological connectivity. These forests are loosely connected through a very narrow (<10 m wide) riparian strip to the remaining fringing mangroves of the Barron River and to the adjacent Richters Creek and Thomatis Creek systems.

B8.3.1.c Northern Sands Pipelines

Delivery Pipeline

Soft clays will be delivered from the dredger via a submerged steel pipeline, which will make landfall at the mouth of Richters Creek. From here the pipeline will run overland (above ground) in a south-westerly direction, initially through Corymbia/Melaleuca woodland, then through anthropogenic grassland of the Pappalardo farm to cross Richters Creek before again extending across cane fields west of Holloways Beach. The pipeline will pass through an existing culvert under the Captain Cook Highway and then westwards to enter the northern end of Lake Narelle. The pipeline will require three booster pumps and laydown areas prior to and during construction (see **Figure B8-3**).

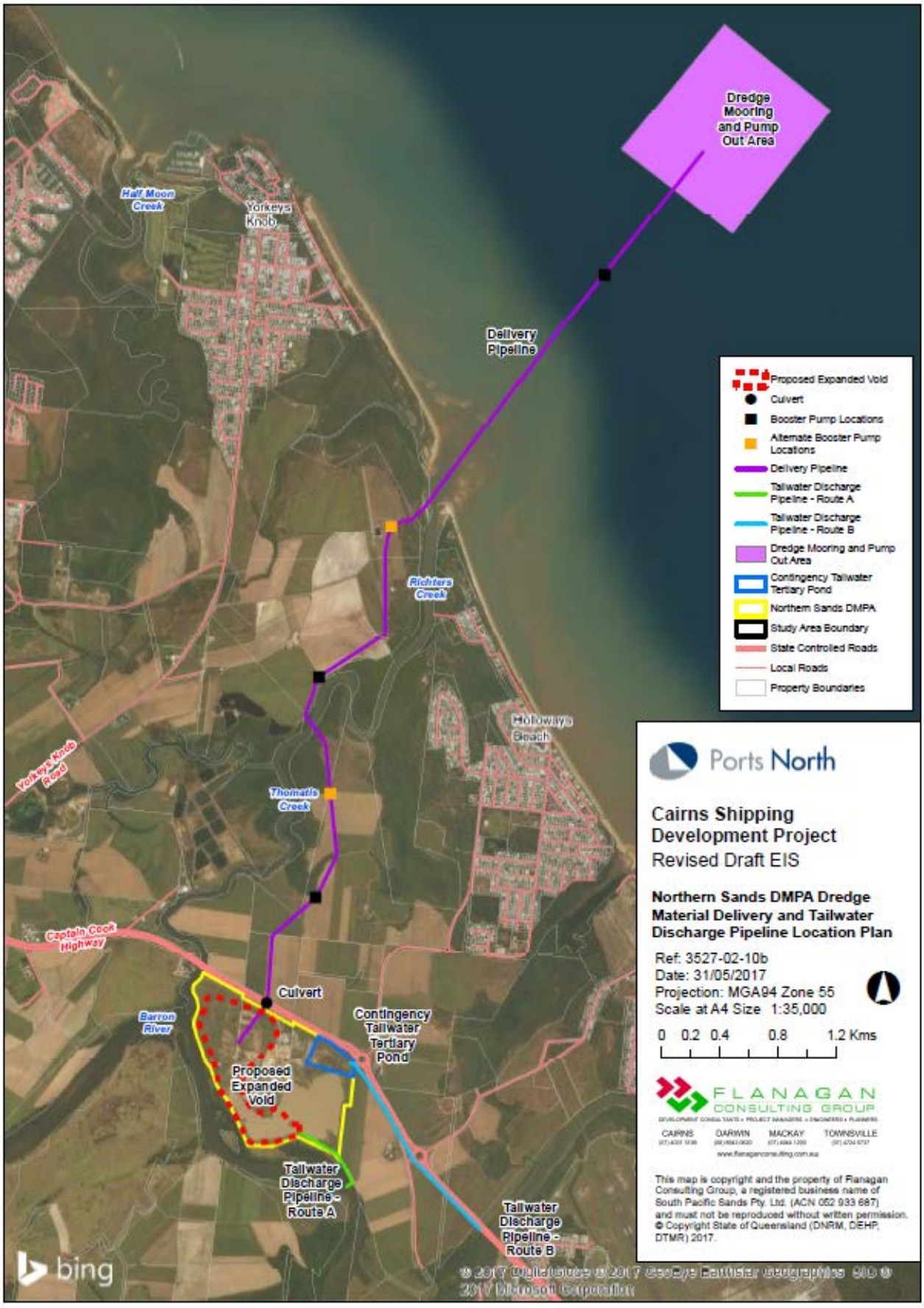


Figure B8-3 Northern Sands DMPA and pipelines.

The delivery pipeline will cross Richters Creek shown on **Figure B8-3** above.

Tailwater Discharge Pipeline(s)

Tailwater decanted from the placement operation will be discharged from Lake Narelle via one of three options (see **Figure B8-3** above), depending on water quality considerations:

- Discharge Site A is located to the southeast of the Northern Sands study area and accessed via Discharge Route 1. It is located on anthropogenic grassland in the south-east of the DMPA, proceeding onto agricultural land adjacent to mangroves fringing the Barron River. The discharge point A has been sited to be located in a cleared area in the fringing mangroves associated with the Barron River and it is expected to be possible to micro-locate the pipeline to be clear of mangrove vegetation.
- Discharge Site B is located adjacent to the northbound Captain Cook Highway bridges and is accessed via either Discharge Pipeline Option 2a which runs via agricultural land, or Pipeline Option 2b which runs adjacent to the Bruce Highway.
    - Option 2a: This route follows anthropogenic grassland in the south-east of the DMPA, proceeding onto agricultural land adjacent to the mangroves fringing the Barron River. It then crosses agricultural land and co-joins with Option 2b close to discharge point B. It is expected to be possible to micro-locate the pipeline to be clear of mangrove vegetation.
    - Option 2b: This route exits the DMPA site at the Holloways Beach roundabout and follows the western road verge of the Captain Cook Highway towards the northbound lane of the Barron River Bridge. The majority of the pipeline route is vegetated with common roadside exotic grasses and forbs including; purple-top Rhodes grass (*Chloris inflata*), wiry love grass (*Eragrostis tenuifolia*), navua sedge (*Cyperus aromaticus*), calopo (*Calopogonium mucunoides*) and sensitive weed (*Mimosa pudica*). This pipeline route should not encounter any remnant vegetation.

B8.3.1.d Tingira Street DMPA

The Tingira Street study area located on Lot 27 on SP218291 located at the end of Tingira Street in Portsmith. The DMPA consists of two separate sites (see **Figure B8-4**). The DMPA is set within an urban industrial landscape to the north, but bordering 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 Trinity Inlet and associated lands.

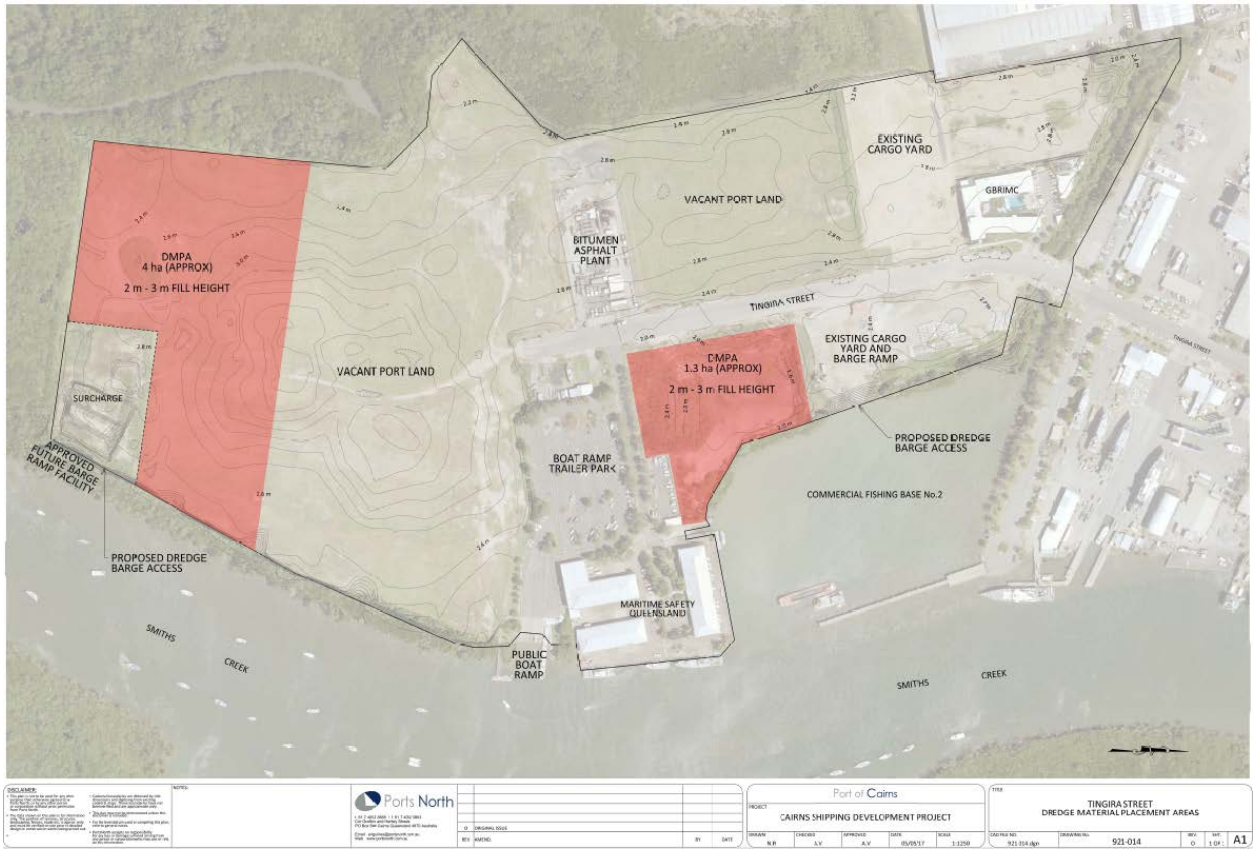


Figure B8-4 Tingira Street DMPA.

Source: Ports North. DMPA (two individual placement areas shaded).

Prior to 1982, the Tingira Street site was a 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 the proposed 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 (now Ports North) 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 to accelerate settlement, with some areas subsequently being developed.

The DMPA contains two parts described below as Site 1 (the southern area) and Site 2 (the northern area). These are shaded on **Figure B8-4** above.

Site 1 – Anthropogenic Grassland (4 ha)

The vegetation community present on Site 1 is a highly disturbed anthropogenic (man-made) grassland. Exotic species e.g., para grass (*Urochloa mutica*), Guinea grass (*Megathyrsus maximus var. maximus*) and navua sedge (*Cyperus aromaticus*) dominate. Native species are rare and are confined to the eastern boundary which borders the remnant mangrove vegetation. The topography is relatively flat with the exception of some low-lying areas to the south and east where recent rainfall had created swampy areas, which were inundated at the time of survey (these wet areas were solely due to heavy rain in the days preceding the March 2017 survey and are transient in nature).

Site 2 – Industrial Area (2.3 ha)

The majority of the DMPA comprises remnants of the site's industrial past. The anthropogenic clearing and deposition of waste material has resulted in non-remnant vegetation with varying levels of weed invasion. The street boundaries of the property to the south and east are dominated by exotic species e.g., leucaena (*Leucaena leucocephala*) and Guinea grass (*Megathyrsus maximus var. maximus*).

However, much of the interior of the site consists of a man-made clearing which is undergoing natural regeneration to a wetland ecosystem due to settlement of the site resulting in accumulation of rainfall, salinity of the reclaimed soil and periodic influx of above normal high tide, resulting in regrowth marine plants recruiting over most of the area.

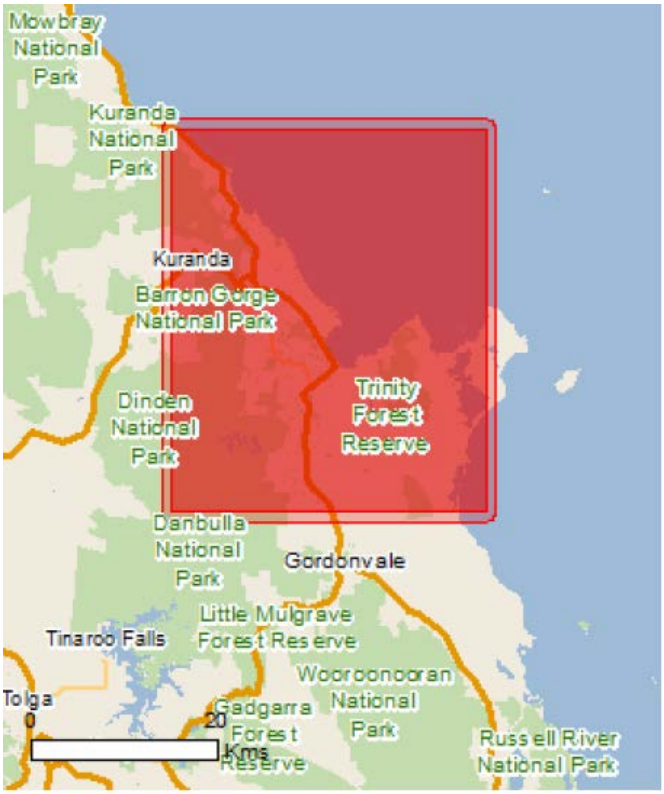
B8.3.2 Matters of National Environmental Significance

B8.3.2.a EPBC Act Controlling Provisions

As explained in **Chapter A1** (Introduction) the CSD Project is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) and will require assessment and approval under this Act before it can proceed. The relevant controlling provisions (Matters of National Environmental Significance or MNES) are as follows, (with reference to the relevant sections of the EPBC Act in brackets):

- World Heritage properties (sections 12 & 15A)
- National Heritage places (sections 15B & 15C)
- Listed threatened species and communities (sections 18 & 18A)
- Listed migratory species (sections 20 & 20A).
- Commonwealth marine areas (sections 23 & 24A)
- Great Barrier Reef Marine Park (sections 24B & 24C)
- Commonwealth land (sections 26 & 27 A).

Specific controlling provisions relevant to terrestrial ecology were identified using the EPBC Act Protected Matters Search Tool on 5 June 2017. See **Figure B8-5** for details of the search area (see **Appendix BD** for the full search report). More specific searches were undertaken in the preparation of **Appendix AM** and are described in that report where relevant. These two separate searched have returned slightly differ species numbers due to subtly different search areas. Those undertaken in the preparation of Appendix AM are used in the detailed discussion in this chapter.



Search area (this approximates the CSD Project Study Area):

- -16.700123, 145.613589
- -16.700123, 145.915229
- -17.052245, 145.915229
- -17.052245, 145.613589

Figure B8-5 EPBC Act Protected Matters search area.

Source: EPBC Act Protected Matters Search Tool accessed 5 June 2017.Refer **Appendix BD** for the full search report).

Those MNES that are mappable are shown on **Figure B8-6**.

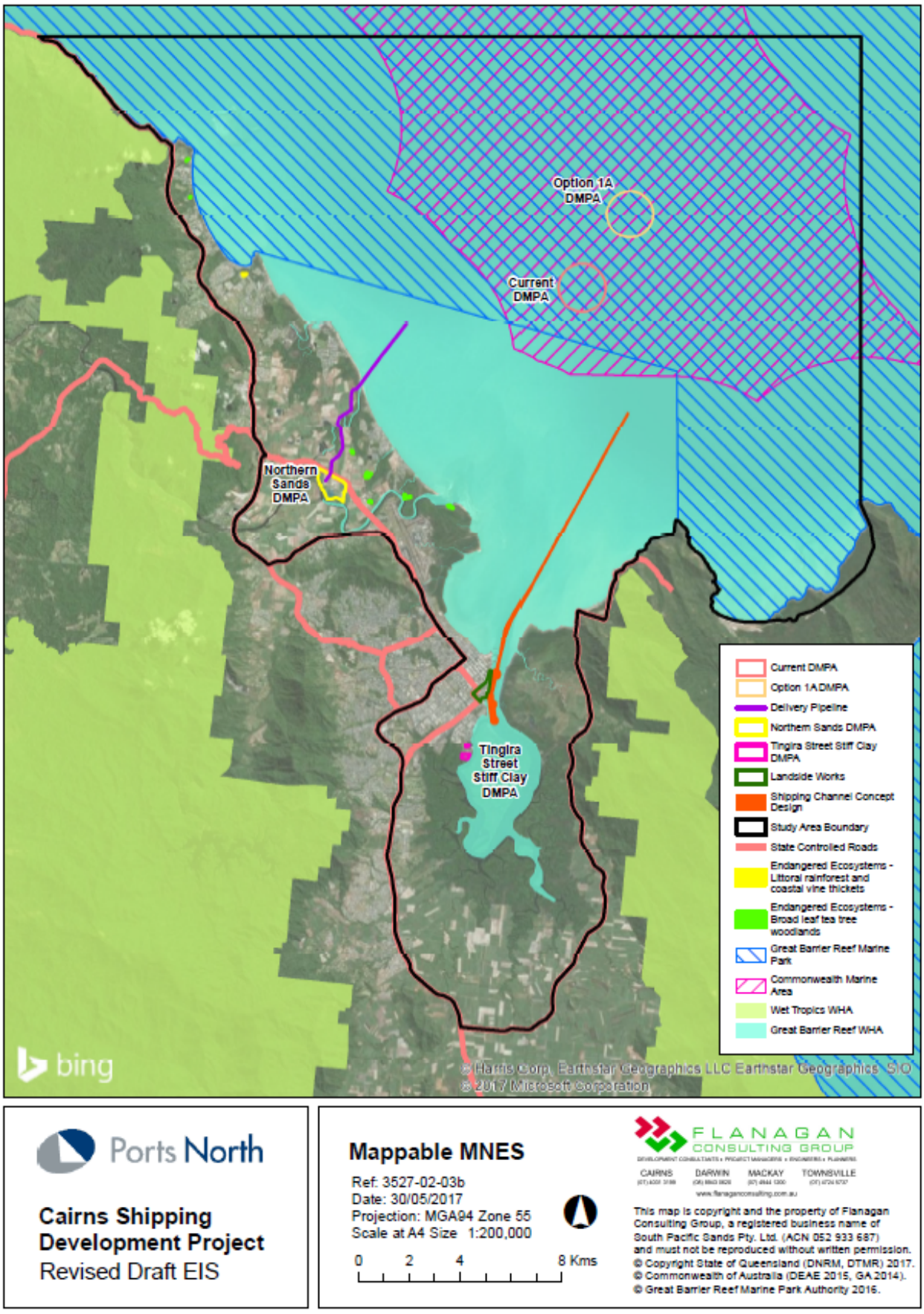


Figure B8-6 Location of mappable MNES in and near the Study Area.

Table B8-3 below lists the various MNES and indicates applicability to terrestrial ecology. Relevant matters are discussed in details following the table. Where indicated in the third column, several matters are discussed in other chapters of this Revised Draft EIS.

TABLE B8-3 RELEVANT CONTROLLING PROVISIONS AND DETAILS

CONTROLLING PROVISION	SEARCH RESULTS	DISCUSSED IN THIS CHAPTER?
World Heritage properties (sections 12 and 15A)	Great Barrier Reef (GBRWHA) Wet Tropics of Queensland (WTQWHA or WTWHA)	Yes See also Chapter B2 & Chapter B19
National Heritage places (sections 15B and 15C)	Wet Tropics of Queensland	Yes See also Chapter B2 & Chapter B19
Listed threatened species and communities (sections 18 & 18A)	72 species, 2 communities	Yes See also Chapter B7
Listed migratory species (sections 20 & 20A).	64 species	Yes See also Chapter B7
World Heritage properties (sections 12 and 15A)	Great Barrier Reef Wet Tropics of Queensland	Yes See also Chapter B2, Chapter B7, & Chapter 19
National Heritage places (sections 15B and 15C)	Great Barrier Reef Wet Tropics of Queensland Wet Tropics World Heritage Area (Indigenous Values)	Yes See also Chapter B2, Chapter 7B, & Chapter B19
Commonwealth marine areas (sections 23 & 24A)	Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast	No See Chapter B2, Chapter B7, & Chapter B19
Great Barrier Reef Marine Park (sections 24B and 24C)	Great Barrier Reef Marine Park	No See Chapter B2, Chapter B7, & Chapter B19
Commonwealth land (sections 26 & 27 A)	• Defence – Cairns Vacant Site • Defence – HMAS Cairns - Cairns • Defence – Kenny Street Naval Stores - Cairns • Defence – Las Palmas Motel - Cairns • Defence – Northern Heritage Motel - Cairns • Defence – Porton Training Depot - Cairns • Defence – Queerah Magazine	No (all urban, developed sites) See Chapter B2 & Chapter B19

Source: EPBC Act Protected Matters Search Tool accessed 3 March 2017. See **Appendix BD** for the full search report.

Relevant provisions are discussed below. The balance are described in **Chapter B2** (Nature Conservation Areas), **Chapter B7** (Marine Ecology), and summarised in **Chapter B19** (EPBC Act Issues).

B8.3.2.b World Heritage Properties (Sections 12 & 15A)

The Protected Matters Search Tool reveals that two World Heritage properties lie within the search area:

- the Great Barrier Reef World Heritage Area (GBRWHA)
- the Wet Tropics of Queensland World Heritage Area (WTWHA).

The values of the GBRWHA are described in detail in **Chapter B19** (EPBC Act Issues). In summary, World Heritage properties are matters of national environmental significance under the EPBC Act, and all World Heritage properties have Outstanding Universal Value (OUV). The concept of OUV underpins the World Heritage Convention which:

> … provides the basis for listing properties on the World Heritage List and protecting and managing World Heritage properties. Broadly, the meaning of Outstanding Universal Value follows the common sense interpretation of the words:
>
> - Outstanding: For properties to be of outstanding universal value they should be exceptional, or superlative – they should be the most remarkable places on Earth.
> - Universal: Properties need to be outstanding from a global perspective. World Heritage does not aim to recognise properties that are remarkable from solely a national or regional perspective. Countries are encouraged to develop other approaches to recognise these places. Australia does this through National Heritage listing.
> - Value: What makes a property outstanding and universal is its 'value', or the natural and/or cultural worth of a property. This is based on standards and processes established under the World Heritage Convention's Operational Guidelines.' (p4).

The four natural environment criteria of the World Heritage Convention are:

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

Great Barrier Reef World Heritage Area

In the vicinity of the Study Area the GBRWHA lies seaward of low water – although the WHA includes all internal waters of the state and, of relevance to the CSD Project, follows low water up Richters and Thomatis Creeks, the Barron River, and Trinity Inlet to the low water mark. Regarding the various Project Areas:

- at the Northern Sands DMPA, the WHA runs up the Barron River to just opposite the south-west corner of the site (approximately 16.863085° S 145.718511°W) (refer to **Figure B8-6**)
- the pipeline crosses the WHA at the mouth of Richters Creek and again near the confluence of Richters Creek and Thomatis Creek (refer to **Figure B8-7**)
- at the Tingira St DMPA, the WHA runs immediately adjacent to the site at low water (refer to **Figure B8-8**).

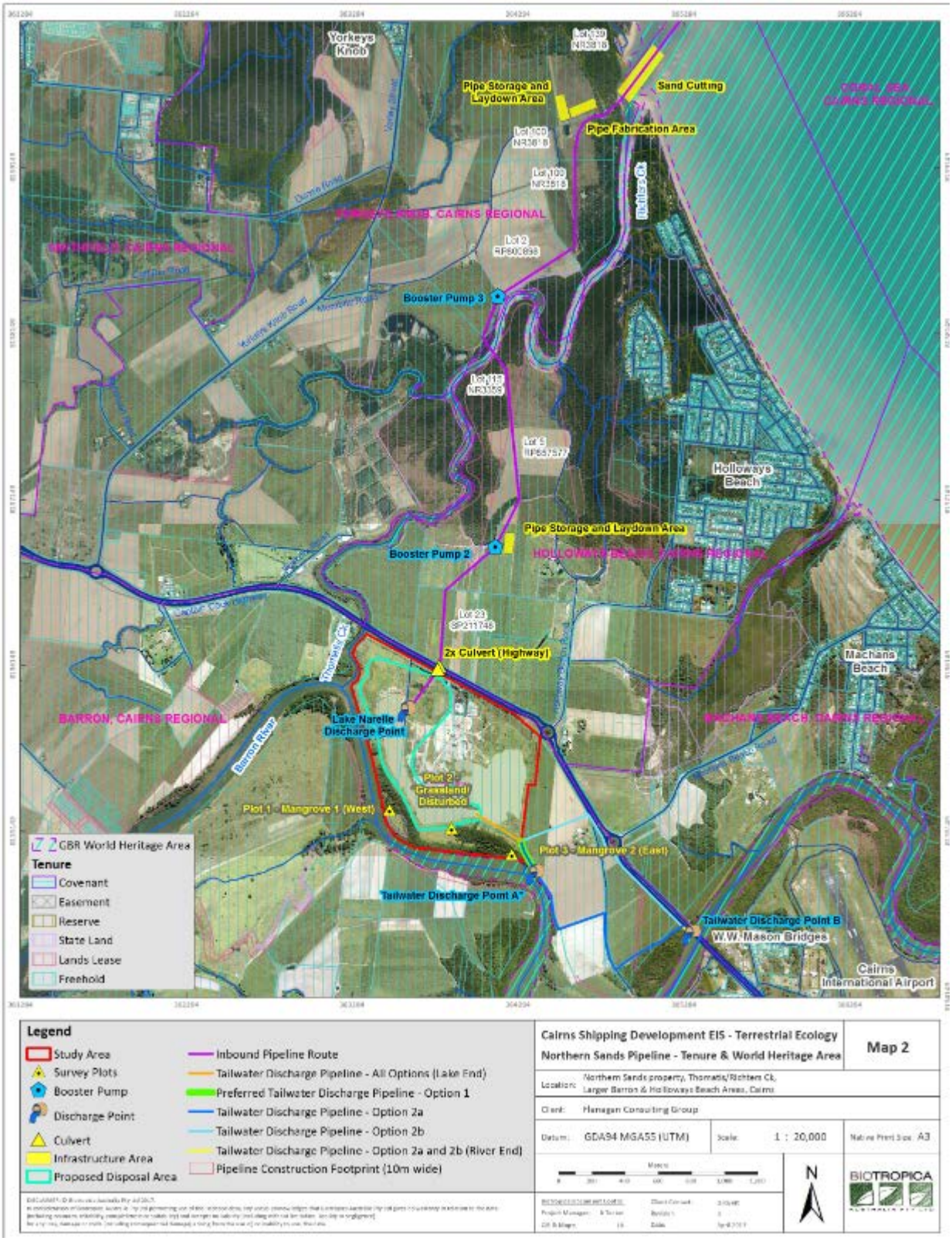


Figure B8-7 GBRWHA in the vicinity of the Northern Sands DMPA and pipeline.

Source: Appendix AM.

Figure B8-8 GBRWHA in the vicinity of the Tingira Street DMPA.

Source: Appendix AM.

For the purposes of impact assessment, the values of the GBRWHA of relevance are those that could be at risk from the works. For the two DMPAs, these are related to ecological processes and in particular water quality and habitat / habitat connectivity. Specifically:

- water quality is assessed in detail in **Chapter B4** (Marine Water Quality) – includes the Barron River and impacts of tailwater discharge and impacts of the Richters Creek crossing
- marine ecology issues are addressed in **Chapter B7** (Marine Ecology)
- habitat / habitat connectivity are discussed later in this chapter in the context of species and landscape connectivity
- as previously noted, a detailed assessment of all MNES is included in **Chapter B19** (EPBC Act Issues).

Wet Tropics of Queensland World Heritage Area

The Protected Matters Search Tool (**Figure B8-5**) reveals that the Wet Tropics of Queensland World Heritage Area (usually simply referred to as the Wet Tropics World Heritage Area or WTWHA) is within the designated search area.

The WTWHA lies outside the Study Area as shown on **Figure B8-6**. Some statistics are relevant:

- Although at its closest, the WTWHA is 3.4 km (upstream) from the Northern Sands DMPA, this is part way up the Kuranda Range Road and there is little if any ecological connection between the two areas at this point, at least from the DMPA to the WHA.
- The WTWHA has stronger but still tenuous connection to the Northern Sands DMPA via the Barron River (it is 5.8 km upstream at its closest point).
- To the east the Grey Peaks NP comes to within 4.5 km of the Tingira Street DMPA but is separated by Trinity Inlet and the East Trinity Reserve.

It is concluded that the WTWHA is sufficiently distant and unconnected to the various project elements that it can be expected to be little impacted by the CSD Project. No further description of values and impacts in this chapter is warranted.

B8.3.2.c National Heritage Places (Sections 15B & 15C)

The Protected Matters Search Tool reveals that three National Heritage Places lie within the search area:

- the Great Barrier Reef
- the Wet Tropics of Queensland
- the Wet Tropics World Heritage Area (Indigenous Values).

According to GBRMPA (2014), while there are specific criteria that apply to the listing of national heritage places, the national heritage listing of the world heritage properties was done on the basis of those values identified by the World Heritage Committee. The national heritage criteria identified as corresponding to those for which a property was world heritage listed are:

- the place has outstanding heritage value to the nation because of the place's importance in the course, or pattern, of Australia's natural or cultural history
- the place has outstanding heritage value to the nation because of the place's possession of uncommon, rare or endangered aspects of Australia's natural or cultural history
- the place has outstanding heritage value to the nation because of the place's potential to yield information that will contribute to an understanding of Australia's natural or cultural history
- the place has outstanding heritage value to the nation because of the place's importance in demonstrating the principal characteristics of:
  - a class of Australia's natural or cultural places or
  - a class of Australia's natural or cultural environments

- the place has outstanding heritage value to the nation because of the place's importance in exhibiting particular aesthetic characteristics valued by a community or cultural group.

The Great Barrier Reef National Heritage Place

The Great Barrier Reef is one of 15 Australian World Heritage places included in the National Heritage List on 21 May 2007. The place has the same boundary as the World Heritage Area.

As was the case for the strategic environmental assessment of the GBR (GBRMPA 2014), for the purposes of this assessment, the values of the GBR national heritage place are taken to correspond to those of the GBRWHA. As a result, these two matters of national environmental significance are addressed together under the discussion on the GBRWHA (see **Section B8.3.2.b**).

The Wet Tropics of Queensland National Heritage Place

The Wet Tropics of Queensland is also one of 15 Australian World Heritage places included in the National Heritage List on 21 May 2007.

For the purposes of this assessment the Wet Tropics of Queensland national heritage place is dealt with together with the WTWHA (see **Section B8.3.2.b**).

The Wet Tropics World Heritage Area (Indigenous Values) National Heritage Place

On 9 November 2012 the Wet Tropics World Heritage Area's Indigenous heritage values were included as part of the existing Wet Tropics of Queensland National Heritage listing. The listing recognises that rainforest Aboriginal heritage is unique to the Wet Tropics and is a remarkable and continuous Indigenous connection with a tropical rainforest environment. To quote the Australian Government website (DoTE 2014):

> The Aboriginal Rainforest People of the Wet Tropics of Queensland have lived continuously in the rainforest environment for at least 5,000 years and this is the only place in Australia where Aboriginal people have permanently inhabited a tropical rainforest environment.
>
> The Aboriginal Rainforest People developed a distinctive cultural heritage determined by their dreamtime and creation stories and their traditional food gathering, processing and land management techniques. Reliance on their traditions helped them survive in this at times inhospitable environment. The distinctiveness of the traditions and technical innovation and expertise needed to process and prepare toxic plants as food and their uses of fire is of outstanding heritage value to the nation and are now protected for future generations under national environmental law.

This amendment added a fifth national heritage criterion to the listing, namely:

> … the place's importance in exhibiting particular aesthetic characteristics valued by a community or cultural group.

As described in **Section B8.3.2.b**, the WTWHA is remote from the site and will not be affected by the development. This applies equally to Indigenous values.

B8.3.2.d Listed Threatened Species (Sections 18 & 18A)

The protected matters search (**Section B8.3.2.a**) reveals that there are 72 listed threatened species in the search area with some being listed as occurring in both project areas. Likelihood of occurrence is as defined in **Section B8.2.7**.

Flora

The protected matters search reveals that there are 19 listed threatened flora species in the Northern Sands Project Area and seven in the Tingira Street Project Area. There are five species that are listed as occurring in both areas (i.e. 21 unique species). Search results (incorporating EPBC Act and NC Act species) are shown in **Appendix AM** (Tables 20 and 21 and APPENDIX 3). Those listed under the EPBC Act only are included in **Table B8-4** below (other species listed under the NC Act are dealt with in **Section B8.3.3.d**).

TABLE B8-4 LISTED THREATENED FLORA (BOTH PROJECT AREAS)

SCIENTIFIC NAME	COMMON NAME	EPBC ACT STATUS	GROWTH FORM	OCCURRENCE LIKELIHOOD *
Alloxylon flammeum	Red silky oak	V	Tree	Unlikely
Archontophoenix myolensis	Myola palm	E	Palm	Unlikely
Cajanus mareebensis	-	E	Trailing herb	Unlikely
Canarium acutifolium var. acutifolium	-	V	Tree	Unlikely
Carronia pedicellata	-	E	Vine	Unlikely
Dendrobium bigibbum (syn. Dendrobium lithocola, Vappodes lithocola)	Cooktown orchid	E	Epiphytic or lithophytic orchid	Unlikely
Dendrobium bigibbum (syn. Vappodes phalaenopsis)	Cooktown orchid	V	Epiphytic or lithophytic orchid	Unlikely
Dendrobium mirbelianum (syn. Durabaculum mirbelianum)	Dark-stemmed antler orchid, Mangrove orchid	E	Epiphytic or lithophytic orchid	Unlikely
Diplazium cordifolium	-	V	Fern	Unlikely
Diplazium pallidum	-	E	Fern	Unlikely
Myrmecodia beccarii	Ant plant	V	Epiphyte	Confirmed, Previously recorded on site
Phaius australis	Lesser swamp-orchid	E	Ground orchid	Unlikely
Phaius pictus	-	V	Ground orchid	Unlikely
Phalaenopsis amabilis subsp. rosenstromii	Native Moth Orchid	E	Epiphytic or lithophytic orchid	Unlikely
Phlegmariurus filiformis (syn. Huperzia filiformis)	Rat's tail tassel-fern	E	Epiphytic fern	Unlikely
Phlegmariurus tetrastichoides	Square tassel-fern	V	Epiphytic fern	Unlikely
Polyphlebium endlicherianum (syn. Crepidomanes endlicherianum)	Middle filmy fern	E	Fern	Unlikely
Polyscias bellendenkerensis	-	V	Shrub to small tree	Unlikely
Sauropus macranthus	Atherton sauropus	V	Shrub	Unlikely
Dendrobium mirbelianum (syn. Durabaculum mirbelianum)	Dark-stemmed antler orchid	E	Epiphytic orchid	Unlikely
Eleocharis retroflexa	-	V	Sedge	Previously recorded on site[1]

Source: Appendix AM (subset of Tables 20 and 21). 1: this was found to be a mis-identification.

* Occurrence likelihood is as defined in **Section B8.2.7**.

Only one listed threatened species (*Myrmecodia beccarii* – Ant plant) was recorded during the site surveys. This species was recorded within the Northern Sands Project Area, specifically within the mangrove vegetation associated with Richters Creek along the delivery pipeline corridor. In addition, two threatened species (*Eleocharis retroflexa* and *M. beccarii*) were recorded near the Tingira Street DMPA during a previous survey (GHD 2012). The following points are relevant:

- *Eleocharis retroflexa.* According to Ports North (A Fletcher pers. comm. 19 May 2017), this was an incorrect identification – subsequent samples from across the Tingira St area were lodged with the Queensland Herbarium for identification. The formal identification was the more common and widespread *Fimbristylis polytrichoides*. In any case, the location of the records was marginally outside of the current Tingira Street DMPA.
- *M. beccarii*. The location of the records was marginally outside of the current Tingira Street DMPA and the species was not recorded during the current field studies.

None of the other species returned in the database searches were considered likely to occur at either site.

Fauna

The protected matters search reveals that there are 84 listed threatened fauna species in the Northern Sands Project Area and 41 in the Tingira Street Project Area. There are 37 species that are listed as occurring in both areas (i.e. 81 unique species). Search results (incorporating EPBC Act and NC Act species) are shown in **Appendix AM (**Tables 22 and 23 and Appendix 3). Those listed under the EPBC Act only are included in **Table B8-5** below (other species listed under the NC Act are dealt with in **Section B8.3.3.d**).

TABLE B8-5 LISTED THREATENED AND MIGRATORY FAUNA (BOTH PROJECT AREAS)

SCIENTIFIC NAME	COMMON NAME	EPBC ACT STATUS	GROWTH FORM	OCCURRENCE LIKELIHOOD *
Actitis hypoleucos	Common sandpiper	MWS	Bird	Possible
Anous stolidus	Common noddy	MMS	Bird	Unlikely
Apus pacificus	Fork-tailed swift	MMB	Bird	Confirmed
Ardenna tenuirostris	Short-tailed shearwater	MMB	Bird	Unlikely
Arenaria interpres	Ruddy turnstone	MWS	Bird	Possible
Calidris acuminata	Sharp-tailed sandpiper	MWS	Bird	Possible
Calidris alba	Sanderling	MWS	Bird	Possible
Calidris canutus	Red knot	E MWS	Bird	Possible
Calidris ferruginea	Curlew sandpiper	CE MWS	Bird	Possible
Calidris melanotos	Pectoral sandpiper	MWS	Bird	Possible
Calidris ruficollis	Red-necked stint	MWS	Bird	Likely to occur
Calidris subminuta	Long-toed stint	MMB	Bird	Possible
Calidris tenuirostris	Great knot	CE MWS	Bird	Possible
Casuarius casuarius johnsonii (southern population)	Southern cassowary (southern population)	E	Bird	Unlikely
Charadrius bicinctus	Double-banded plover	MWS	Bird	Possible
Charadrius leschenaultii	Greater sand plover	V MWS	Bird	Likely to occur
Charadrius mongolus	Lesser sand plover	E MWS	Bird	Possible
Charadrius veredus	Oriental Plover	MWS	Bird	Unlikely
Chlidonias leucopterus	White-winged black tern	MMB	Bird	Possible
Cuculus optatus	Oriental cuckoo	MTS	Bird	May overfly site

SCIENTIFIC NAME	COMMON NAME	EPBC ACT STATUS	GROWTH FORM	OCCURRENCE LIKELIHOOD *
Crocodylus porosus	Salt-water crocodile	MMS	Reptile	Likely to occur
Dasyurus hallucatus	Northern quoll	E	Mammal	Unlikely
Dasyurus maculatus gracilis	Spotted-tailed quoll	E	Mammal	Unlikely
Erythrotriorchis radiatus	Red goshawk	V	Bird	May overfly site
Fregata ariel	Lesser frigatebird	MMS	Bird	Unlikely
Fregata minor	Great frigatebird	MMS	Bird	Unlikely
Fregetta grallaria grallaria	White-bellied storm-petrel (Australasian)	MMS	Bird	Unlikely
Gallinago hardwickii	Japanese snipe	MWS	Bird	Possible
Gallinago megala	Swinhoe's snipe	MWS	Bird	Unlikely
Gallinago stenura	Pin-tailed Snipe	MMB	Bird	Unlikely
Gelochelidon nilotica	Gull-billed tern	MMB	Bird	Confirmed
Hipposideros semoni	Semon's leaf-nosed bat	V	Mammal	Unlikely
Hirundapus caudacutus	White-throated needletail	MTS	Bird	Confirmed
Hirundo rustica	Barn swallow	MTS	Bird	Likely to occur
Limicola falcinellus	Broad-billed sandpiper	MWS	Bird	Possible
Limnodromus semipalmatus	Asian dowitcher	MMB	Bird	Possible
Limosa lapponica baueri	Bar-tailed godwit (baueri), Western Alaskan bar-tailed godwit	V MWS	Bird	Likely to occur
Limosa lapponica menzbieri	Bar-tailed godwit (menzbieri), Northern Siberian bar-tailed godwit	CE MWS	Bird	Possible
Limosa limosa	Black-tailed godwit	MWS	Bird	Likely to occur
Litoria dayi (syn. Nyctimystes dayi)	Australian lacelid	E	Amphibian	Unlikely
Litoria myola	Kuranda tree frog	E	Amphibian	Unlikely
Litoria nannotis	Waterfall frog	E	Amphibian	Unlikely
Litoria nyakalensis	Mountain mistfrog	CE	Amphibian	Unlikely
Litoria rheocola	Common mistfrog	E	Amphibian	Unlikely
Macroderma gigas	Ghost bat	V	Mammal	Unlikely
Melanotaenia eachamensis	Lake Eacham rainbowfish	E	Fish	Unlikely
Mesembriomys gouldii rattoides	Black-footed tree-rat (north Queensland)	V	Mammal	Unlikely
Monarcha melanopsis	Black-faced monarch	MTS	Bird	Likely to occur
Motacilla flava	Yellow wagtail	MTS	Bird	Possible
Myiagra cyanoleuca	Satin flycatcher	MTS	Bird	Likely to occur

SCIENTIFIC NAME	COMMON NAME	EPBC ACT STATUS	GROWTH FORM	OCCURRENCE LIKELIHOOD *
Numenius madagascariensis	Eastern curlew	CE MWS	Bird	Possible
Numenius minutus	Little curlew	MWS	Bird	Likely to occur
Numenius phaeopus	Whimbrel	MWS	Bird	Likely to occur
Onychoprion anaethetus	Bridled tern	MMB	Bird	Possible
Pandion cristatus (syn. Pandion haliaetus)	Eastern osprey	MWS	Bird	Confirmed
Petauroides volans	Greater glider	V	Mammal	Unlikely
Phaethon lepturus	White-tailed tropicbird	MMB	Bird	Unlikely
Phaethon rubricauda	Red-tailed tropicbird	MMB	Bird	Unlikely
Phascolarctos cinereus	Koala	V	Mammal	Unlikely
Philomachus pugnax	Ruff	MMB	Bird	Unlikely
Plegadis falcinellus	Glossy ibis	MMB	Bird	Likely to occur
Pluvialis fulva	Pacific golden plover	MWS	Bird	Likely to occur
Pluvialis squatarola	Grey plover	MWS	Bird	Possible
Pteropus conspicillatus	Spectacled flying-fox	V	Mammal	Confirmed
Rhinolophus robertsi (large form) (syn. Rhinolophus philippinensis)	Greater large-eared horseshoe bat	V	Mammal	Possible
Rhipidura rufifrons	Rufus fantail	MTS	Bird	Confirmed
Rostratula australis (syn. Rostratula benghalensis (sensu lato))	Australian painted snipe	E	Bird	Unlikely
Saccolaimus saccolaimus nudicluniatus	Bare-rumped sheathtail bat	V	Mammal	Possible
Symposiachrus trivirgatus (syn. Monarcha trivirgatus)	Spectacled Monarch	MTS	Bird	Confirmed
Sterna albifrons (syn. Sternula albifrons)	Little Tern	MMS	Bird	Likely to occur
Sterna dougallii	Roseate tern	MMB	Bird	Possible
Sterna hirundo	Common tern	MMB	Bird	Possible
Sterna sumatrana	Black-naped tern	MMB	Bird	Possible
Sula leucogaster	Brown booby	MMB	Bird	Unlikely
Thalasseus bergii	Crested tern	MMB	Bird	Possible
Tringa brevipes (syn. Heteroscelus brevipes)	Grey-tailed tattler	MWS	Bird	Unlikely
Tringa glareola	Wood sandpiper	MWS	Bird	Possible
Tringa incana (syn. Heteroscelus incanus)	Wandering tattler	MWS	Bird	Possible
Tringa nebularia	Common greenshank	MWS	Bird	Likely to occur
Tringa stagnatilis	Marsh sandpiper	MWS	Bird	Likely to occur
Tringa totanus	Common redshank	MMB	Bird	Unlikely

SCIENTIFIC NAME	COMMON NAME	EPBC ACT STATUS	GROWTH FORM	OCCURRENCE LIKELIHOOD *
Tyto novaehollandiae kimberli	Masked owl (northern subspecies)	V	Bird	Unlikely
Xenus cinereus	Terek sandpiper	MWS	Bird	Possible
Xeromys myoides	Water mouse	V	Mammal	Unlikely
Actitis hypoleucos (syn. Tringa hypoleucos)	Common sandpiper	MWS	Bird	Confirmed
Cuculus optatus (syn. Cuculus ussellii)	Oriental cuckoo	MTS	Bird	May overfly site
Pandion cristatus (syn.Pandion haliaetus)	Eastern osprey	MWS	Bird	May overfly site
Sterna albifrons	Little tern	MMS	Bird	Likely to occur

Source: Appendix AM (subset of Tables 22 and 23).

* Occurrence likelihood is as defined in **Section B8.2.7**.

Based on this assessment:

- five species are listed as critically endangered
- 11 as endangered
- 13 as vulnerable
- 64 as migratory species.

Some species are shown as both migratory and listed species. Of these (referring to the search area):

- 11 species are confirmed as occurring
- 15 are likely to occur
- 24 may possibly occur
- 4 may overfly the site
- 31 are unlikely to occur.

Of these, only one listed species was recorded at either project area, the Vulnerable listed *Pteropus conspicillatus* (Spectacled flying-fox). This was recorded foraging in the mangroves on the Northern Sands Project Area in both the wet and dry season ecology surveys.

Overall:

- One threatened fauna species (*Pteropus conspicillatus* (Spectacled flying fox) EPBC – V) was recorded within the Northern Sands project area and Tingira Street study area.
- An additional two threatened species (*Esacus magnirostris* (Beach stone curlew) EPBC – Migratory) and *Crocodylus porosus* (Estuarine crocodile) EPBC – Migratory) were also considered present due to reliable desktop records (Biotropica Australia 2014) or personal communications.
- Essential habitat (see description in **Section B8.4.3.c**) is mapped within the Northern Sands DMPA for one listed species (Casuarius *casuarius johnsonii* (Southern cassowary) although this species is most unlikely to occur.

B8.3.2.e Listed Threatened Communities (sections 18 & 18A)

The Protected Matters Search Tool reveals that two protected ecological communities potentially occur within the project areas. These communities are:

- the Broad leaf tea-tree (*Melaleuca viridiflora*) woodlands in high rainfall coastal far north Queensland (RE equivalents are 7.3.8a, 7.3.8b, 7.3.8c, 7.3.8d, 7.5.4g, 8.3.2, 8.5.2a, 8.5.2c and 8.5.6)
- Littoral rainforest and coastal vine thickets of eastern Australia (RE equivalents are 3.2.1a, 3.2.1b, 3.2.12, 3.2.13, 3.2.28, 3.2.29, 3.2.31, 3.2.11, 3.12.20, 7.2.1a-i, 7.2.2a-h, 7.2.5a, 7.2.6b, 7.11.3b, 7.12.11d, 8.2.2 and 12.2.2).

Figure B8-9 Location of listed threatened ecological communities.

A = Broad leaf tea-tree (*Melaleuca viridiflora*) woodlands in high rainfall coastal north Qld;
B = Littoral rainforest and coastal vine thickets of eastern Australia.

Neither of the listed communities was found to be present in either project area, despite a targeted search. Available mapping (refer **Figure B8-9**) shows the location of these communities as follows:

- the closest example of 'Broad leaf tea-tree (*Melaleuca viridiflora*) woodlands in high rainfall coastal north Qld community' ('A' on the following figure) is 6.2 km north-west of the delivery pipeline corridor
- the closest examples of 'Littoral rainforest and coastal vine thickets community' ('B' on the following figure) occurs approximately 415 m east of the delivery pipeline corridor and 850 m east of the Northern Sands DMPA.

B8.3.2.f Listed Migratory Species (sections 20 & 20A)

The protected matters search reveals that there are 64 migratory species listed under the EPBC Act (along with 61 special least concern species under the NC Act) that are returned from desktop searches as potentially occurring within the combined Northern Sands Project Area and the Tingira Street Project Area. Some of these species are also listed threatened (EVNT - or Endangered, Vulnerable, or Near Threatened) species under the EPBC and NC Acts.

Search results are shown in **Appendix AM** (Tables 22 and 23 and APPENDIX 3).

TABLE B8-6 MIGRATORY SHOREBIRDS RECORDED AT NORTHERN SANDS AND TINGIRA STREET

SPECIES	COMMON NAME	EPBC	NCA	NORTHERN SANDS	TINGIRA STREET
Apus pacificus	Fork-tailed swift	Migratory	Special Least Concern	Present	Not recorded
Actitis hypoleucos	Common sandpiper	Migratory	Special Least Concern	Not recorded	Present
Calidris acuminata	Sharp-tailed sandpiper	Migratory	Special Least Concern	Not recorded	Present
Gelochelidon nilotica	Gull-billed tern	Migratory	Special Least Concern	Present	Not recorded
Hirundapus caudacutus	White-throated needletail	Migratory	Special Least Concern	Present	Present
Gallinago hardwickii	Japanese (syn. Latham's) snipe	Migratory	Special Least Concern	Not recorded	Present
Numenius phaeopus	Whimbrel	Migratory	Special Least Concern	Not recorded	Present
Tringa stagnatilis	Marsh sandpiper	Migratory	Special Least Concern	Not recorded	Present
Pandion cristatus	Eastern osprey	Migratory	Special Least Concern	Present	Not recorded
Rhipidura rufifrons	Rufous fantail	Migratory	Special Least Concern	Present	Not recorded
Symposiachrus trivirgatus	Spectacled monarch	Migratory	Special Least Concern	Present	Not recorded

Source: Appendix AM (Table 44).

The migratory species recorded are principally waders, shore-birds and species typical of wetland and tidal ecosystems, and common aerial species. A number of these species are protected under international conventions and treaties, specifically the Bonn Convention, JAMBA (Japan Australia Migratory Bird Agreement), CAMBA (China Australia Migratory Bird Agreement) and ROKAMBA (Republic of Korea Australia Migratory Bird Agreement). Further discussion on these treaties and agreements is included in **Appendix AM**.

During the surveys *Numenius phaeopus* (Whimbrel) was recorded once at the Tingira Street DMPA. This record was of a single individual. The project area is not of international importance to *N. phaeopus* with much greater numbers utilising the more suitable habitat available at the Cairns Foreshore location which is some 5 km south of the Tingira Street DMPA.

Gallinago hardwickii (Latham's snipe) does not commonly aggregate in large flocks or use the same habitats as many other migratory shorebird species. Consequently, different criteria are used from that shown above to determine important habitat for this species. Within the EPBC guidelines, important habitat for *G. hardwickii* is described as:

- areas that have previously been identified as internationally important for the species, OR
- areas that support at least 18 individuals of the species.

G. hardwickii was recorded at the Tingira Street DMPA Site 2 on each of the six surveys completed in this location. Although there were several individuals recorded during each survey, the maximum number of reliably distinct individuals recorded on the site by the surveyor was 13. In no cases did the number of individuals recorded using the site at one time reach 18 (the critical threshold number), meaning that this site is not of international significance to *G. hardwickii*.

Appendix AM concludes that neither project area is an internationally or nationally important site, nor is it defined 'important habitat' for the 37 migratory shorebird species covered by EPBC Act policy statement 3.21.

B8.3.3 Matters of State Environmental Significance

B8.3.3.a Introduction to MSES

Matters of State Environmental Significance (MSES) are established in the context of the planning framework, under the *Sustainable Planning Act 2009* via the State Planning Policy (SPP). MSES include values that are protected under other Queensland legislation such as:

- *Nature Conservation Act 1992*
- *Marine Parks Act 2004*
- *Fisheries Act 1994*
- *Environmental Protection Act 1994*
- *Regional Planning Interest Act 2014*
- *Vegetation Management Act 1999*.

Table B8-7 below lists the various MSES and indicates applicability to terrestrial ecology and most of these are mapped on **Figure B8-10** and **Figure B8-11**. Relevant matters along with additional figures are discussed in details following the table.

TABLE B8-7 MSES AND APPLICABILITY

MSES CRITERION	RELEVANT TO TERRESTRIAL ECOLOGY
MSES Criterion 1 – State Conservation Areas	
1.1 – Protected Areas	No. No National Parks, Conservation Parks, Forest Reserves, Resource Reserve, State Forests or Timer Reserves exist within the study area. The closest area of protected estate is Greys Peak National Park, which lies 3.5 km to the east of the Wharves. More details and mapping are included in **Chapter B2** (Nature Conservation Areas).
1.2 – Marine Parks	Yes. The Northern Sands delivery pipeline corridor crosses areas mapped as estuarine conservation zone associated with Richters Creek.
1.3 – Fish Habitat Areas	Yes. The Northern Sands delivery pipeline corridor crosses Richters Creek in two locations where there is a mapped FHA (Yorkeys Creek, Type B). The delivery pipeline corridor also runs adjacent to Richters Creek where this FHA is mapped for approximately 150 m.
MSES Criterion 2 – Wetlands and Waterways	
2.1 – High Ecological Significance wetlands on the map of Referable Wetlands	No.
2.2 – High Ecological Value (HEV) wetlands	No.
2.3 – High ecological value (HEV) waterways	No.
2.4 – Strategic Environmental Areas	No.
MSES Criterion 3 – Species	
Threatened wildlife under the Nature Conservation Act 1992 and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006	Yes. Threatened species under the NC Act and special least concern birds have been recorded within both project areas and within the Study Area in general.
MSES Criterion 4 – Regulated Vegetation	
4.1 – Vegetation Management Regional Ecosystems and Remnant Map	Yes. Category B areas on the RVM map are mapped within both project areas and within the Study Area in general.
4.2 – Vegetation Management Wetland Map	No.
4.3 – Vegetation Management Watercourse Map	Yes. Richters Creek, the Barron River, and a small un-named watercourse near Northern Sands are mapped as VMA watercourses. This latter VMA watercourse does not exist (it is inaccurate mapping of the Barron River and is not considered further).
MSES Criterion 5 – Offset areas	
Legally secured offset areas	No.

Source: Study team compilation based on **Appendix AM**.

Relevant MSES are discussed below. Some of these are also described in **Chapter B2** (Nature Conservation Areas), and **Chapter B7** (Marine Ecology).

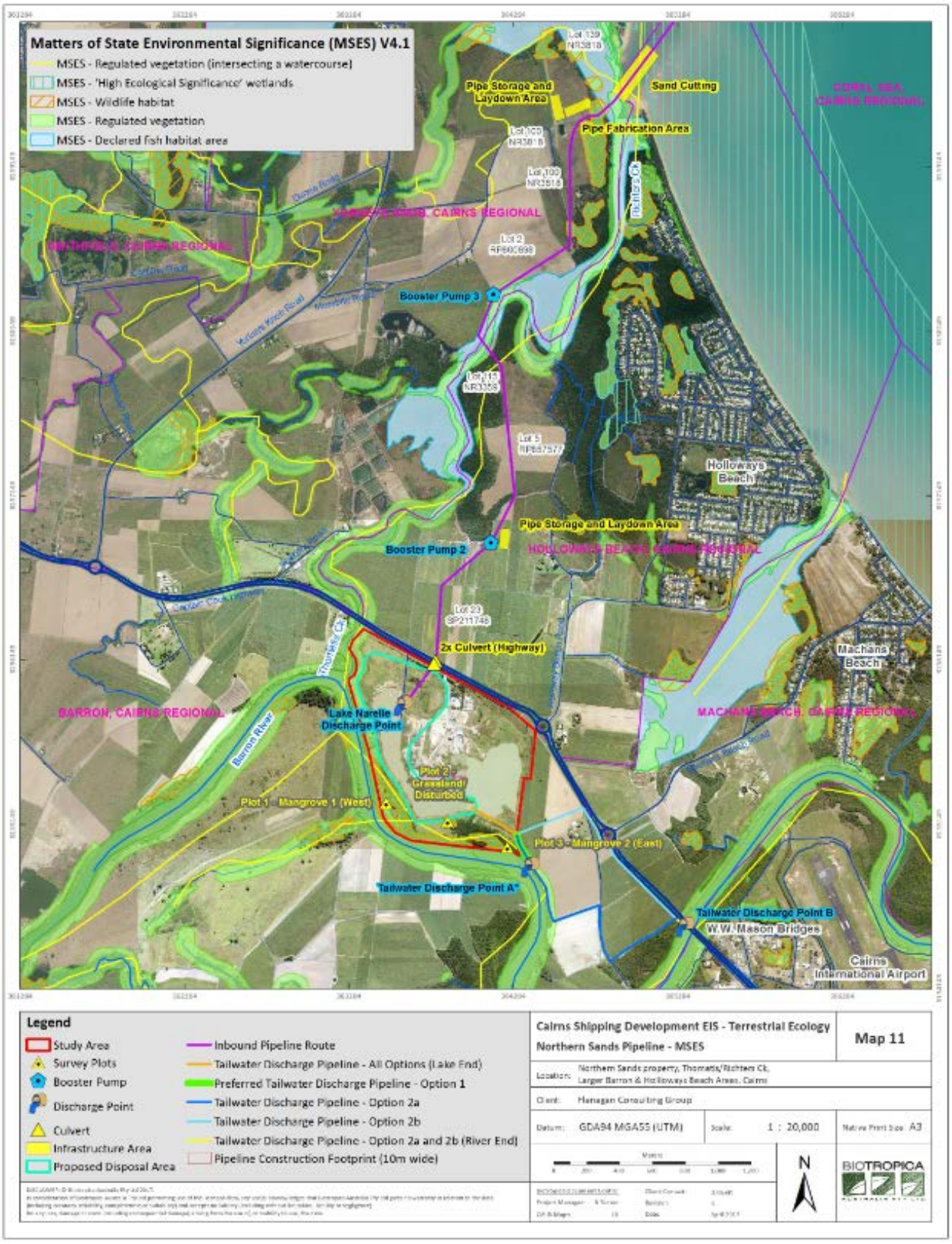


Figure B8-10 Northern Sands Project Area MSES.

Source: Appendix AM. The crossing of the mouth of Richters Creek is referred to above as a 'sand cutting' although the final construction methodology has not been confirmed.

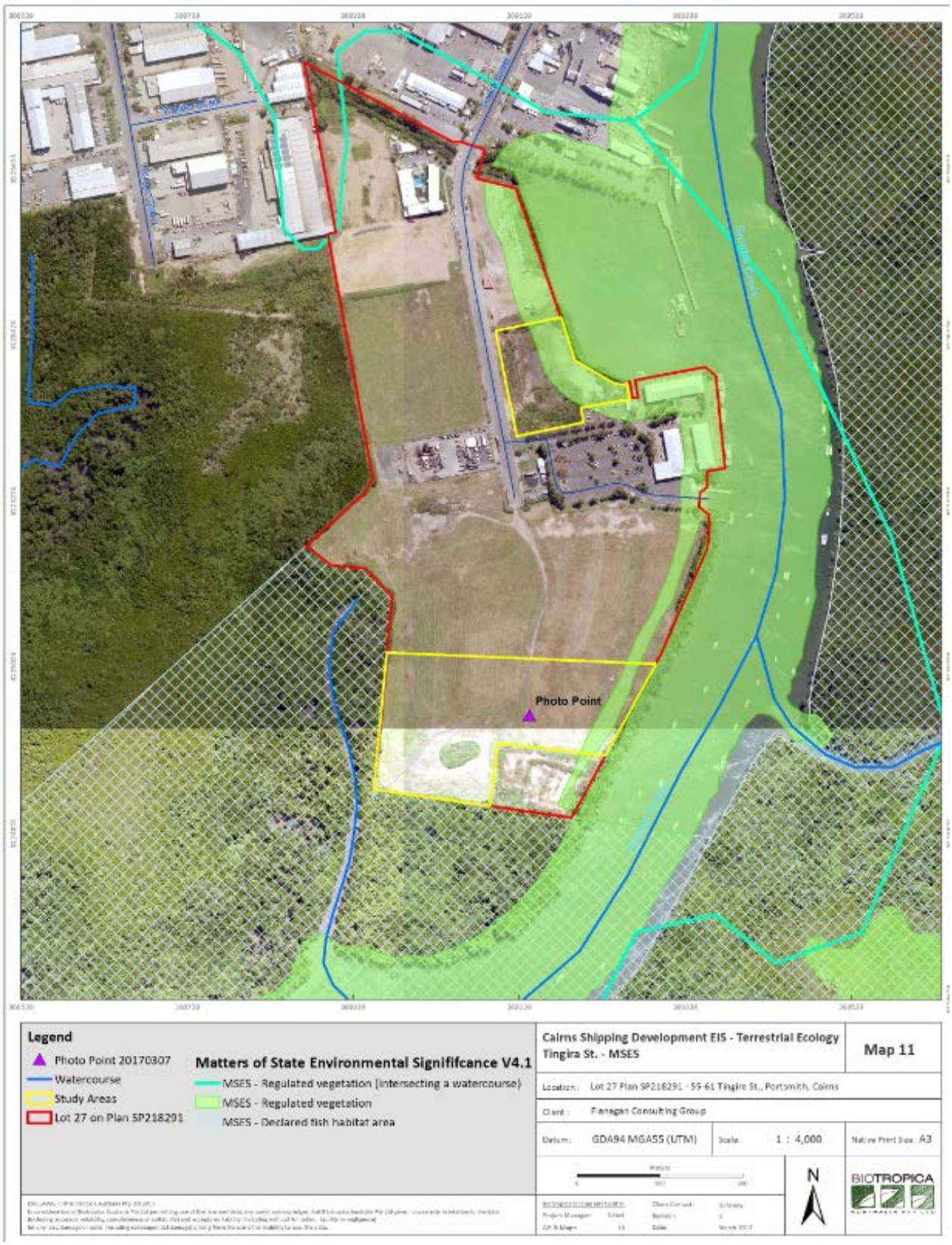


Figure B8-11 Tingira Street Project Area MSES.

Source: Appendix AM.

B8.3.3.b Marine Parks

The Great Barrier Reef Coast Marine Park (GBRCMP) is designated and managed under the *Queensland Marine Parks Act 2004*. It is a State Marine Park that is the same length (north to south) as the Great Barrier Reef Marine Park but differs in its boundaries. The GBRCMP is established over the tidal lands and waters to protect and conserve the values of the natural marine environment whilst allowing for sustainable use. It protects habitats including mangrove wetlands, seagrass beds, mudflats, sandbanks, beaches etc. These two parks are shown on **Figure B8-12**.

Northern Sands

The Northern Sands DMPA and the tailwater outlet pipeline corridor are sufficiently inland that they are not affected by the GBRCMP zoning. However, the delivery pipeline corridor crosses areas mapped as 'estuarine conservation zone' in several places as shown on **Figure B8-12** and **Figure B8-13**.

Tingira Street

The GBRCMP in the vicinity of the Tingira Street DMPA follows the boundary of Lot 27 as shown on **Figure B8-14**.

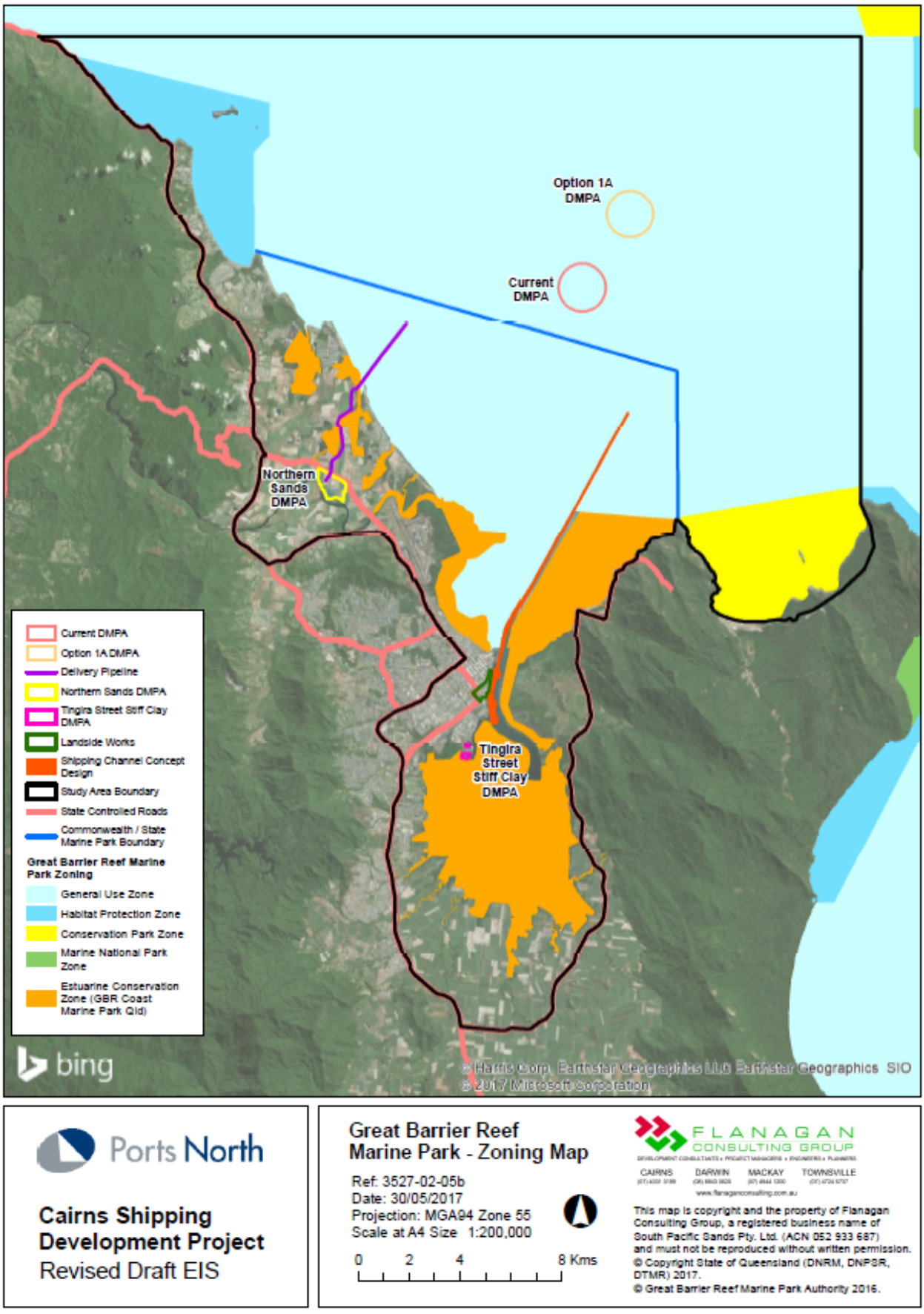


Figure B8-12 GBRMP and GBRCMP zoning – Study Area.

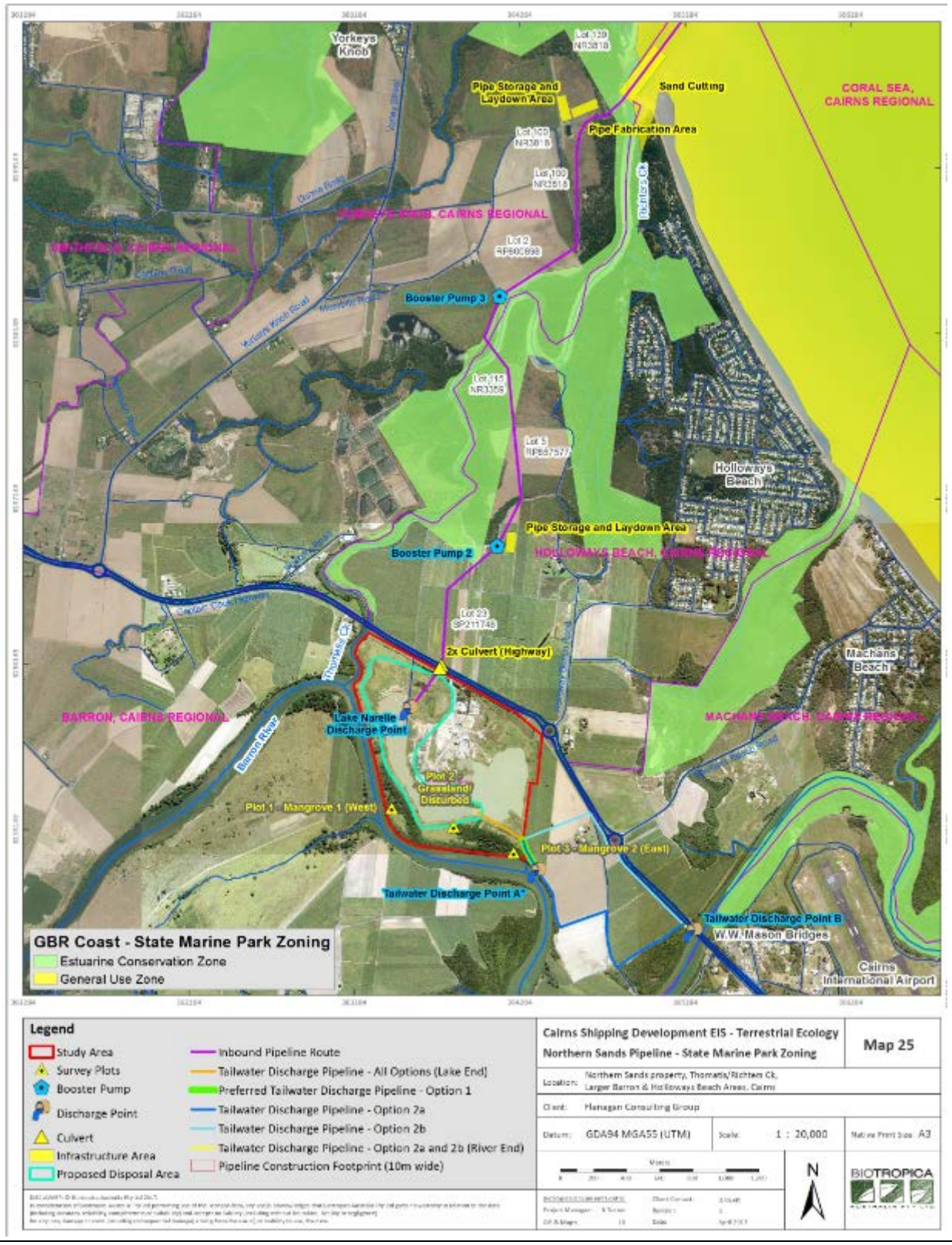


Figure B8-13 Northern Sands Project Area marine park zoning.

Source: Appendix AM. The crossing of the mouth of Richters Creek is referred to above as a 'sand cutting' although the final construction methodology has not been confirmed.

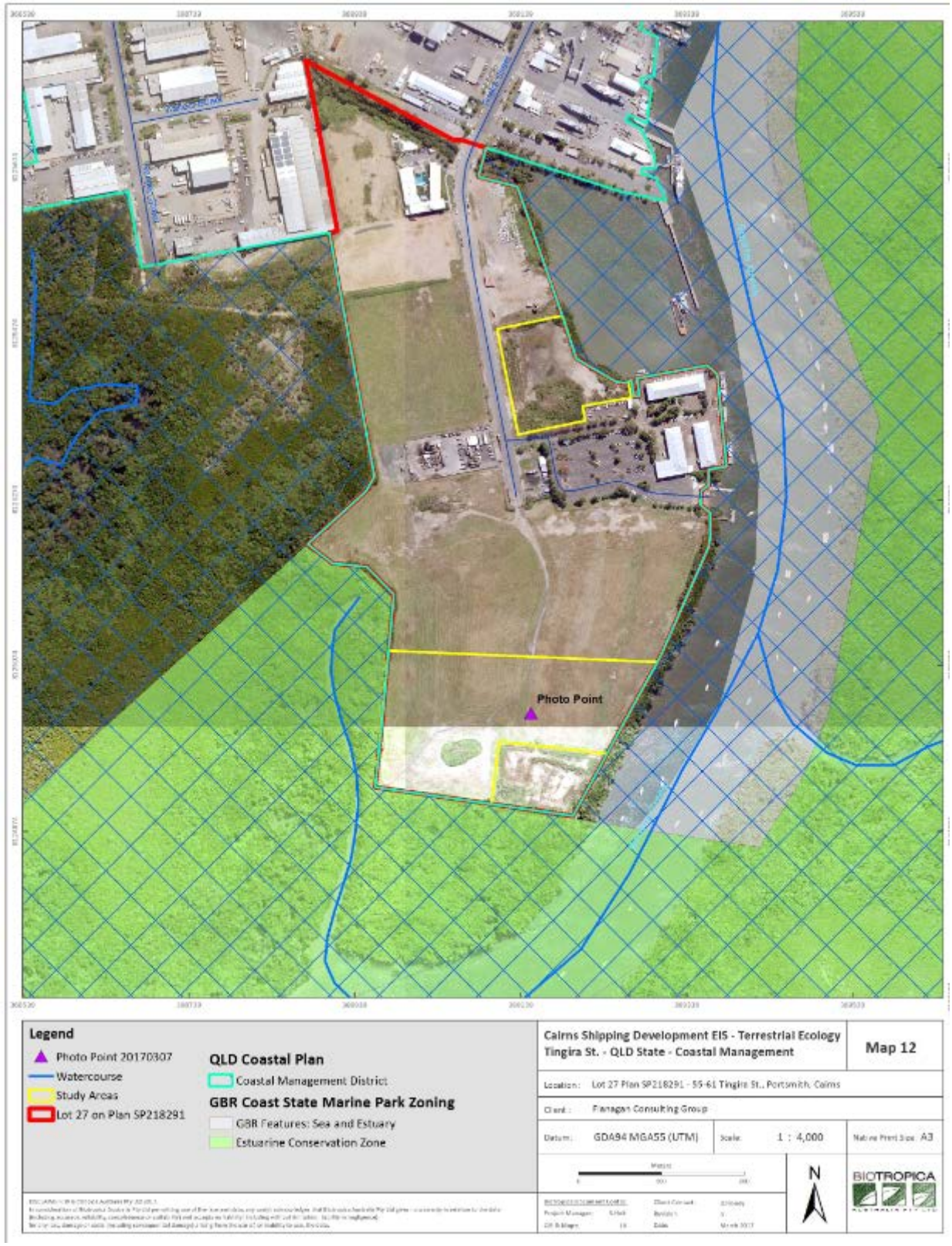


Figure B8-14 Tingira Street Project Area marine park zoning and Coastal Management District.

Source: Appendix AM.

B8.3.3.c Fish Habitat Areas

A Fish Habitat Area (FHA) is a marine protected area under the *Fisheries Act 1994* (Qld) which focuses on protecting natural fish habitats from alteration and degradation by strictly limiting development within and adjacent to the FHA, while allowing for community use and access. FHAs are assigned a management level, either 'A' for very strict management, or 'B' where existing or planned use requires a more flexible management approach.

Northern Sands

The Yorkeys Creek FHA (FHA-034 – Type B) covers the mouth of Yorkeys Creek and Richters Creek and runs up Richters Creek for several kilometres as shown on **Figure B8-10**. This shows that the delivery pipeline corridor crosses the FHA at two locations.

Tingira Street

The Trinity Inlet FHA (FHA-003 – Type B) covers Admiralty Island and areas to the east up much of Trinity Inlet for several kilometres as shown on **Figure B8-11**. This shows that the DMPA abuts the FHA on its southern and western boundary.

B8.3.3.d Threatened Wildlife

Flora

The WILDNET search (**Appendix AM** APPENDIX 3) reveals that there are 25 listed threatened flora species in the Northern Sands Project Area and seven in the Tingira Street Project Area. There are six species that are listed as occurring in both areas (i.e. 26 unique species). Search results (incorporating EPBC Act and NC Act species) are shown in **Appendix AM** (Tables 20 and 21 and APPENDIX 3). Those listed under the NC Act only are included in **Table B8-8** below.

TABLE B8-8 LISTED THREATENED FLORA (BOTH PROJECT AREAS)

SCIENTIFIC NAME	COMMON NAME	NC ACT STATUS	GROWTH FORM	OCCURRENCE LIKELIHOOD *
Acacia hylonoma	-	V	Tree	Unlikely
Alpinia hylandii	-	NT	Herb	Unlikely
Alloxylon flammeum	Red silky oak	V	Tree	Unlikely
Archontophoenix myolensis	Myola palm	E	Palm	Unlikely
Cajanus mareebensis	-	E	Trailing herb	Unlikely
Canarium acutifolium var. acutifolium	-	V	Tree	Unlikely
Carronia pedicellata	-	E	Vine	Unlikely
Dendrobium bigibbum (syn. Dendrobium lithocola, Vappodes lithocola)	Cooktown orchid	E	Epiphytic or lithophytic orchid	Unlikely
Dendrobium bigibbum (syn. Vappodes phalaenopsis)	Cooktown orchid	V	Epiphytic or lithophytic orchid	Unlikely
Dendrobium mirbelianum (syn. Durabaculum mirbelianum)	Dark-stemmed antler orchid, Mangrove orchid	E	Epiphytic or lithophytic orchid	Unlikely
Diplazium cordifolium	-	V	Fern	Unlikely
Diplazium pallidum	-	E	Fern	Unlikely

SCIENTIFIC NAME	COMMON NAME	NC ACT STATUS	GROWTH FORM	OCCURRENCE LIKELIHOOD *
Myrmecodia beccarii	Ant plant	V	Epiphyte	Confirmed Previously recorded on site
Phaius australis	Lesser swamp-orchid	E	Ground orchid	Unlikely
Phalaenopsis amabilis subsp. rosenstromii	Native Moth Orchid	E	Epiphytic or lithophytic orchid	Unlikely
Phlegmariurus filiformis (syn. Huperzia filiformis)	Rat's tail tassel-fern	E	Epiphytic fern	Unlikely
Phlegmariurus tetrastichoides	Square tassel-fern	V	Epiphytic fern	Unlikely
Polyphlebium endlicherianum (syn. Crepidomanes endlicherianum)	Middle filmy fern	V	Fern	Unlikely
Polyscias bellendenkerensis	-	V	Shrub to small tree	Unlikely
Randia audasii	Daintree gardenia	NT	Small tree	Unlikely
Sauropus macranthus	Atherton sauropus	V	Shrub	Unlikely
Senegalia albizioides	Climbing Wattle	NT	Vine	Unlikely
Wetria australiensis		V	Shrub	Unlikely
Zeuxine polygonoides	Velvet Jewel Orchid	V	Terrestrial orchid	Unlikely
Dendrobium mirbelianum (syn. Durabaculum mirbelianum)	Dark-stemmed antler orchid	E	Epiphytic orchid	Unlikely
Eleocharis retroflexa	-	V	Sedge	Previously recorded on site[1]

Source: Appendix AM (subset of Tables 20 and 21). 1: this was found to be a mis-identification.

* Occurrence likelihood is as defined in **Section B8.2.7**.

Only one listed threatened wildlife species (*Myrmecodia beccarii* – Ant plant) (V-NC Act) was recorded during the site surveys. This species was recorded within the Northern Sands Project Area, specifically within the mangrove vegetation associated with Richters Creek and on the Tingira Street site during a previous survey (GHD 2012). None of the other species returned in the database searches were considered likely to occur at either site. These matters are discussed in **Section B8.3.2.d** (MNES) and repeated here as the species are also MSES.

Fauna

The WILDNET search reveals that there are 83 listed threatened fauna species listed threatened flora species (EVNT and Special Least Concern) in the Northern Sands Project Area and 37 in the Tingira Street Project Area. There are 30 species that are listed as occurring in both areas (i.e. 90 unique species). Search results (incorporating EPBC Act and NC Act species) are shown in **Appendix AM** (Tables 22 and 23 and APPENDIX 3). Those listed under the NC Act only are included in **Table B8-9** below.

TABLE B8-9 LISTED THREATENED FAUNA (BOTH PROJECT AREAS)

SCIENTIFIC NAME	COMMON NAME	NC ACT STATUS	GROWTH FORM	OCCURRENCE LIKELIHOOD *
Actitis hypoleucos	Common sandpiper	SLC	Bird	Possible
Anous stolidus	Common noddy	SLC	Bird	Unlikely
Apus pacificus	Fork-tailed swift	SLC	Bird	Confirmed
Ardenna tenuirostris	Short-tailed shearwater	SLC	Bird	Unlikely
Arenaria interpres	Ruddy turnstone	SLC	Bird	Possible
Calidris acuminata	Sharp-tailed sandpiper	SLC	Bird	Possible
Calidris alba	Sanderling	SLC	Bird	Possible
Calidris canutus	Red knot	SLC	Bird	Possible
Calidris ferruginea	Curlew sandpiper	SLC	Bird	Possible
Calidris melanotos	Pectoral sandpiper	SLC	Bird	Possible
Calidris ruficollis	Red-necked stint	SLC	Bird	Likely to occur
Calidris subminuta	Long-toed stint	SLC	Bird	Possible
Calidris tenuirostris	Great knot	SLC	Bird	Possible
Casuarius casuarius johnsonii (southern population)	Southern cassowary (southern population)	E	Bird	Unlikely
Charadrius bicinctus	Double-banded plover	SLC	Bird	Possible
Charadrius leschenaultii	Greater sand plover	SLC	Bird	Likely to occur
Charadrius mongolus	Lesser sand plover	SLC	Bird	Possible
Charadrius veredus	Oriental Plover	SLC	Bird	Unlikely
Chlidonias leucopterus	White-winged black tern	SLC	Bird	Possible
Cuculus optatus	Oriental cuckoo	SLC	Bird	May overfly site
Crocodylus porosus	Salt-water crocodile	V	Reptile	Likely to occur
Cyclopsitta diophthalma macleayana	Macleay's double-eyed fig-parrot	V	Bird	Confirmed
Dasyurus maculatus gracilis	Spotted-tailed quoll	E	Mammal	Unlikely
Erythrotriorchis radiatus	Red goshawk	E	Bird	May overfly site
Erythrura trichroa	Blue-faced parrot-finch	NT	Bird	Likely to occur
Fregata ariel	Lesser frigatebird	SLC	Bird	Unlikely
Fregata minor	Great frigatebird	SLC	Bird	Unlikely
Fregetta grallaria grallaria	White-bellied storm-petrel (Australasian)	SLC	Bird	Unlikely
Gallinago hardwickii	Japanese snipe	SLC	Bird	Possible
Gallinago megala	Swinhoe's snipe	SLC	Bird	Unlikely
Gallinago stenura	Pin-tailed Snipe	SLC	Bird	Unlikely
Gelochelidon nilotica	Gull-billed tern	SLC	Bird	Confirmed
Hipposideros semoni	Semon's leaf-nosed bat	E	Mammal	Unlikely
Hirundapus caudacutus	White-throated needletail	SLC	Bird	Confirmed
Hirundo rustica	Barn swallow	SLC	Bird	Likely to occur

SCIENTIFIC NAME	COMMON NAME	NC ACT STATUS	GROWTH FORM	OCCURRENCE LIKELIHOOD *
Limicola falcinellus	Broad-billed sandpiper	SLC	Bird	Possible
Limnodromus semipalmatus	Asian dowitcher	SLC	Bird	Possible
Limosa lapponica baueri	Bar-tailed godwit (baueri), Western Alaskan bar-tailed godwit	V SLC	Bird	Likely to occur
Limosa lapponica menzbieri	Bar-tailed godwit (menzbieri), Northern Siberian bar-tailed godwit	SLC	Bird	Possible
Limosa limosa	Black-tailed godwit	SLC	Bird	Likely to occur
Litoria dayi (syn. Nyctimystes dayi)	Australian lacelid	E	Amphibian	Unlikely
Litoria myola	Kuranda tree frog	E	Amphibian	Unlikely
Litoria nannotis	Waterfall frog	E	Amphibian	Unlikely
Litoria nyakalensis	Mountain mistfrog	E	Amphibian	Unlikely
Litoria rheocola	Common mistfrog	E	Amphibian	Unlikely
Macroderma gigas	Ghost bat	V	Mammal	Unlikely
Monarcha melanopsis	Black-faced monarch	SLC	Bird	Likely to occur
Motacilla flava	Yellow wagtail	SLC	Bird	Possible
Myiagra cyanoleuca	Satin flycatcher	SLC	Bird	Likely to occur
Numenius madagascariensis	Eastern curlew	V	Bird	Possible
Numenius minutus	Little curlew	SLC	Bird	Likely to occur
Numenius phaeopus	Whimbrel	SLC	Bird	Likely to occur
Onychoprion anaethetus	Bridled tern	SLC	Bird	Possible
Ornithorhynchus anatinus	Platypus	SLC	Mammal	Unlikely
Pandion cristatus (syn. Pandion haliaetus)	Eastern osprey	SLC	Bird	Confirmed
Phaethon lepturus	White-tailed tropicbird	SLC	Bird	Unlikely
Phaethon rubricauda	Red-tailed tropicbird	V	Bird	Unlikely
Phascolarctos cinereus	Koala	V	Mammal	Unlikely
Philomachus pugnax	Ruff	SLC	Bird	Unlikely
Plegadis falcinellus	Glossy ibis	SLC	Bird	Likely to occur
Pluvialis fulva	Pacific golden plover	SLC	Bird	Likely to occur
Pluvialis squatarola	Grey plover	SLC	Bird	Possible
Pteropus conspicillatus	Spectacled flying-fox	V	Mammal	Confirmed
Rhinolophus robertsi (large form) (syn. Rhinolophus philippinensis)	Greater large-eared horseshoe bat	E	Mammal	Possible
Rhipidura rufifrons	Rufus fantail	SLC	Bird	Confirmed
Rostratula australis (syn. Rostratula benghalensis (sensu lato))	Australian painted snipe	V	Bird	Unlikely

SCIENTIFIC NAME	COMMON NAME	NC ACT STATUS	GROWTH FORM	OCCURRENCE LIKELIHOOD *
Saccolaimus saccolaimus nudicluniatus	Bare-rumped sheathtail bat	E	Mammal	Possible
Symposiachrus trivirgatus (syn. Monarcha trivirgatus)	Spectacled Monarch	SLC	Bird	Confirmed
Sterna albifrons (syn. Sternula albifrons)	Little Tern	SLC	Bird	Likely to occur
Sterna dougallii	Roseate tern	SLC	Bird	Possible
Sterna hirundo	Common tern	SLC	Bird	Possible
Sterna sumatrana	Black-naped tern	SLC	Bird	Possible
Sula leucogaster	Brown booby	SLC	Bird	Unlikely
Tachyglossus aculeatus	Short-beaked echidna	SLC	Mammal	Possible
Thalasseus bergii	Crested tern	SLC	Bird	Possible
Tringa brevipes (syn. Heteroscelus brevipes)	Grey-tailed tattler	SLC	Bird	Unlikely
Tringa glareola	Wood sandpiper	SLC	Bird	Possible
Tringa incana (syn. Heteroscelus incanus)	Wandering tattler	SLC	Bird	Possible
Tringa nebularia	Common greenshank	SLC	Bird	Likely to occur
Tringa stagnatilis	Marsh sandpiper	SLC	Bird	Likely to occur
Tringa totanus	Common redshank	SLC	Bird	Unlikely
Tyto novaehollandiae kimberli	Masked owl (northern subspecies)	V	Bird	Unlikely
Xenus cinereus	Terek sandpiper	SLC	Bird	Possible
Xeromys myoides	Water mouse	V	Mammal	Unlikely
Actitis hypoleucos (syn. Tringa hypoleucos)	Common sandpiper	SLC	Bird	Confirmed
Cuculus optatus (syn. Cuculus ussellii)	Oriental cuckoo	SLC	Bird	May overfly site
Esacus magnirostris	Beach stone-curlew	V	Bird	Likely to occur
Pandion cristatus (syn.Pandion haliaetus)	Eastern osprey	SLC	Bird	May overfly site
Sterna albifrons	Little tern	SLC	Bird	Likely to occur
Taphozous australis	Coastal sheathtail bat	NT	Mammal	Unlikely

Source: Appendix AM (subset of Tables 22 and 23).

* Occurrence likelihood is as defined in **Section B8.2.7**.

Based on this assessment:

- 11 species are listed as endangered
- 22 as vulnerable
- 2 as near-threatened
- 66 special least concern / VSLC.

Of these (noting that some species are shown as both migratory and listed species and referring to the overall search area):

- 9 species are confirmed as occurring
- 18 are likely to occur
- 30 may possibly occur
- 4 may overfly the site
- 29 are unlikely to occur.

Of these, only two EVNT species were recorded during the field surveys:

- *Pteropus conspicillatus* (spectacled flying-fox) (V-NC Act)
- *Cyclopsitta diophthalma macleayana* (Macleay's Double-eyed Fig-Parrot (V-NC Act).

Two other species (*Esacus magnirostris* (beach stone-curlew) and *Crocodylus porosus* (estuarine crocodile)) were recorded in the Northern Sands Project Area during the Aquis fauna surveys (Biotropica Australia 2014).

B8.3.3.e Vegetation Management Regional Ecosystems and Remnant Map

The clearing of native vegetation in Queensland is regulated by the *Vegetation Management Act 1999* (VM Act), the *Sustainable Planning Act 2009* (SP Act) and associated policies and codes. Mapping governed by the VM Act gives an indication of the conservation values of remnant natural vegetation.

The remnant vegetation types mapped within the two project areas (including those within the delivery pipeline corridor and the tailwater pipelines corridor) are shown in **Table B8-10**.

TABLE B8-10 REGIONAL ECOSYSTEMS OCCURRING WITHIN THE NORTHERN SANDS PROJECT AREA

REGIONAL ECOSYSTEM	VMA STATUS	BIODIVERSITY STATUS	DESCRIPTION
Northern Sands Study Area			
7.1.1	LC	NoC	Mangrove closed scrub to open forest. Sheltered coastlines, estuaries, and deep swales between dunes, on fine anaerobic silts, inundated with saline water at high tide. (BVG1M: 35a)
7.3.10a	OC	E	Mesophyll vine forest. Moderately to poorly-drained alluvial plains, of moderate fertility. Lowlands of the very wet and wet zone. (BVG1M: 1a)
7.3.25a	OC	OC	Riverine wetland or fringing riverine wetland. *Melaleuca leucadendra* open forest and woodland. Stream levees and prior streams on well-drained sandy clay loam alluvial soils. (BVG1M: 22c)
7.3.28a	OC	E	Riverine wetland or fringing riverine wetland. Open water within natural non-tidal rivers. Rivers and creeks. (BVG1M: 16d)
Northern Sands Delivery pipeline			
7.1.1	LC	NoC	Mangrove closed scrub to open forest. Sheltered coastlines, estuaries, and deep swales between dunes, on fine anaerobic silts, inundated with saline water at high tide. (BVG1M: 35a)
7.2.3b	OC	OC	*Corymbia tessellaris* and *Corymbia clarksoniana* (or *C. intermedia*), woodland to open forest. Beach ridges, predominantly of Holocene age. (BVG1M: 9e)

REGIONAL ECOSYSTEM	VMA STATUS	BIODIVERSITY STATUS	DESCRIPTION
7.3.25a	OC	OC	*Melaleuca leucadendra* +/- vine forest species open forest to closed forest on alluvium fringing streams
Northern Sands Discharge Option 1 (Discharge Point A*)			
None mapped			
Northern Sands Discharge Option 2a			
7.1.1	LC	NoC	Mangrove closed scrub to open forest. Sheltered coastlines, estuaries, and deep swales between dunes, on fine anaerobic silts, inundated with saline water at high tide. (BVG1M: 35a)
Northern Sands Discharge Option 2b			
7.1.1.	LC	NoC	Mangrove closed scrub to open forest. Sheltered coastlines, estuaries, and deep swales between dunes, on fine anaerobic silts, inundated with saline water at high tide. (BVG1M: 35a)

Source: Appendix AM (Table 25).

Northern Sands

The Northern Sands DMPA is mapped as Freehold land and Lake Narelle has no remnant vegetation associated with it. However, there is some remnant vegetation located between the Lake and the Barron River.

The delivery pipeline corridor and tailwater pipelines corridor are variously mapped as Freehold, Lands Lease, State Land and Reserve. There are several categories of remnant vegetation located along the proposed pipeline routes (see **Figure B8-15**).

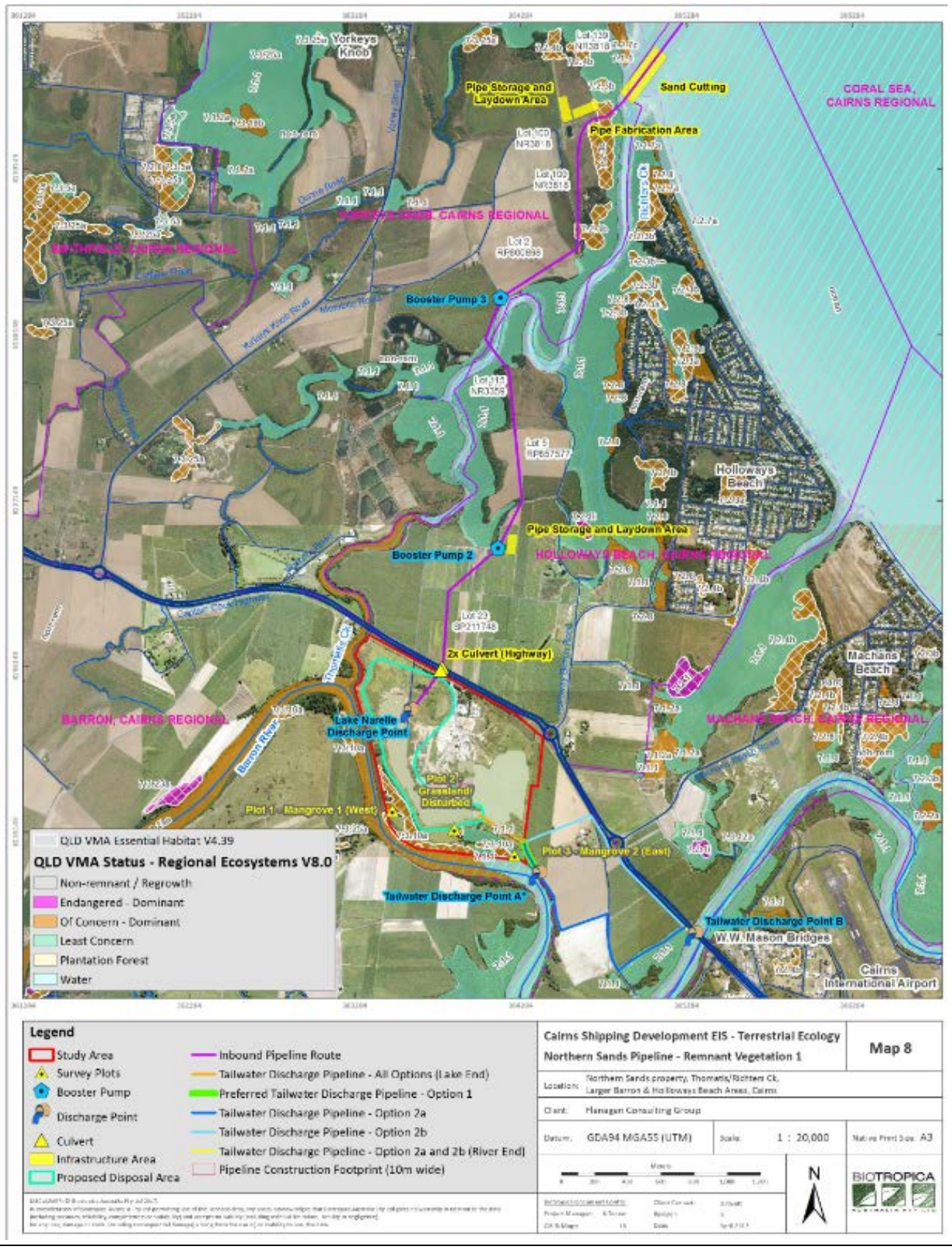


Figure B8-15 Northern Sands Project Area remnant vegetation.

Source: Appendix AM. The crossing of the mouth of Richters Creek is referred to above as a 'sand cutting' although the final construction methodology has not been confirmed.

Tingira Street

The majority of the Tingira Street DMPA is mapped as non-remnant vegetation, however there are some small strips of remnant vegetation (RE 7.1.1) mapped on the boundaries of the site. When overlaid over an aerial photograph of the site, it appears that the vegetation to which this mapping applies is outside of the site boundaries and it is a mapping error due to the scale of the remnant vegetation mapping that makes it appear to be within the DMPA.

There are no good representative examples of remnant REs or REs that are described as having 'medium' or 'low' representation in the protected area estate as defined in the Regional Ecosystem Description Database.

There are no sites containing near-threatened or bio-regionally significant species or essential, viable habitat for near-threatened or bio-regionally significant species.

B8.3.3.f Vegetation Management Watercourse Map

Northern Sands

Watercourses mapped under the VM Act are shown on **Figure B8-16**.

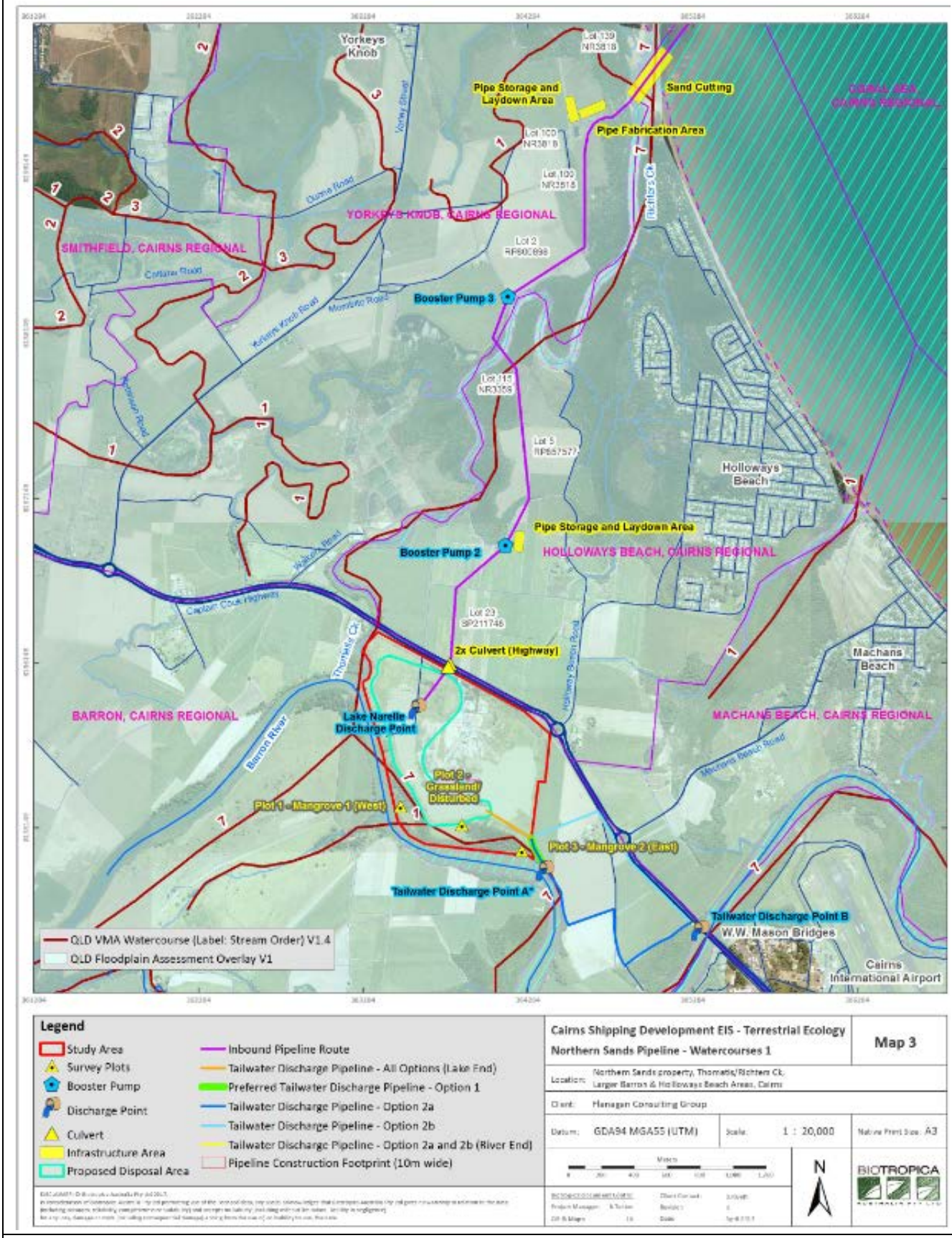


Figure B8-16 Northern Sands Project Area VM Act watercourses.

Source: Source: Appendix AM. The crossing of the mouth of Richters Creek is referred to above as a 'sand cutting' although the final construction methodology has not been confirmed.

This mapping shows that:

- while there is a VM Act watercourse on the south of the site associated with the mangrove vegetation, this is a mapping error (the watercourse is actually the Barron River)
- Richters Creek is a VM Act watercourse – this is crossed by the delivery pipeline corridor in two places
- the Barron River is a VM Act watercourse.

Tingira Street

There are no VM Act watercourses on the Tingira Street Project Area. The nearest is Smiths Creek (**Appendix TS8.1** Map TS3).

B8.3.3.g Marine Plants

Marine plants are defined in the *Fisheries Act 1994* (Fisheries Act) and include mangroves, seagrass, saltwater couch, samphires and algae growing on or adjacent to tidal wetlands. All marine plants, regardless of whether they are alive or dead or whether they grow on freehold, leasehold or unallocated State lands are protected due to their importance in providing food and shelter for fish.

Section 8 of the Fisheries Act provides the following definition of a marine plant.

1. 'Marine plant' includes the following –
   a) A plant (a 'tidal plant') that usually grows on, or adjacent to tidal land, whether it is living or dead, standing or fallen;
   b) The material of a tidal plant, or other plant material on tidal land;
   c) A plant, or material of a plant, prescribed under a regulation or management plan to be a marine plant.

In terms of 'tidal land', HAT for Cairns is 1.86 m above Australian Height Datum (AHD). While the Melaleuca wetland at the mouth of Richters Creek is shown as being just above 0.0 m AHD and is not influenced by the tides, it could be 'adjacent' to tidal land.

The DPI&F Fish Habitat Management Operational Policy FHMOP001 (2007) gives guidance in relation to the determination of 'adjacent' in the above definition. (Note: the Fisheries Act does not define 'adjacent' as it relates to marine plants. In the absence of a definition, this policy describes the application of 'adjacent' in terms of when a marine plant development permit application would be required for disturbance of plants in or adjacent to the tidal zone.) This following definition is extracted from DPI&F (2007):

> High fisheries significance plants are plants that usually grow on or adjacent to tidal land (that have a capacity for connectivity, for example, via seasonal flows during the wet season) and are known to contribute to fisheries productivity. Plants that usually grow on tidal lands include all true mangroves, seagrasses, marine algae, salt couch and samphires. These types of plants would normally occur where there is some tidal influence. These are protected marine plants regardless of their location.
>
> Plants that usually grow adjacent to tidal lands include Melaleuca and Casuarina species. These plants are of value to fisheries productivity, in particular, where Melaleuca swamps adjacent to tidal areas are either permanently or periodically tidally connected. (DPI&F (2007) s10.1)

Northern Sands

The Northern Sands Project Area contains some mangrove marine plants where the delivery pipeline corridor crosses Richters Creek and at tailwater discharge point B.

The other location where marine plants are to be considered within the Northern Sands project area is the mouth of Richters Creek. In this location, the vegetation is mapped as both mangroves (7.1.1) and 7.2.3b (Corymbia woodland on beach ridges). However, as discussed, the site survey more correctly identified this area as a Melaleuca swamp (7.3.25a (riverine wetland) / 7.2.9b (palustrine wetland)). Although it is considered that this Melaleuca swamp has relatively limited value as a fisheries habitat, it does meet the definition shown above and arguably could be defined as containing marine plants. Taking the precautionary principle, the

Melaleuca swamp will be included as a marine plant area for the purposes of the CSD Project.

Northern Sands

At the Tingira Street DMPA, the mangrove species that are regenerating within Site 2 are marine plants. These plants will be cleared as a result of the project. For the purposes of this report, all land within Site 2 that is below HAT is considered to be a marine plant area. In addition, the salt-tolerant grass *Sporobolus virginicus* was recorded on the eastern boundary of Site 1. However this species is likely to only be recorded in this area after significant and consistent rain and is transient at best.

B8.3.3.h Essential Habitat

Essential habitat mapping identifies sites and locations considered to contain important habitat for flora and fauna species of conservation significance. The State uses these essential habitat maps to determine the habitat status of the vegetation when assessing applications to clear. This enables them to fulfil obligations under the VM Act to regulate vegetation clearing in such a way as to prevent the loss of biodiversity.

Essential habitat is only mapped over remnant or regrowth vegetation and is based on one of the following criteria:

- confirmed sightings or records of a species of conservation significance breeding or utilising major habitat resources in that location
- known suitable habitat or resources for a species of conservation significance occurring at a location
- habitat that forms part of a potentially important corridor for a species of conservation significance.

Northern Sands DMPA

Within the Northern Sands project area, the vegetation between Lake Narelle and the Barron River and vegetation that is crossed by the delivery pipe near the mouth of Richters Creek are partially mapped as essential habitat for the Southern cassowary (*Casuarius casuarius johnsonii).* Neither of the discharge options involves intersecting any essential habitat (see **Appendix AM** Maps NS13 & P11).

Tingira Street DMPA

There is no essential habitat mapped on the Tingira Street site.

B8.3.4 Other Commonwealth Matters

In addition to MNES, there are other non-statutory matters relevant to terrestrial ecology that are of interest to the Commonwealth Government. These are described below.

B8.3.4.a Directory of Nationally Important Wetlands

The Directory of Nationally Important Wetlands is a non-statutory recognition of the importance of some wetlands. The Directory identifies nationally important wetlands, and provides a knowledge base of the variety of wetlands and the many fauna and flora species that depend on them. A wetland may be considered nationally important if it meets at least one of the following criteria:

2. It is a good example of a wetland occurring within a biogeographic region in Australia
3. It is a wetland that plays an important ecological or hydrological role in the natural functioning of a major wetland system / complex
4. It is a wetland that is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail
5. The wetland supports 1% or more of the national populations of any native plant or animal taxa
6. The wetland supports native plant or animal taxa or communities which are considered endangered or vulnerable at the national level
7. The wetland is of outstanding historical or cultural significance.

Northern Sands Project Area

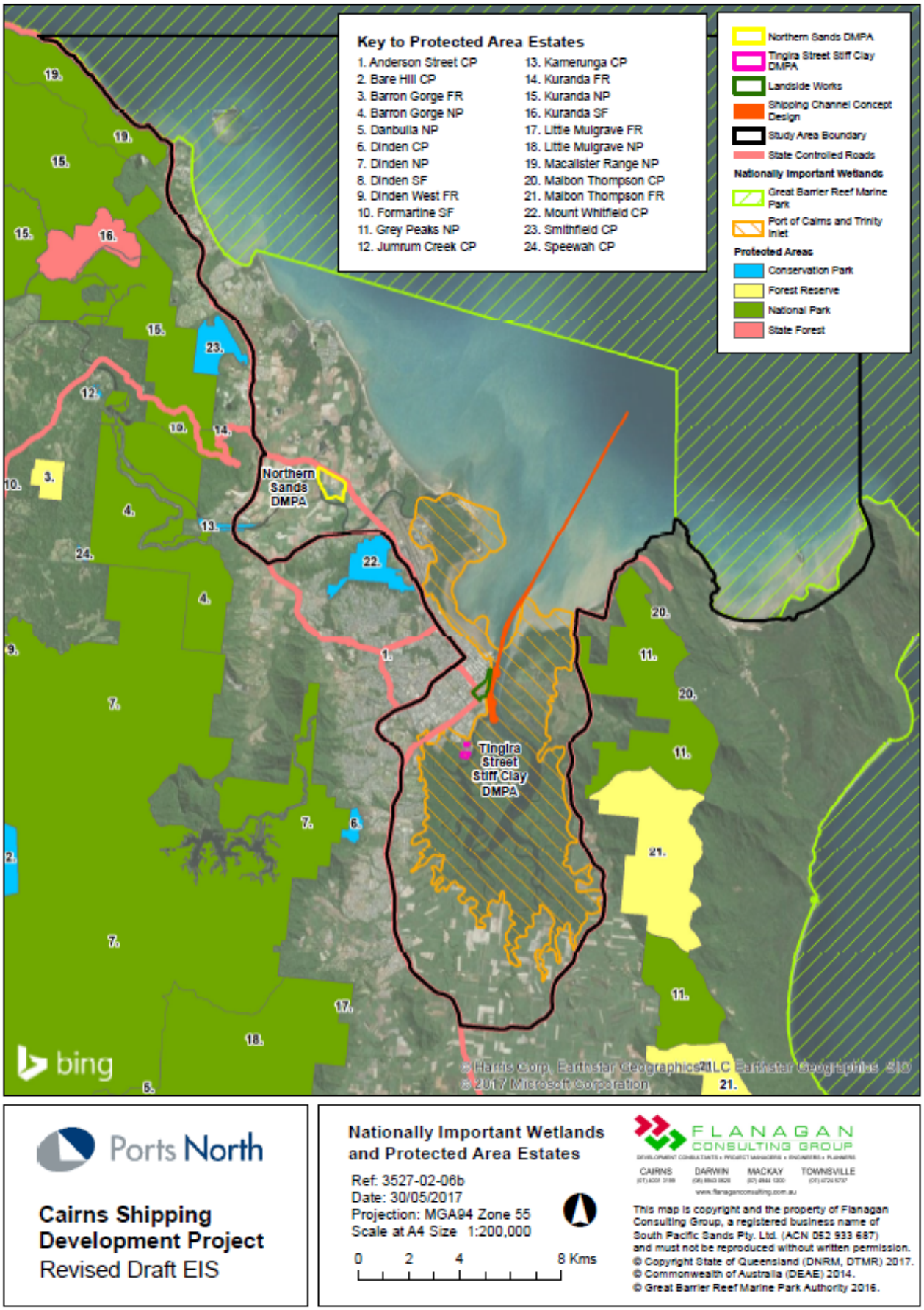
There are no wetlands listed in the Directory of Nationally Important Wetlands that will be impacted by works in the Northern Sands Project Area. The nearest wetland to the project area which is listed in the Directory of Nationally Important Wetlands is the Port of Cairns and Trinity Inlet which is approximately 2.9 km to the south-east.

Tingira Street Project Area

The whole of the Tingira Street Project Area is part of the Port of Cairns and Trinity Inlet Wetland of National Importance (see Figure B8-17).

The project area represents only a small part (0.41%) of the larger Port of Cairns and Trinity Inlet Wetland which covers approximately 6410 ha. The criteria that the Port of Cairns and Trinity Inlet meets for inclusion in this Directory are 1, 2 and 3 in the above list.

While Wetlands of National Importance are not specifically protected under legislation, they do give an indication of an area's environmental value and are often considered during assessment of projects.



Ports North

Cairns Shipping Development Project
Revised Draft EIS

Nationally Important Wetlands and Protected Area Estates

Ref: 3527-02-06b
Date: 30/05/2017
Projection: MGA94 Zone 55
Scale at A4 Size 1:200,000

0 2 4 8 Kms

FLANAGAN CONSULTING GROUP
CAIRNS DARWIN MACKAY TOWNSVILLE

Figure B8-17 Protected Estate and Nationally Important Wetlands.

B8.3.4.b Weeds of National Significance

Weeds are also of concern at the Commonwealth level. Refer to **Section B8.3.7** where Commonwealth-listed and other species of exotic flora are discussed.

B8.3.5 Other State Matters

In addition to MSES, there are other non-statutory matters relevant to terrestrial ecology that are of interest to the Queensland Government. These are described below.

B8.3.5.a FNQ Regional Plan

The Far North Queensland Regional Plan 2009-2031 State Planning Regulatory Provisions were repealed on 26th October 2012. However the associated mapping showing areas of 'high' and 'general' environmental significance (HES and GES respectively) is still a useful guide to the ecological values of the areas on a regional scale. These classifications are identical to wetlands under the EP Act (**Section B8.3.5.c**).

The areas of HES are based on protected areas, world heritage areas, high value wetland (using the AquaBAMM assessment methodology), areas of essential habitat and of concern and endangered regional ecosystems. The mapped areas of GES are based on wetland areas (other than the high value wetlands) and remnant vegetation other than the 'Of Concern' and 'Endangered' regional ecosystems.

The aim of the mapping of these HES and GES are to assist the objective that urban development should be located outside of these areas, or located and designed to minimise impacts and offset residual impacts in these areas.

Areas of HES and GES are associated with the remnant vegetation on the Northern Sands Project Area and the Tingira Street Project (see **Figure B8-18** and **Figure B8-19**), with some overlap areas being a function of mapping polygon overlay offset error, as exemplified on **Figure B8-19**.

These maps show that neither project area is within an area mapped as HES.

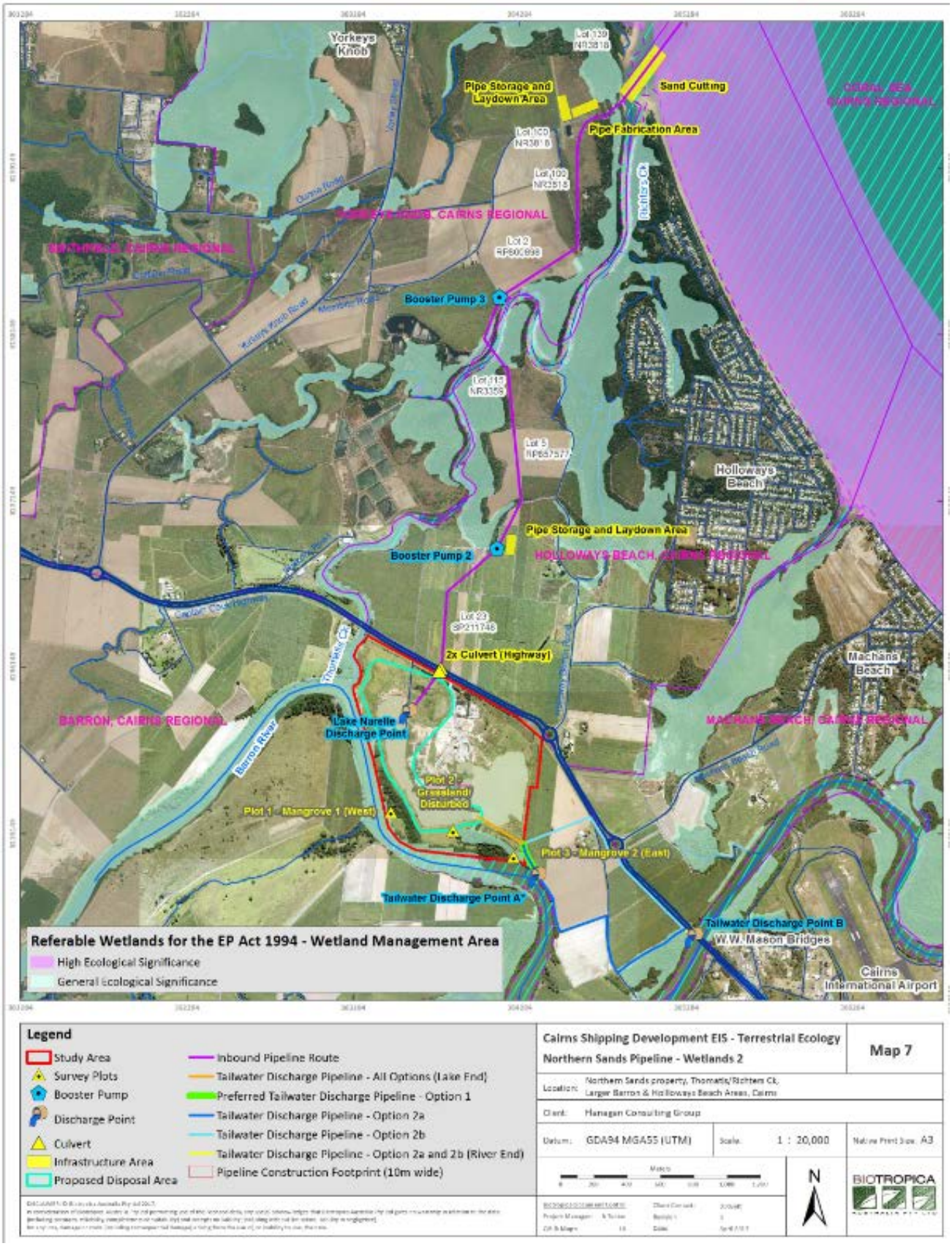


Figure B8-18 Northern Sands Project Area wetlands.

Source: Appendix AM. The crossing of the mouth of Richters Creek is referred to above as a 'sand cutting' although the final construction methodology has not been confirmed.

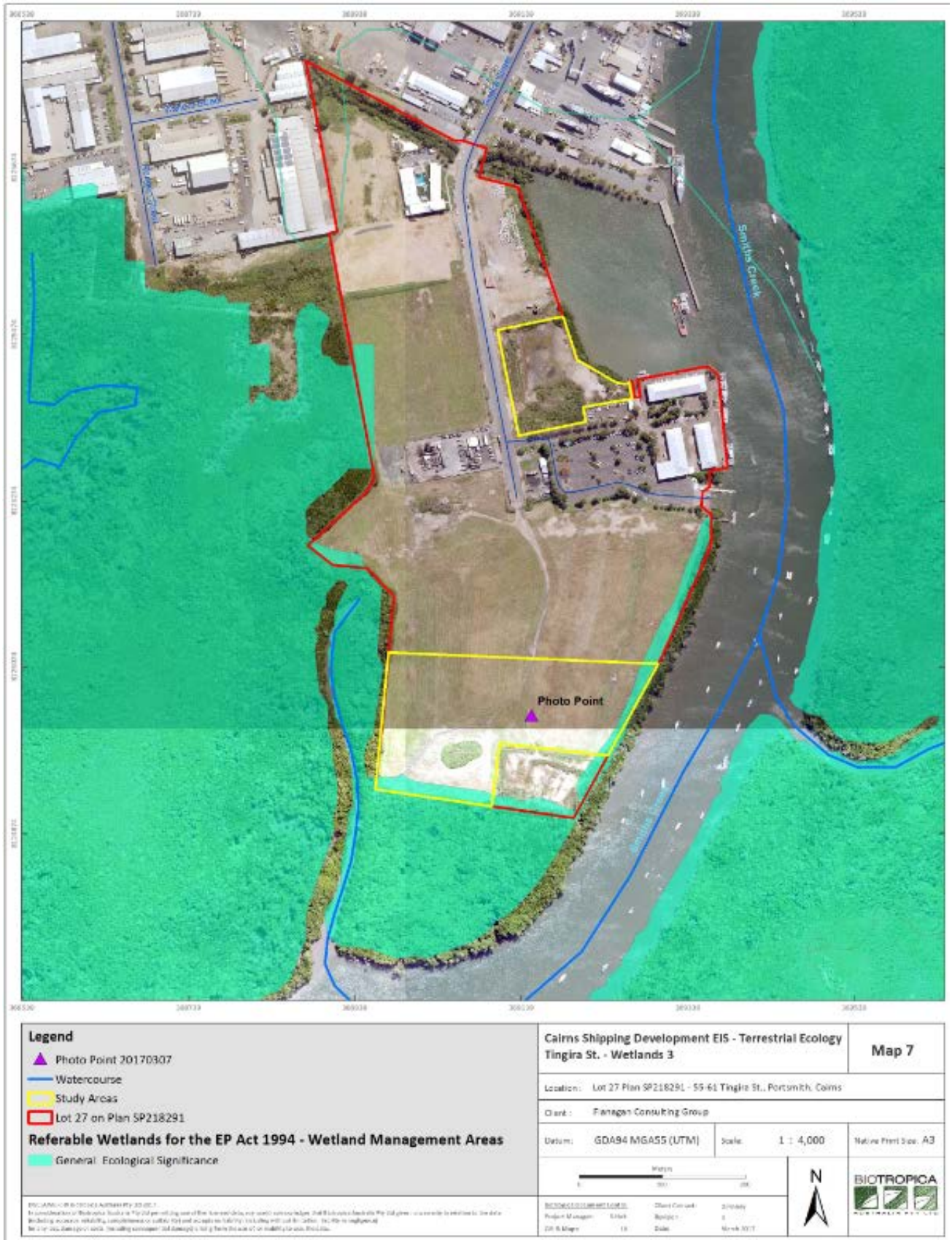


Figure B8-19 Tingira Street Project Area wetlands.

Source: Appendix AM.

B8.3.5.b Weeds of State Significance

Weeds are also of concern at the state level Refer to **Section B8.3.7** where state-listed and other species of exotic flora are discussed.

B8.3.5.c Wetlands

***Environmental Protection Regulation 2008* – Referable Wetlands**

Map of Referrable Wetlands

The Queensland Government is committed to the statutory protection of wetlands in catchments adjoining the Great Barrier Reef lagoon. They seek to ensure that development is planned, designed, constructed and operated so as not to cause harm to the hydrology of wetlands in wetland protection areas that protect matters national and state environmental significance including the outstanding universal values of the Great Barrier Reef. Under SPA, SDAP Module 11 enacts this protection.

The map of referable wetlands identifies the location of wetland protection areas (WPA) in Great Barrier Reef catchments. WPAs include a wetland surrounded by a 100 m trigger area within urban areas and a 500 m trigger area within rural areas.

There are no WPA or associated trigger areas within either project area (the nearest WPA trigger area is approximately 85 m east of part of the Northern Sands delivery pipeline corridor).

Ecological Significance of Wetlands

Wetlands are also assessed for ecological significance using the environmental values for wetlands in Section 81A of the EPR. Wetlands are considered either High Ecological Significance (HES) or of General Ecological Significance (GES) based on their environmental values. There are no trigger areas associated with these wetlands. These classifications are identical to wetlands under the FNQ Regional Plan 2009-2031 (**Section B8.4.6.a**)

The Study Area contains the following GES wetlands:

- Tingira Street DMPA – across the remnant vegetation communities that border Smiths Creek
- Northern Sands Project Area:
  - Northern Sands DMPA – the vegetation associated with the Barron River
  - delivery pipeline corridor – crosses wetlands associated with Richters Creek and the mouth of Richters Creek
  - tailwater discharge pipeline (Option 2) – crosses a mapped wetland
  - tailwater discharge pipeline (Option 2) – does not cross any mapped GES wetlands.

Other wetland mapping

Lake Narelle (Northern Sands DMPA) is mapped under the Queensland wetland mapping programme as a ‘Lacustrine wetland’. This mapping classifies all waterbodies and does not distinguish between natural and artificial waterbodies, nor classify for ecological importance of the ‘wetland’. The Queensland wetland mapping is a non-statutory mapping layer.

Lake Narelle is currently used as an approved sand quarry and the existing void is approved for the disposal of inert construction and demolition waste. The void contains water from groundwater seepage and rainfall. However it displays low ecological values due to the site based and surrounding area levels of anthropogenic disturbance.

B8.3.5.d Groundwater Dependent Ecosystems

Groundwater Dependent Ecosystems (GDEs) include:

- ecosystems that may rely on the surface expression of groundwater, including surface water ecosystems that may have a groundwater component, such as rivers, wetlands and springs
- ecosystems that may rely on the subsurface presence of groundwater (Sinclair Knight Merz 2011a, b).

Information on potential groundwater dependent ecosystems is available from the National Atlas of Groundwater Dependent Ecosystems. Based on information from this atlas, the potential for groundwater dependent ecosystems in surface water bodies and for vegetation in the Northern Sands Project Area is shown on **Figure B8-20**. There are no GDEs in the vicinity of the Tingira Street Project Area.

CDM Smith (quoted in Biotropica 2014) note the following in relation to the GDEs of the Barron River delta:

- Shallow groundwater occurs within the Quaternary sediments of the Barron River Delta and alluvium, also known as the Northern Beaches Aquifers. This aquifer is a potentially significant regional groundwater resource, although it has not been studied as extensively as the Mulgrave River Alluvium located to the south of Cairns (AGE 2007).
- Recharge to the water table is thought to occur via diffuse rainfall infiltration across the delta area. The first storm events of each wet season usually generate large amounts of runoff but as wet seasons progress subsequent rainfall results in deeper wetting of the soil, which facilitates greater infiltration and groundwater recharge (AGE 2007).

The presence of GDEs was assessed by Golder Associates (2017) as part of the input into **Chapter B6** (Water Resources).

Figure B8-20 indicates the presence of vegetation with a high potential for groundwater interaction between Narelle Lake and the Barron River along the western and southern boundaries of the lake. The reaches of Thomatis Creek and Barron River in the vicinity of the Northern Sands site are indicated to have moderate potential for groundwater interaction. According to Biotropica Australia (2016), surface GDEs are extensive, covering large parts of the Lake Narelle system, in addition to (some but not all) riparian vegetation fringing the Barron River, and the Barron River itself.

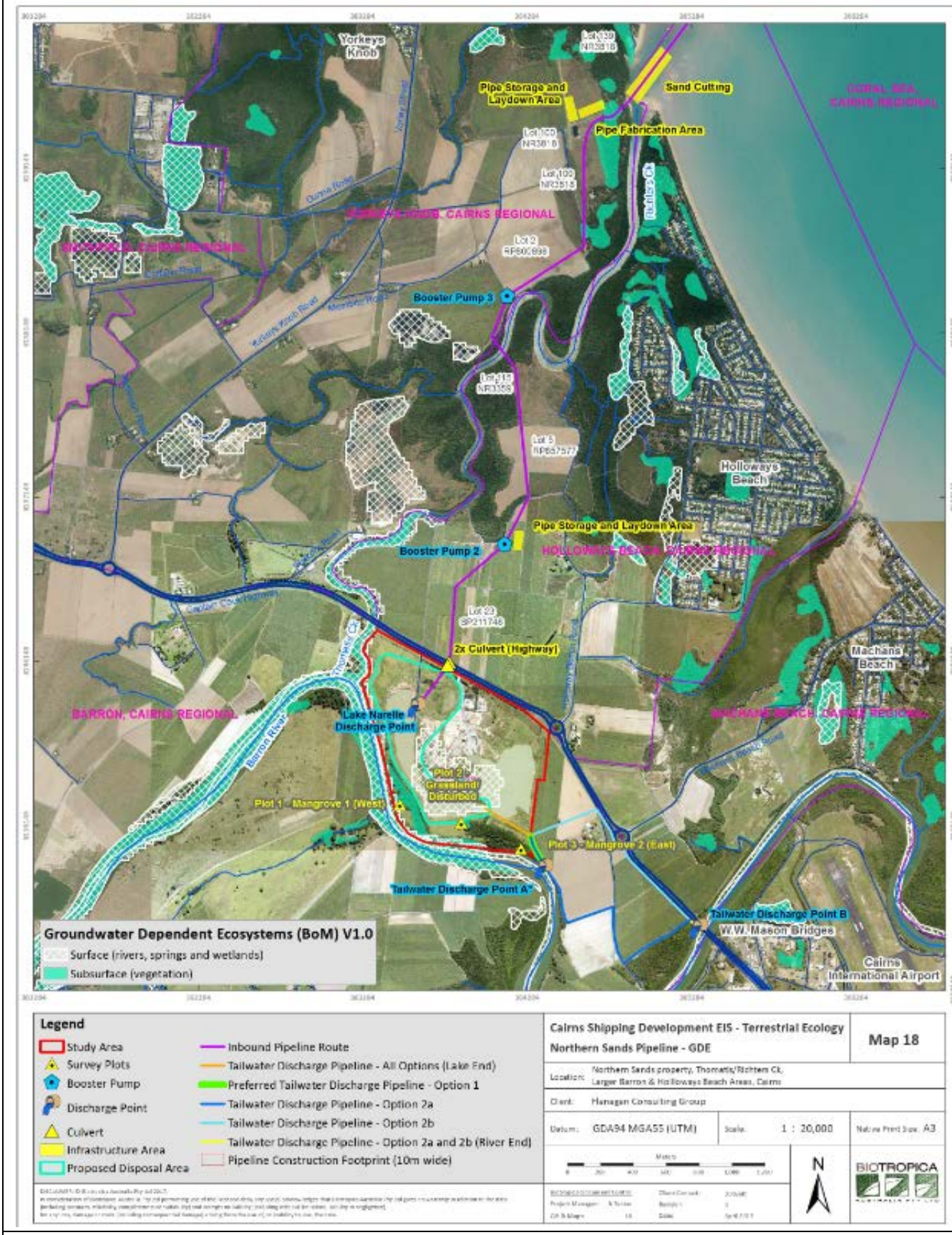


Figure B8-20 Groundwater dependent ecosystems in the Northern Sands Project Area.

Source: Appendix AM. The crossing of the mouth of Richters Creek is referred to above as a 'sand cutting' although the final construction methodology has not been confirmed.

The interaction of groundwater and these GDEs is assessed in **Chapter B6** (Water Resources). Reference is made to the findings in this chapter in the discussion of impacts (**Section B8.4**).

B8.3.5.e Waterways Under the *Fisheries Act 1994* (Qld)

Certain waterways are regulated under the *Fisheries Act 1994* (Qld) (Fisheries Act) to regulate impacts on fish passage. The associated mapping provides an indication of the fisheries values of the waterway and is used as part of the operational works stage of a project. Waterway Barrier Works are deemed to be MSES under the *Environmental Offsets Act 2014 (Qld)* but not under the SPP.

Northern Sands

As shown on **Figure B8-21** below, the delivery pipeline corridor will cross sections of Richters Creek mapped as Major (Estuary).

Tingira Street

The Tingira Street Project Area is adjacent to Smiths Creek mapped as Major (Estuary). (**Appendix AM** Map T4).

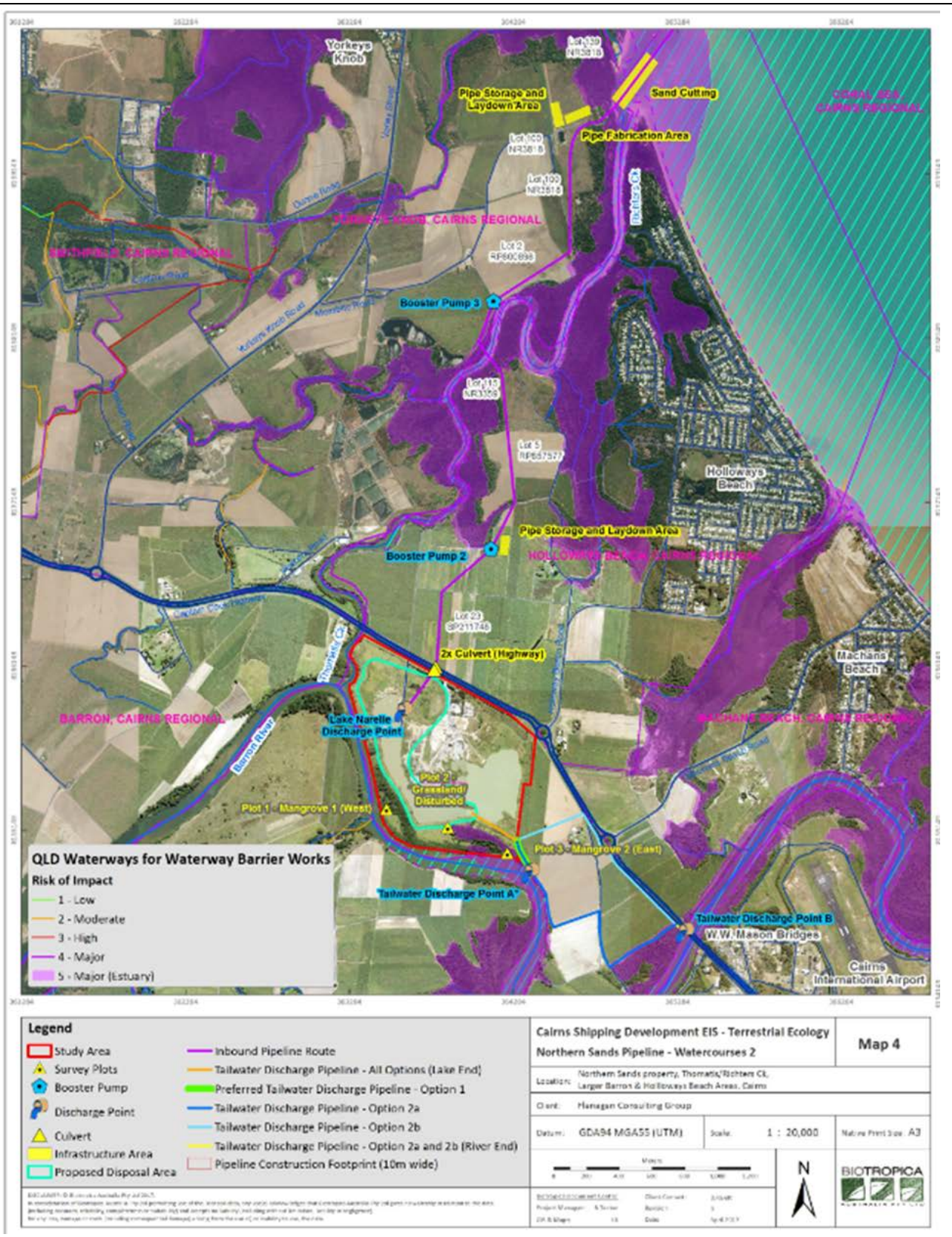


Figure B8-21 Northern Sands Project Area waterways (Fisheries Act designations).

Source: Appendix AM. The crossing of the mouth of Richters Creek is referred to above as a 'sand cutting' although the final construction methodology has not been confirmed.

B8.3.6 Wildlife Corridors and Connectivity

Wildlife corridors allow movement and dispersal of wildlife across large geographical areas. They are often made up of smaller (stepping stone) or connected linear patches of habitat that provide connectivity to large or important habitat patches throughout the landscape. They provide for both fauna movement and dispersal as well as flora dispersal.

The Study Area is not within any national, state or regional corridors recognised by the Commonwealth Government (SEWPaC 2012a; DEH 2011). However, there are state significant ecological corridors throughout the Cairns region which support a high to very high level of species richness (DEH 2011).

The two project areas are both located within the Cairns City environs separated by about 10 km. The intervening land is an urban landscape which includes Cairns City centre and suburbs. There is no direct terrestrial connectivity between the two areas. However both project areas are connected to the waters of the Great Barrier Reef (through Smiths Creek at Tingira Street, and via the Barron River and Thomatis / Richters Creeks at Northern Sands).

While the habitats provided by the two project areas are quite different, both have mangroves associated, and both provide some habitat for migratory and wading birds. Although both areas are used by migratory shorebird species, with the Tingira Street study area recording a significant collection of migratory species, the habitats on the sites are not unique, rare in the landscape, or well connected to other areas of habitat. There are no movement corridors of significance that incorporate either of the study areas and the project will not change any barriers to movement for any species.

With the exception of the GBRWHA, there are no protected areas located within or close to the boundaries of the two project areas. There are no sites containing any special ecological values e.g., high habitat diversity or areas of high endemism. There are no buffer areas to a protected area, nor important habitat corridors between protected areas within the likely zone of influence. There are no declared areas of major interest or critical habitat declared under the NC Act, nor declared areas of high nature conservation value or areas vulnerable to land degradation under the VM Act within the likely zone of influence.

In terms of corridors for migratory birds, the Cairns area contains has internationally recognised habitats (see the discussion on the East Asia – Australasian Flyway in **Section B8.3.2.f**). However, neither project area is included in the recognised habitat.

B8.3.7 Exotic Flora

B8.3.7.a Listed Weeds

A full list of weeds present is presented in **Appendix AM** (APPENDIX 4). Listing categories give an appreciation of the degree of threat that these weeds pose to ecological values as described later in this section.

Northern Sands Project Area

The Northern Sands Project Area contains abundant weed flora (64 species). Exotic species in the mangrove-dominated areas are confined to the margins with no species able to penetrate into the more intact portions of these areas. Listed exotic flora found in the Northern Sands Project Area are shown below in **Table B8-11**. Of these, five species are considered serious and invasive weed species. The majority of weed species were recorded within the Northern Sands DMPA while only Singapore daisy (*Sphagneticola trilobata*) was found in the delivery pipeline corridor.

TABLE B8-11 LISTED EXOTIC FLORA OF THE NORTHERN SANDS PROJECT AREA

SPECIES	COMMON NAME	WONS	BIOSECURITY ACT [QLD]	FNQROC	CRC PMP
Annona glabra	Pond apple	Yes	Cat 3		
Calopogonium mucunoides	Calopo				Medium
Cyperus aromaticus	Navua sedge				Medium
Hymenachne amplexicaulis	Olive hymenachne	Yes	Cat 3		High
Ipomoea hederifolia	Scarlet creeper				Medium
Leucaena leucocephala	Leucaena				Medium
Macroptilium atropurpureum	Siratro				Medium
Megathyrsus maximus var. maximus	Guinea grass				Medium
Ricinus communis	Castor oil plant				Medium
Sansevieria trifasciata	Mother-in-laws tongue				Medium
Senna obtusifolia	Sicklepod		Cat 3		High
Sphagneticola trilobata	Singapore daisy		Cat 3		Medium
Sporobolus jacquemontii	American rat's tail grass		Cat 3		Medium
Urochloa mutica	Para grass				Medium

Source: Appendix AM Table 13.

Of the weeds listed, *Hymenachne amplexicaulis*, *Sphagneticola trilobata*, *Sporobolus jacquemontii*, and *Senna obtusifolia* are considered invasive, and this is reflected in their State-listed status (RM Cat 3 – *Biosecurity Act 2014*). Whilst *H. amplexicaulis* is confined to poorly-drained freshwater habitats, *Sphagneticola trilobata*, *Sporobolus jacquemontii*, and *Senna obtusifolia* occur in all disturbed sites.

Pond apple (*Annona glabra*) was recorded at the Option B discharge location. The species is listed as a WoNS, and as RM Category 3 (QLD). All the remaining weeds are common and ubiquitous in the local area. Weed species thrive in disturbed areas and the increase in site traffic, clearing of vegetation and areas of bare ground during the construction phase are likely to increase the spread of these species if mitigation measures are not applied.

Tingira Street Project Area

In total, 35 weed species were recorded over the two sites, 19 species at Site 1 and 26 species at Site 2 (refer **Table B8-12**). Of these 35, four are listed under various levels of government legislation; Navua sedge (*Cyperus aromaticus*), Singapore daisy (*Sphagneticola trilobata*), American rat's tail grass (*Sporobolus jacquemontii*) and Light-blue snake weed (*Stachytarpheta cayennensis*). The remainder of the weed species present are acknowledged as environmental weeds which pose little to no threat to the surrounding landscape as they require ongoing to disturbance to survive and are generally unable to outcompete native vegetation.

TABLE B8-12 LISTED WEED SPECIES RECORDED WITHIN THE TINGIRA STREET STUDY AREA

SPECIES	COMMON NAME	WONS	BIOSECURITY ACT [QLD]	FNQROC	CRC PMP
Cyperus aromaticus	Navua sedge			Cat 4	Medium
Sphagneticola trilobata	Singapore daisy		Cat 3	Cat 3	Medium
Sporobolus jacquemontii	American rat's tail grass		Cat 3	Cat 3	Medium
Stachytarpheta cayennensis	Light-blue snake weed			Cat 4	Low

Source: Appendix AM Table 18.

Classification Frameworks

Weeds are classified under a range of management frameworks as discussed below. The remainder of the weed species present are acknowledged as environmental weeds which pose little to no threat to the surrounding landscape as they require ongoing to disturbance to survive and are generally unable to outcompete native vegetation.

Weeds of National Significance

The 32 Weeds of National Significance (WoNS) have been identified by the Australian government based on their invasiveness, potential for spread, and environmental, social and economic impacts. They have been nominated as they require coordinated action among levels of Government and between States to effectively control particular species. National management groups have been established for various WoNS to oversee the implementation of the respective national strategic plans.

Two WoNS (*Annona glabra* (Pond apple) and *Hymenachne amplexicaulis* (Olive Hymenachne)) were recorded during the wet season flora survey. Both of these species were recorded within the Northern Sands Project Area and no WoNS were recorded at the Tingira Street Project Area.

Biosecurity Act 2014

Invasive species (flora and fauna) management in Queensland has previously been undertaken under the auspices of the *Land Protection [Pest and Stock Route Management] Act 2002* and since 1 July 2016 under the *Biosecurity Act 2014*. Unlike the previous Act, the *Biosecurity Act 2014* classifies species as 'restricted matters' and places them in categories rather than classes.

There is no mapping of the matters considered under the Biosecurity Act 2014. There are no programmes for pest or weed species in either project area that are relevant to the Project.

Far North Queensland Reginal Organisation of Councils (FNQROC)

The FNQ Regional Pest Management Strategy is the standardised framework for pest management prioritisation across the member councils of the Far North Queensland Regional Organisation of Councils (FNQROC). This regional approach allows better use of resources available within the community and government to strategically address priority pests, and provide for more efficient and cost-effective meeting of Local Government responsibilities under the now superseded *Land Protection (Pest and Stock Route Management) Act 2002* and the new *Biosecurity Act 2014*. Specific identification / prioritisation of individual pest species for management are reflected in each FNQ Local Government's Pest Management Plan.

No weeds listed under this classification system where located in the Northern Sands Project Area while all four listed weeds at the Tingira Street Project Area are listed (as either Cat 3 or Cat 4).

Cairns Regional Council Pest Management Plan

The Cairns Regional Council Pest Management Plan details pest plants and animals within the greater Cairns area. The CRC PMP employs a Weed Priority Matrix (WPM) to prioritise management of weeds. The WPM uses staff and stakeholder consultation to score weeds according to 9 criteria and resulted in the identification of 20 top priority weeds.

There is no mapping for the CRC Pest Management Plan.

The site survey recorded two high priority, 11 medium and one low priority weed species in the Northern Sands Project Area and Tingira Street Project.

B8.3.8 Exotic Fauna

Northern Sands Project Area

Two exotic species, nutmeg manikin (*Lonchura punctulata*) and European house mouse (*Mus musculus*) were recorded in the dry season only. Cane toads (*Bufo marinus*) were only recorded in the wet season, whilst Indian mynas (*Acridotheres tristis*) were recorded across the seasons.

Tingira Street Project Area

No pest species were recorded during surveys conducted for this project, but it is highly likely that common species will occur.

B8.4 Assessment of Potential Impacts

B8.4.1 Impact Assessment Methodology

B8.4.1.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) (**Table B8-13**)
- the duration of impact
- the likelihood of impact.

These are considered together to determine the final level of impact risk, which is described in **Table B8-13**.

B8.4.1.b Consequence Criteria

Impact consequence criteria are different for each matter under discussion. **Table B8-13** shows the criteria used for this chapter.

TABLE B8-13 IMPACT CONSEQUENCE CRITERIA

IMPACT CONSEQUENCE	DESCRIPTION OF SIGNIFICANCE
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. Very high sensitivity of environmental receptors to impact (e.g. national significance such as loss or removal of a population with an EPBC listing status).
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. High to moderate sensitivity of environmental receptors to impact (e.g. fragmentation or partial loss of populations of EPBC listed threatened flora)
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. Moderate sensitivity of environmental receptors to impact (e.g. removal or significant reduction in the extent of suitable habitat assessed as 'high suitability' for EPBC listed threatened flora across the site).
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 (e.g. reduction in the extent of suitable habitat assessed as 'high suitability' for EPBC listed threatened flora across the site, however replacement habitat will be provided).
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	Impacts have a positive outcome on the existing situation. This could include, for example, an improvement in vegetation management.

B8.4.1.c Duration

Table B8-14 shows the general approach to classifying the duration of identified impacts.

TABLE B8-14 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

B8.4.1.d Likelihood of Impact

Likelihood of impact is described in **Table B8-15** below.

TABLE B8-15 LIKELIHOOD OF IMPACT

LIKELIHOOD OF IMPACTS	RISK PROBABILITY CATEGORIES
Highly Unlikely	Highly unlikely to occur but theoretically possible
Unlikely	May occur during construction of the project but probability well below 50%; unlikely, but not negligible
Possible	Less likely than not but still appreciable; probability of about 50%
Likely	Likely to occur during construction or during a 12 month timeframe; probability greater than 50%
Almost Certain	Very likely to occur as a result of the proposed project construction and/or operations; could occur multiple times during relevant impacting period

B8.4.1.e Risk Matrix

Risk is described as the product of likelihood and consequence as shown in **Table B8-16**below.

TABLE B8-16 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

B8.4.1.f Risk Rating

The rating of risk as assessed above is different for each matter under discussion. **Table B8-17** shows the rating used for this chapter.

TABLE B8-17 RISK RATING LEGEND

RISK RATING	DESCRIPTION
Extreme Risk	An issue requiring change in project scope; almost certain to result in a 'significant' impact on a Matter of National or State Environmental Significance
High Risk	An issue requiring further detailed investigation and planning to manage and reduce risk; likely to result in a 'significant' impact on a Matter of National or State Environmental Significance
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

B8.4.1.g The Role of Mitigation

In accordance with the adopted impact assessment process, impacts are assessed in **Section B8.4** in the absence of mitigation. Recommended mitigation actions are described in **Section B8.5**, and mitigated impacts assessed in **Section B8.6**. Certain actions (i.e. such as rehabilitation of cleared areas and standard construction management) are assumed to be in-scope (i.e. not a mitigation recommendation).

See 'Assumptions' below.

B8.4.2 Assumptions

The following assumptions are used for the impact assessment process:

- The location of the Northern Sands DMPA, inlet and tailwater pipelines and tailwater ponds will be micro-located to minimise the requirement to clear any native vegetation.
- The booster pumps and laydown areas associated with the delivery pipeline are located in areas with no natural vegetation (e.g. agricultural areas), and therefore have no direct impact on terrestrial ecology values.
- The maximum clearing width for both the delivery pipeline and the tailwater discharge outlet pipeline is 10 m (this will be minimised where possible).
- Areas of disturbance will be rehabilitated following decommissioning of the pipelines. This is in-scope (i.e. not a mitigation recommendation).
- Standard construction management will be undertaken. This is in-scope (i.e. not a mitigation recommendation). Refer to **Section B8.5.1.b**.
- 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 B8.1.3**. These are critical to an appreciation of impacts.

B8.4.3 MNES

B8.4.3.a World Heritage Properties (Sections 12 & 15A)

Great Barrier Reef World Heritage Area

Both DMPAs abut the GBRWHA and the delivery pipeline corridor crosses the WHA at the mouth of Richters Creek and upstream on its route to the DMPA.

Impacts in these areas are addressed in **Chapter B7** (Marine Ecology) and summarised in **Chapter B19** (EPBC Act Issues).

Wet Tropics of Queensland World Heritage Area

It is considered unlikely that the CSD Project will significantly impact on the values of the WTWHA due to the following facts:

- the boundary of the WHA is a minimum of 3.4 km from any part of the Study Area at its closest point
- the intervening land is highly disturbed and subject to high intensity agriculture and residential developments
- there are no terrestrial vegetation corridors between the WHA and the two project areas
- all parts of the Study Area are 'downstream' of the WHA and hence unlikely to export pollutants or other matters that could impact on WHA values.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Highly unlikely
Duration: N/A
Level of risk: Negligible
Mitigation: Not required.

B8.4.3.b National Heritage Places (Sections 15B & 15C)

The Great Barrier Reef

As for the GBRWHA (see **Section B8.4.3.a** above).

The Wet Tropics of Queensland

As for the WTWHA (see **Section B8.4.3.a** above).

The Wet Tropics World Heritage Area (Indigenous Values)

As for the WTWHA (see **Section B8.4.3.a** above).

B8.4.3.c Listed Threatened Species (Sections 18 & 18A)

Flora

Section B8.3.2.d concludes that only one listed threatened species (*Myrmecodia beccarii* – Ant plant) EPBC Act – V) was recorded during the site surveys. This species was recorded within the Northern Sands Project Area, specifically within the mangrove vegetation associated with Richters Creek along the delivery pipeline corridor. There are also historical records of the presence of this species in the mangroves between the Tingira Street DMPA and Smiths Creek, and in the mangroves and wetland vegetation associated with the mouth of Richters Creek at the delivery pipeline corridor crossing location and it may also be present in the mangroves associated with Discharge Point B at the end of the tailwater pipelines corridor, although none were recorded during ground survey.

The detailed terrestrial ecology report (Biotropica Australia 2017b) included as **Appendix AM** includes a detailed assessment of the conservation status and threat regime of this species. Key findings are:

- The mitigation inherent in the design and location of the project area and associated pipelines has resulted in required the minimisation of impact on any remnant habitats. This has minimised the number of *M. beccarii* that may be impacted by the proposed development. Approximately 0.27 ha of habitat suitable to host this species is likely to be impacted.
- The number of individuals to be cleared as a result of the pipeline corridor clearing will be determined when the corridor location is finalised. A detailed survey for this species is recommended once the clearing zone is finalised.
- The impact of the project on this species is not permanent. After the pipeline has been removed, the mangrove vegetation will be allowed to regenerate which is likely to provide suitable habitat for *M. beccarii* to re-establish in the previously disturbed areas. Active rehabilitation of these areas is in-scope as follows.
    - Upon decommissioning the pipelines, the original land form and soil profile will be reinstated (and stabilised as required) and any areas of mangroves and marine plants that were cleared will be encouraged to regenerate.
    - Once the mangrove species have re-established and are sufficiently mature, *M. beccarii* should begin to recolonise. However, this requires that the mangrove / wetland species are sufficiently tall and with a relatively closed canopy to provide the humidity required by *M. beccarii*. It is likely to require greater than ten years for the mangrove / wetlands to regenerate sufficiently to be able to support this species.

In terms of conservation management programs:

- Under the SPRING database provided by EHP, *M. beccarii* is ranked as 'high' priority. The detailed assessment (**Appendix AM**) concludes that the CSD Project is not inconsistent with these recovery objectives.
- Approved Conservation Advice for *M. beccarii* was published in December 2008 [Threatened Species Scientific Committee (2008)]. The main threats identified within the Conservation Advice are the clearing of lowland paperbark woodlands, localised settlement pressures and the removal or destruction of plants by plant and butterfly collectors (Forster 2000). The CSD Project does not adversely impact on the local population on site and is consistent with the Conservation Advice.

In terms of the relevant MNES EIS guidelines, there will be no significance impact (i.e. consequence is Minor).

Mitigation is feasible. See **Section B8.5.2.a** for an assessment of the effect of mitigation on the level of risk.

In addition, *M. beccarii* was recorded near the Tingira Street DMPA during a previous survey (GHD 2012). However the location of the records was marginally outside of the current study area and the species was recorded during the current field studies. None of the other species returned in the database searches were considered likely to occur at either site.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Minor
Likelihood: Likely
Duration: Long term
Level of risk: Medium
Mitigation: Feasible.

Fauna

Section B8.3.2.d concludes that:

- One threatened fauna species (*Pteropus conspicillatus* (Spectacled flying fox) EPBC – V) was recorded within the Northern Sands project area and Tingira Street study area.
- An additional two threatened species (*Esacus magnirostris* (Beach stone curlew) EPBC – Migratory) and *Crocodylus porosus* (Estuarine crocodile) EPBC – Migratory) were also considered present due to reliable desktop records, or personal communications.
- Essential habitat is mapped within the Northern Sands DMPA for one listed species (Casuarius *casuarius johnsonii* (Southern cassowary) although this species is most unlikely to occur.

Appendix AM addresses each of these species in turn. The following is a summary of key aspects of this assessment.

Pteropus conspicillatus

Individuals of the species *Pteropus conspicillatus* (Spectacled flying-fox) were recorded foraging in the mangrove vegetation within the Northern Sands study area. The species was not recorded at the Tingira Street study area but may use the mangrove vegetation surrounding the sites.

Appendix AM includes a detailed assessment of the conservation status and threat regime of this species. Key findings are:

- Night works and the associated high voltage flood lights can impact on nocturnal species such as the Spectacled flying-fox. However given the 80 day duration of impact at the Northern Sands DMPA (where the majority of foraging habitat for the species is available), any negative impacts are considered temporary only. Recommendations in relation to the timing of the works to minimise such impacts are discussed in **Section B8.5.2.a**.

- The species is not roosting or breeding within either project area and there will not be significant loss of specialised habitat for the species.

In terms of conservation management programs:

- Under the SPRING database, *P. conspicillatus* is ranked as 'high' priority. The detailed assessment (**Appendix AM**) concludes that of the above known threats to *P. conspicillatus* within the Wet Tropics bioregions, the proposed use of Northern Sands and Tingira Street as DMPAs is only potentially relevant to threats posed by weeds and barbed-wire:
  - Weeds: It should be noted that wild tobacco (*Solanum mauritianum*) and guava (*Psidium guajava*) are species targeted for eradication as a conservation measure for the Spectacled flying-fox were not recorded during the flora survey of the Northern Sands project area or Tingira Street study area. Hence the associated actions including weed control actions for these species are not relevant to the proposed project. Weed control mitigation measures will be instigated as a standard procedure for the Project, however species specific controls will not be required.
  - Avoidance of the use of barbed wire: This is a recommended mitigation topic.
- There is no Approved Conservation Advice for this species.

In terms of the relevant MNES EIS guidelines, there will be no significant impact (i.e. consequence is Negligible).

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Possible
Duration: Temporary
Level of risk: Negligible
Mitigation: Feasible.

Esacus magnirostris

Although no Individuals of the species *Esacus magnirostris* (Beach stone-curlew) were recorded during the current survey, previous work (Biotropica Australia 2014) records a breeding pair of birds on the beach at the mouth of Richters Creek. In addition, this species has also been recorded at the Tingira Street study area for a number of years. Records show that between September to November of 2016 they were rarely absent if the tide was more than three quarters full (A. Gillanders pers. comm.). Therefore, although this species was not recorded during the surveys of the study areas, the precautionary principle requires the assumption of the presence of breeding habitat for this species on the delivery pipeline corridor at the mouth of Richters Creek and at the Tingira Street DMPA.

Appendix AM includes a detailed assessment of the conservation status and threat regime of this species. Key findings are:

- The development of the delivery pipeline to the Northern Sands DMPA will cause a short term direct impact on the northern beach at the mouth of Richters Creek. This has been discussed with CRC (27 appropriate 2017) to determine if there could be potential conflict between Council's dredging and beach nourishment program at Holloways Beach and works associated with the delivery pipeline at the mouth of Richters Creek. This revealed that no works in this area are planned in 2019 (although this could change if there is a cyclone in the intervening period). Discussions also reveal no significant potential conflict with Northern Beaches bikeway project.
- There will also be indirect impacts of noise and vibration during the construction of the pipeline. Of the known threats to *E. magnirostris* within the Wet Tropics bioregion, the proposed pipeline construction at the mouth of Richters Creek will be relevant to 'urban development' and potentially 'recreation / tourism' threats. Although the pipeline will not increase the recreation / tourism in the area, the increased human activity on the beach during construction of the pipeline will result in a similar outcome. Construction management to limit these impacts is assumed to be in-scope.

- The project will cause permanent loss of the species habitat at the Tingira Street DMPA. The loss of the habitat at this area is urban development that disrupts the breeding or resting place of this species. The final landform is to be an industrial hardstand that will not provide the habitat required. Construction management to limit impacts is assumed to be in-scope, while mitigation of loss of habitat is not feasible.

For each of these threat categories, EHP have a series of prioritised actions to abate the threat. The majority of these actions are not relevant to the CSD Project (e.g. Produce / update essential habitat mapping for the Beach stone-curlew using data from WildNet). The only action provided for *E. magnirostris* that may be considered relevant to this development is; 'Undertake research and monitor the impacts of urban development (both individual and cumulative development) on Back on Track Priority Species.' (EHP 2017a). This is a recommended mitigation action (see **Section B8.5** for an assessment of the effect of mitigation on the level of risk).

Although the construction of the pipeline is likely to have a short term impact on any *E. magnirostris* that may be using the beach / mangrove interface at Richters Creek for foraging and resting, the impact is likely to be temporary in nature and providing construction is taken outside of the breeding season (September to February), impacts on this species are unlikely to be significant.

The loss of the habitat at the Tingira Street site is a more significant impact as it will be a permanent loss of habitat.

In terms of conservation management programs:

- Under the SPRING database, *E. magnirostris* is ranked as 'high' priority. The detailed assessment (**Appendix AM**) concludes that the CSD Project is not inconsistent with the recovery objectives for the Northern Sands Project Area whereas it is inconsistent at the Tingira Street DMPA.
- There is no Approved Conservation Advice for this species.

In terms of the relevant MNES EIS guidelines, there will be no significant impact (i.e. consequence is Minor).

Mitigation is not feasible at the Tingira Street DMPA due to the intended end use of the site as an industrial hardstand.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Minor (both project areas)
Likelihood: Possible (delivery pipeline corridor), Almost certain (Tingira Street DMPA)
Duration: Temporary (delivery pipeline corridor), Permanent (Tingira Street DMPA)
Level of risk: Low (pipeline), Medium (Tingira Street DMPA)
Mitigation: Not feasible (Tingira Street DMPA).

As an overall rating for the project, the precautionary approach is used and the highest risk assessed across both sites is used, resulting in a medium risk rating for *E. magnirostris*.

Crocodylus porosus

Although no Estuarine crocodiles (*Crocodylus porosus*) were recorded during the site survey, they are known to use Lake Narelle (B. Arnett pers. comm.) and Richters Creek (Biotropica 2014).

A variety of habitats suitable for *C. porosus* such as freshwater rivers and lakes, mangroves and brackish water are available in the area surrounding both the Northern Sands project area and the Tingira Street study area. *C. porosus* are known to disperse from areas in search of resources such as food or habitat and any individual(s) utilising the overall Study Area are likely to inhabit different areas depending on seasonal resource availability.

The Queensland Crocodile Management Plan (QCMP) was published by EHP in 2017 (EHP 2017b) and supports the Nature Conservation (Estuarine Crocodile) Conservation Plan 2007, which is made under the NC Act. The QCMP assesses risk to public safety and is based, in part, on the size of the crocodile population in an area and whether they are resident or transitory. Both the Northern Sands Project Area and the Tingira Street DMPA are mapped as 'Zone B' areas. In this area there is 'high likelihood of crocodiles entering the area from surrounding crocodile habitat'. The management objective for this zone is to significantly reduce the number of crocodiles in close proximity to large urban areas, with a particular focus on large crocodiles. The CSD Project does not conflict with this management objective.

In terms of conservation management programs:

- There are no threats or actions for this species listed in SPRING.
- There is no Approved Conservation Advice for this species.

In terms of the relevant MNES EIS guidelines, there will be no significant impact (i.e. consequence is Negligible).

Mitigation is not required.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Temporary
Level of risk: Negligible
Mitigation: Not required

Casuarius casuarius johnsonii

No Southern cassowary (*Casuarius casuarius johnsonii*) were recorded during the field surveys and there was no habitat of high or specific value recorded. However, some vegetation within the delivery pipeline corridor at the mouth of Richters Creek is mapped as 'essential habitat' for this species. The essential habitat mapping is based on the presence of a number of regional ecosystems that are known to contain habitat factors suitable for use by cassowaries. Although the concept of essential habitat is a MSES matter, it is relevant to this MNES issue. Research undertaken for the Aquis project that covers the mouth of Richters Creek revealed that the occurrence of the Southern cassowary is unlikely (Biotropica Australia 2014) and has 'not been observed on the site for many years' (Aquis Resort at The Great Barrier Reef 2014).

In terms of impacts, it is assumed that the remnant vegetation marked as essential habitat within the Northern Sands Project Area will be avoided during construction. Neither of the discharge options in the Northern Sands Project Area impact on any mapped essential habitat nor is the Tingira Street DMPA likely to be utilised by this species.

In terms of conservation management programs:

- The following are threats for this species listed in SPRING:
  - habitat degradation
  - loss / removal of individuals
  - loss / removal of individuals
  - loss of habitat
- There is no Approved Conservation Advice for this species.

In terms of the relevant MNES EIS guidelines, there will be no significant impact (i.e. consequence is Negligible).

Mitigation is not required.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: temporary
Level of risk: Negligible
Mitigation: Not required.

Listed Threatened Species Summary

The overall risk assessment for listed threatened species is shown below. This is based on the highest level of risk for all of the species considered, i.e. *Myrmecodia beccarii* (Ant plant) where the risk level is Medium.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Minor
Likelihood: Almost certain
Duration: Permanent
Level of risk: Medium
Mitigation: Feasible.

Medium risk is defined in **Table B8-17** as 'An issue requiring project specific controls and procedures to manage.' In this instance mitigation measures are available.

With the exception of *Esacus magnirostris* (Beach stone-curlew), mitigation is feasible for the other species or is not considered necessary. For this species, mitigation is not possible due to the fact that, following placement of stiff clays at the Tingira Street DMPA, the land is to be used for an already approved industrial hardstand and cannot be rehabilitated (see **Section B8.1.3.b**).

B8.4.3.d Listed Threatened Communities (sections 18 & 18A)

Section B8.3.2.e concludes that no threatened ecological communities are mapped as occurring within the Northern Sands Project Area or the Tingira Street Project Area. In addition, no listed threatened ecological communities were recorded during the ecology surveys.

The closest RE that is listed as being equivalent to the threatened ecological communities (RE7.3.8a) occurs 3 km southwest of the Tingira Street Project Area. The land between the study area and this RE consists of mangrove vegetation, and waters of Smiths Creek and the Trinity Inlet. The small patch of remnant vegetation RE7.3.8a is adjacent (< 100 m) to existing urban development.

Due to the distance between the study area and the threatened ecological community it is considered unlikely that there will be any impacts on this RE as a result of the project.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Highly unlikely
Duration: N/A
Level of risk: Negligible.
Mitigation: Not required.

B8.4.3.e Listed Migratory Species (sections 20 & 20A)

Discussion

A total of 64 migratory species listed under the EPBC Act were returned from desktop searches as potentially occurring within the combined Northern Sands project area and the Tingira Street project area. Some of these species are also listed threatened species under the EPBC Act. In total, 11 species were recorded in at least one of the two project areas. The migratory species recorded are principally waders, shore-birds and species typical of wetland and tidal ecosystems, and common aerial species.

A number of these species are protected under international conventions and treaties, specifically the Bonn Convention, JAMBA (Japan Australia Migratory Bird Agreement), CAMBA (China Australia Migratory Bird Agreement) and ROKAMBA (Republic of Korea Australia Migratory Bird Agreement). These agreements list terrestrial, water and shorebird species which migrate between Australia and the respective countries.

In 2015 the Federal Government released EPBC Act Policy Statement 3.21 'Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species'. The policy statement (DEWHA 2015) is designed to assist in avoiding, assessing and mitigating significant impacts on migratory shorebirds listed under the EPBC Act It covers 37 migratory shore-bird species, 36 of which breed in the northern hemisphere and migrate to the non-breeding grounds of Australia along the East Asian – Australasian flyway (see **Figure B8-22**).

Figure B8-22 East Asian-Australasian Flyway.

Source: DEWHA (2015).

Migratory shorebird species are mostly present in Australia through the non-breeding period, from as early as August to as late as April/May each year. After arrival in Australia they disperse throughout the country to a variety of coastal and inland habitats. Immature birds of some species remain in Australia for a number of years before reaching maturity and migrating north to breed for the first time (DEWHA 2015).

Important Habitat

Under the EPBC Act, 'important habitat' is a key concept for migratory species. Important habitats in Australia for migratory shorebirds under the EPBC Act include those recognised as nationally or internationally important (see below). The widely accepted and applied approach to identifying internationally important shorebird habitat utilises the criteria adopted under the Ramsar Convention on Wetlands. Using this approach, a site is internationally important if it regularly supports:

- 1% of the individuals in a population of one species or subspecies of waterbird OR
- a total abundance of at least 20 000 waterbirds.

While Nationally important habitat for migratory shorebirds can be defined using a similar approach to the international criteria i.e. if it regularly supports:

- 0.1% of the flyaway population of a single species of migratory shorebird OR
- 2000 migratory shorebirds OR
- 15 migratory shorebird species.

Figure B8-23 illustrates the process for identifying important habitat for migratory shorebirds under the EPBC Act. This process applies to each of the migratory shorebird species with the exception of Latham's snipe (*Gallinago hardwickii*) which is treated differently because of its cryptic lifestyle (DEWHA 2015).

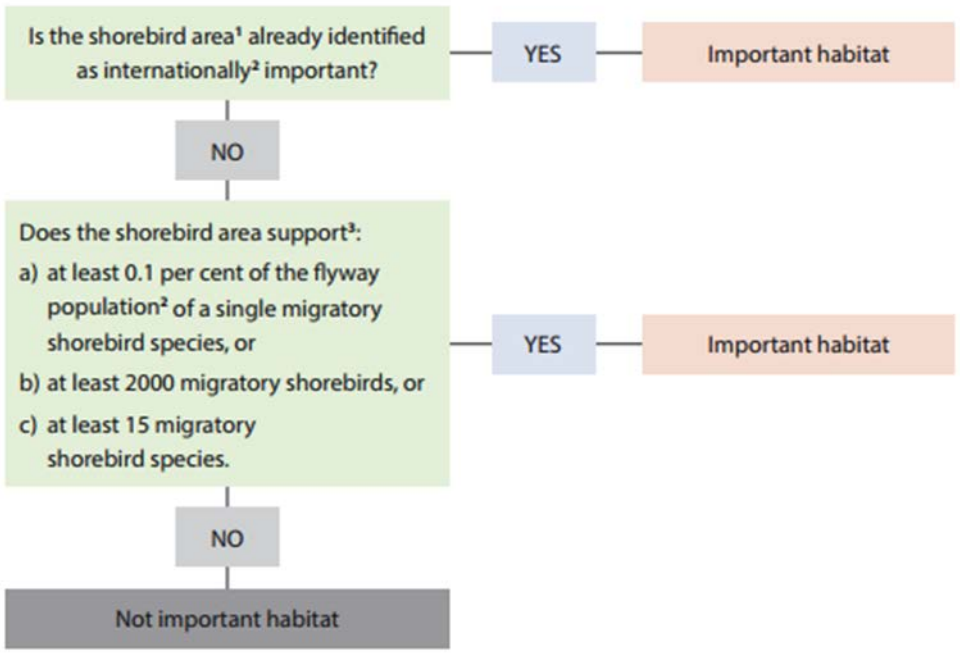


Figure B8-23 Process for identifying important habitat for migratory shorebirds (excluding Latham's snipe).
Source: DEWHA (2015).

Australia has 118 internationally important sites for 28 migratory shorebird species, of which the Cairns Foreshore is the only site within the vicinity of the zone of influence for the CSDP. The Cairns Foreshore is an internationally important site for the Whimbrel (*Numenius phaeopus*).

The Cairns Foreshore is an important site for *N. phaeopus* based on a study in 2005 which recorded 1027 birds (Bamford *et al.* 2008). The 1% trigger threshold for the *N. phaeopus* is 1000 based on a flyway population estimate of 100 000 individuals. While the population estimate is based on counts undertaken in 1999 and 2000, it is thought that the actual population size is larger than the count data suggests (Bamford *et al.* 2008). It therefore seems unlikely that the Cairns Foreshore would remain an internationally important site for *N. phaeopus*, based on the count taken in 2005, which recorded only 27 individuals more than the underestimated trigger value of 1000.

To determine whether either project area is 'important habitat' for migratory shorebirds, the criteria in **Figure B8-23** require consideration. The Study Area is not listed as internationally important and the surveys undertaken on site show that the site does not support at least 0.1% of the flyway population of a single species – 2000 migratory shorebirds.

The final criteria is whether the site 'supports' at least 15 shorebird species. The definition of 'support' in relation to this criteria is defined within the Guidelines as, 'migratory shore-birds are recorded during surveys and/or known to have occurred at the site within the previous five years'.

During the surveys undertaken on the Tingira Street study area, five of the 37 species covered by the Guideline have been recorded. An additional seven species have been recorded on site by others in the past five years. In the absence of records of any of the other Guideline species being recorded on the site, the study area does not meet the criteria of supporting at least 15 shorebird species.

Some comments follow for each of the 11 species described above.

Significant impact guidelines for migratory shorebirds

As defined in the EPBC Act Policy Statement 1.1 Significant impact Guidelines, an action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for migratory species
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

As neither of the project areas meet the definition of an 'important habitat' for migratory shorebirds, the proposed development is unlikely to have a significant impact on these species.

Despite this, the loss of the regenerating wetland environment at the Tingira Street DMPA is likely to have an impact on the migratory birds that use this area, by displacing individuals that currently utilise this site. However there are several areas of higher quality and greater extent available in close vicinity to the Tingira Street site. The adjacent East Trinity site provides habitat likely to accommodate the small number of individuals that may be displaced from Tingira Street.

Apus pacificus

Apus pacificus (Fork-tailed swift) was recorded in the Northern Sands Project Area.

The detailed assessment (**Appendix AM**) concludes that, given the extensive range for this species and the unspecialised nature of its habitat requirements, the project will have a negligible impact on this species.

No mitigation is required.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Temporary
Level of risk: Negligible
Mitigation: Not required.

Actitis hypoleucos

Actitis hypoleucos (Common sandpiper) was recorded during the bird survey at the Tingira Street DMPA. It is common in small numbers with the estimated population within Australia in the non-breeding season is estimated to be approximately 3000 individuals (Geering *et al.* 2007).

The Cairns Foreshore is listed as an area of national importance for the species with a maximum count of 42 individuals recorded at that location. Any individuals that are displaced as a result of loss of habitat from Tingira Street are likely to use the nearby Cairns Foreshore habitat. The detailed assessment (**Appendix AM**) concludes that, due to the close proximity of this more suitable habitat, and the small number of individuals affected, the project will have a negligible impact on this species.

No mitigation is required.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Permanent
Level of risk: Negligible
Mitigation: Not required.

Calidris acuminata

Calidris acuminata (Sharp-tailed sandpiper) was recorded during one of the six surveys at the Tingira Street study area.

The detailed assessment (**Appendix AM**) concludes that, given the small number of individuals recorded and the close proximity of suitable habitat at East Trinity, the project will have a negligible impact on this species.

No mitigation is required.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Permanent
Level of risk: Negligible
Mitigation: Not required.

Gelochelidon nilotica

Gelochelidon nilotica (Gull-billed tern) was found at the Northern Sands DMPA.

This nomadic and highly dispersive species breeds in inland locations and only uses coastal lagoons outside the breeding season. The detailed assessment (**Appendix AM**) concludes that the proposed project will not impact on the breeding success of this species. Lake Narelle is unlikely to be a significant habitat for this species and there are numerous more suitable waterbodies in the vicinity of the site (e.g. Cattana Wetlands). The project will have a negligible impact on this species.

No mitigation is required.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Temporary
Level of risk: Negligible
Mitigation: Not required.

Hirundapus caudacutus

Hirundapus caudacutus (White-throated needletail) was recorded foraging at the Northern Sands DMPA.

The detailed assessment (**Appendix AM**) concludes that, given the extensive range for this species and the unspecialised nature of its habitat requirements, the project will have a negligible impact on this species.

No mitigation is required.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Temporary
Level of risk: Negligible
Mitigation: Not required.

Gallinago hardwickii

Gallinago hardwickii (Latham's snipe) was recorded at the Tingira Street DMPA (Site 2) on each of the six surveys completed in this location. *G. hardwickii* does not commonly aggregate in large flocks or use the same habitats as many other migratory shorebird species. Consequently different criteria are used from that described above to determine important habitat for this species. Within the EPBC guidelines, important habitat for *G. hardwickii* is described as:

- areas that have previously been identified as internationally important for the species, OR
- areas that support at least 18 individuals of the species.

The wet grassland habitat at Tingira Street Site 1 is a seasonal feature existing only during periods of regular rainfall. Due to the transient nature of the site, it would have value to the species for only a short period each year. The detailed assessment (**Appendix AM**) concludes that the site does not have any qualities that are not found in greater extent and better quality at East Trinity site on the eastern side of Trinity Inlet. Any birds displaced by the project are likely to use the adjacent East Trinity habitats. Using the EPBC Significant Impact Guidelines (DoE 2013) definition, the Tingira Street study area does not support areas of important habitat for migratory species nor does it support an ecologically significant proportion of the population of any migratory species. Therefore the impact on the species is not significant as defined by these criteria. It has therefore been reassessed as Low for the purposes of this Revised Draft EIS.

Although there were several individuals recorded during each survey, 18 individuals (the critical threshold number) were not recorded using the site at one time (the maximum number of reliably distinct individuals recorded on the site by the surveyor was 13). This site is therefore not of international significance for *G. hardwickii*. However, for a species that does not congregate, the number of individuals of this species recorded on the site was of close to being of national importance. Unofficial counts completed in the area by bird watchers, and verbally discussed with Biotropica survey staff onsite, report numbers of national importance recorded on site (i.e. greater than 18). These figures cannot be verified.

Overall, due to the relatively large number of individuals using the site, and the permanent nature of the impact, the CSD Project is likely to have an impact on this species. The transient nature of the resources for this species reduces what may otherwise have been a relatively significant impact to a minor impact.

Mitigation is not feasible at the Tingira Street DMPA due to the intended end use of the site as an industrial hardstand.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Minor
Likelihood: Almost certain
Duration: Permanent
Level of risk: Medium
Mitigation: Not feasible.

Numenius phaeopus

Numenius phaeopus (Whimbrel) was observed during one of the six bird surveys at the Tingira Street industrial site.

During the surveys of the project area *N. phaeopus wa*s recorded once at the Tingira Street DMPA. This record was of a single individual. The detailed assessment (**Appendix AM**) concludes that the project area is not of international importance to *N. phaeopus* with much greater numbers utilising the more suitable habitat available at the Cairns Foreshore location which is some 5 km south of the Tingira Street DMPA.

Cairns Foreshore is listed as an internationally important habitat for this species, and individuals that are displaced as a result of the project at Tingira Street are likely to use the Cairns Foreshore site. The project will have a negligible impact on this species.

No mitigation is required.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Permanent
Level of risk: Negligible
Mitigation: Not required.

Tringa stagnatilis

Tringa stagnatilis (Marsh sandpiper) was recorded during one of the six surveys of the Tingira Street Project Area.

The detailed assessment (**Appendix AM**) concludes that, given the range of habitats within which the marsh sandpiper is known to inhabit, the ephemeral wetlands at Tingira Street are unlikely to be core habitat. Any individuals that may be displaced as a result of the project are likely to use the nearby East Trinity site. The project will have a negligible impact on this species.

No mitigation is required.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Permanent
Level of risk: Negligible
Mitigation: Not required.

Pandion cristatus

Pandion cristatus (Eastern osprey) was recorded taking fish from Lake Narelle and consuming the catch in the vegetation on site.

The key threat to the species is loss, degradation or alteration of habitat for urban or tourism activity (Olsen 1998). The detailed assessment (**Appendix AM**) concludes that, given the large scale distribution and unspecialised habitat requirements, Lake Narelle is unlikely to be a significant habitat for this species and there are numerous more suitable waterbodies in the vicinity of the site (such as the Cattana Wetlands). The project will have a negligible impact on this species.

No mitigation is required.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Temporary
Level of risk: Negligible
Mitigation: Not required.

Rhipidura rufifrons

Rhipidura rufifrons (Rufous fantail) was Rufous fantail was recorded within the Northern Sands study area.

The impact of the project on Lake Narelle will not affect this species. The delivery pipeline will result in the loss of approximately 0.14 ha of sclerophyllous habitat near the mouth of Richters Creek. The detailed assessment (**Appendix AM**) concludes that, given the small amount of habitat to be lost, the project will have a negligible impact on this species.

No mitigation is required.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Temporary
Level of risk: Negligible
Mitigation: Not required.

Symposiachrus trivirgatus

Symposiachrus trivirgatus (Spectacled monarch) was recorded within the Northern Sands Project Area.

The Northern Sands DMPA and pipeline corridors contain some habitat that is suitable for the species. The detailed assessment (**Appendix AM**) concludes that, due to the mitigation inherent in the design of the project (minimising the area of mangrove and mature habitats impacted), and the temporary nature of the impact on the mangroves, the project will have a negligible impact on this species.

No mitigation is required.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Temporary
Level of risk: Negligible
Mitigation: Not required.

Listed Migratory Species Summary

The overall risk assessment for listed migratory species is shown below. This is based on the highest level of risk for all of the species considered (i.e. *G. hardwickii*) which is Low. All other species have a negligible level of risk.

Mitigation is not feasible at the Tingira Street DMPA due to the intended end use of the site as an industrial hardstand.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Almost Certain
Duration: Permanent
Level of risk: Low
Mitigation: Not feasible.

Appendix AM concludes that neither project area is an internationally or nationally important site, nor are they defined 'important habitat' for the 37 migratory shorebird species covered by EPBC Act policy statement 3.21.

B8.4.4 MSES

B8.4.4.a Marine Parks

Northern Sands

The Northern Sands DMPA and the tailwater outlet pipeline corridor are sufficiently inland that they are not affected by the GBRCMP zoning. However, the 'estuarine conservation zone' covers the mouth of Yorkeys Creek and Richters Creek and runs up Richters Creek for several kilometres. It is crossed on two occasions by the delivery pipeline corridor (i.e. at the mouth of Richters Creek and further upstream at the creek crossing).

Tingira Street

The GBRCMP in the vicinity of the Tingira Street DMPA follows the boundary of Lot 27 as shown on **Figure B8-14**

The assessment of the impact of the CSD Project on the GBRCMP is included in **Chapter B7** (Marine Ecology) and summarised in **Chapter 2** (Nature Conservation Areas). It is not considered further in this chapter.

B8.4.4.b Fish Habitat Areas

Northern Sands

The Yorkeys Creek FHA (FHA-034 – Type B) covers the mouth of Yorkeys Creek and Richters Creek and runs up Richters Creek for several kilometres. It is crossed on two occasions by the delivery pipeline corridor (i.e. at the mouth of Richters Creek and further upstream at the creek crossing).

Tingira Street

The Trinity Inlet FHA (FHA-003 – Type B) covers Admiralty Island and areas to the east up much of Trinity Inlet for several kilometres. The DMPA abuts the FHA on its southern and western boundary.

The assessment of the impact of the CSD Project on Fish Habitat Areas is included in **Chapter B7** (Marine Ecology) and summarised in **Chapter 2** (Nature Conservation Areas). It is not considered further in this chapter.

B8.4.4.c Threatened Wildlife

Flora

Section B8.3.2.d concludes that only one listed threatened species (*Myrmecodia beccarii* – Ant plant) NC Act – V) was recorded during the site surveys. This has been assessed in **Section B8.4.3.c** as the species is also a listed threatened species under the EPBC Act. Although the significance criteria used in assessing impacts under these two acts are not identical, the CSD Project risk assessment criteria are.

The detailed assessment (**Appendix AM**) concludes that the project will have a minor impact on this species.

Mitigation is feasible. See **Section B8.5.3.a** for an assessment of the effect of mitigation on the level of risk.

As previously noted, the threatened *M. beccarii*) (V-NC Act) was recorded on the Tingira Street site during a previous survey (GHD 2012). However the location of the records was marginally outside of the current study area and the species was not recorded during the current field studies. None of the other species returned in the database searches were considered likely to occur at either site.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Minor
Likelihood: Almost certain
Duration: Long term
Level of risk: Medium
Mitigation: Feasible.

Fauna

Section B8.3.2.d concludes that only two EVNT species were recorded during the field surveys:

- *Pteropus conspicillatus* (spectacled flying-fox) (V-NC Act)
- *Cyclopsitta diophthalma macleayana* (Macleay's Double-eyed Fig-Parrot (V-NC Act).

In addition:

- One other species (*Crocodylus porosus* (Estuarine crocodile) V-NC Act) was also considered present due to reliable desktop records (Biotropica Australia 2014) or personal communications.
- Essential habitat is mapped within the Northern Sands DMPA for one listed species (Casuarius *casuarius johnsonii* (Southern cassowary) although this species is most unlikely to occur.

Pteropus conspicillatus

This species is also a listed threatened species under the EPBC Act and has been assessed in **Section B8.4.3.c**. Although the significance criteria used in assessing impacts under these two acts are not identical, the CSD Project risk assessment criteria are.

Mitigation is feasible. See **Section B8.5.3.a** for an assessment of the effect of mitigation on the level of risk.

Cyclopsitta diophthalma macleayana

This species was recorded within the Northern Sands project area in both the wet and dry season surveys foraging in the canopy of the mangrove vegetation on site. There were no signs that this species was roosting or breeding on the site.

Appendix AM includes a detailed assessment of the conservation status and threat regime of this species. Key findings are:

- The threats for the species are likely to relate to loss of habitat and clearing for agriculture and urban development.
- The remnants of habitat are small and fragmented, causing difficulties for foraging or dispersing birds through loss of connectivity between foraging areas, increased predation when crossing open areas, and intermittent gaps in food availability (Curtis *et al.* 2012). The remaining habitat is also vulnerable to weed invasion and loss of fig trees (Curtis *et al.* 2012).
- The Northern Sands Project Area contains very limited habitat for this species that cannot be found in better quality and quantity in nearby locations. The lack of rainforest within the project area minimises the risk that this species would be breeding within the project area or associated pipelines.

In terms of conservation management programs:

- There are no threats or actions for this species listed in SPRING.
- Approved Conservation Advice for *C. diophthalma coxeni* was published in July 2016 [Threatened Species Scientific Committee (2016)]. The main threats identified within the Conservation Advice are the clearing of subtropical rainforest / eucalypt ecotones thought to be breeding habitat for the subspecies and fragmentation of habitat containing trees used for feeding. The other two threats listed (invasion of habitat by Cats claw (*Macfedyena unguis-catil*) and illegal collection of eggs, are not relevant to the Project. The Northern Sands Project Area contains very limited habitat for this species that cannot be found in better quality and quantity in nearby locations. The lack of rainforest within the project area minimises the risk that this species would be breeding within the project area or associated pipelines. The Project is not inconsistent with the Conservation Advice.

In terms of the relevant MNES EIS guidelines, there will be no significant impact (i.e. consequence is Negligible).

No mitigation is required.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Temporary
Level of risk: Negligible
Mitigation: Not required.

Crocodylus porosus

This species is also a listed threatened species under the EPBC Act and has been assessed in **Section B8.4.3.c**. Although the significance criteria used in assessing impacts under these two acts are not identical, the CSD Project risk assessment criteria are.

Mitigation is not required.

Casuarius casuarius johnsonii

This species is also a listed threatened species under the EPBC Act and has been assessed in **Section B8.4.3.c**. Although the significance criteria used in assessing impacts under these two acts are not identical, the CSD Project risk assessment criteria are.

Mitigation is not required.

Threatened Wildlife Summary

This is repeated below, based on the highest level of risk for all of the species considered, i.e. *Myrmecodia beccarii* (Ant plant) where the risk level is Medium.

Mitigation of impacts on *Myrmecodia beccarii* and *Pteropus conspicillatus* is feasible. See **Section B8.5.3.a** for an assessment of the effect of mitigation on the level of risk.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Minor
Likelihood: Almost certain
Duration: Long term
Level of risk: Medium
Mitigation: Feasible.

B8.4.4.d Vegetation Management Regional Ecosystems and Remnant Map

The vegetation communities within the two project areas are of low value due to the long disturbance history and anthropogenic land use in the broader landscape. At Northern Sands, sections of the delivery pipeline corridor are located within disturbed agricultural land of low ecological value, although it also passes through beachfront and riparian areas with higher inherent values. It should also be recognised that vegetation communities with inherently low value can still have some value as fauna habitat.

The area of each type of vegetation to be cleared as a result of the delivery pipeline and Option B discharge point is shown in **Table B8-18**. It should be noted that this is an estimate only, as the final disturbance area for the delivery pipeline and tailwater discharge pipelines can only be confirmed during detailed design. For the purposes of this estimate, the width of the corridor of disturbance is considered to be 10 m. This may be able to be reduced in important areas.

TABLE B8-18 VEGETATION CLEARING REQUIRED

VEGETATION TYPE		VEGETATION CLEARING REQUIRED (HA)					
Description	**RE**	**Northern Sands**				**Tingira Street**	
		DMPA	Delivery pipeline	Tailwater Discharge Option 1	Tailwater Discharge Option 2 (a,b)	Site 1	Site 2
Mangrove	RE1.1.1 (LC)	0	0.16	0	0.11	0	0
Melaleuca wetland	RE 7.2.9a / 7.3.25a (OC)	0	0.14	0	0	0	0
Anthropogenic grassland	Non-remnant	12.05	0	0	0	4.17	0
Tidally influenced land	Non-remnant	0	0	0	0	0	0.76
	Total	**12.05**	**0.30**	**0**	**0.11**	**4.17**	**0.76**

Source: Appendix AM (Table 60).

The total estimated clearing is 17.4 ha. Of this approximately 1.2 ha is remnant vegetation. Approximately 0.4 ha will be rehabilitated.

Northern Sands Project Area

It is assumed that the forthcoming design-phase mitigation inherent in the design of the project (e.g. the micro-location of the pipelines and discharge points to ensure that mangrove habitats are only minimally impacted if at all) will ensure that none of the remnant mangrove habitats that border with both project areas (including Option 1 pipeline and A* discharge outlet at Northern Sands) will be cleared.

Although there is a narrow corridor (ca. 3 m) of the mangrove vegetation cleared at the Northern Sands Option B discharge outlet, this corridor is not expected to be of sufficient width to allow for the construction of the discharge pipeline and outlet. It is expected that some of the remnant vegetation in this location (7.1.1 – LC) will require clearing. Based on the alignment as currently proposed, it is estimated that approximately 0.11 ha of mangrove vegetation will be cleared for the location of the discharge pipeline Option B. This is a medium term impact and rehabilitation of cleared areas is in-scope.

It is assumed that the Northern Sands delivery pipeline corridor will also be micro-located when it lies adjacent to the edge of mangroves and riparian vegetation, to ensure that the disturbance zone does not affect these vegetation types. However, some disturbance to the remnant mangrove vegetation (RE7.1.1 – LC) associated with Richters Creek will be unavoidable where the pipeline crosses the creek. Based on the alignment as currently proposed, it is estimated that approximately 0.16 ha of mangrove vegetation will require clearing in this location. This is a medium term impact and rehabilitation of cleared areas is in-scope.

The delivery pipeline will also require the clearing of the remnant vegetation adjacent to the mouth of Richters Creek, although this will be minimised by using the already cleared path where possible. As discussed above, this vegetation is most correctly described as Melaleuca wetland (REs 7.2.9a (OC) and 7.1.1 (LC) /7.3.25a (OC)). Based on the alignment as currently proposed, it is estimated that approximately 0.14 ha of this habitat will require clearing. This is a medium term impact and rehabilitation of cleared areas is in-scope.

The laydown areas for the delivery pipeline are located in cleared agricultural areas. Construction on these (cleared) laydown areas will not have an impact on the terrestrial ecology of the project area.

Tingira Street DMPA

At the Tingira Street DMPA, assuming that the mangrove vegetation adjacent to the sites is not impacted, the clearing at Site 1 will consist of approximately 4.17 ha of anthropogenic grassland, while at Site 2, approximately 0.76 ha of non-remnant (tidally influenced) land will be cleared. **Section B8.4.4.e** discusses the relevance of this land to marine plant management.

Mitigation is not required.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Almost certain
Duration: Short term
Level of risk: Low
Mitigation: Not required.

B8.4.4.e Marine Plants

It is assumed that areas of remnant mangrove vegetation within the Northern Sands project area, the Option A* discharge and the mangroves at bordering the Tingira Street study area will not be cleared. However some marine plants are likely to be cleared at both Northern Sands project area and Tingira Street study area as a result of the project.

Table B8-18 shows that approximately 0.27 ha of mangrove marine plants, 0.14 ha of Melaleuca wetland marine plants, and 0.76 ha of tidally influenced marine plants will be cleared across both project areas as a result of the CSD Project.

As discussed above, in-scope is the micro-location of the pipeline to minimise clearing of remnant vegetation and the rehabilitation of marine species after the pipeline has been removed upon decommissioning of the project.

Mitigation is not required in the Northern Sands Project Area and not feasible at the Tingira Street DMPA due to the intended end use of the site as an industrial hardstand.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Minor
Likelihood: Almost certain
Duration: Medium term
Level of risk: Medium
Mitigation: Not required / not feasible.

B8.4.4.f Essential Habitat

Within the Northern Sands Project Area, the vegetation between Lake Narelle and the Barron River and vegetation that is crossed by the delivery pipe near the mouth of Richters Creek are partially mapped as essential habitat for the Southern cassowary (*Casuarius casuarius johnsonii).* Neither of the discharge options involves intersecting any essential habitat.

There is no essential habitat mapped on the Tingira Street site.

As discussed in **Section B8.4.3.c**, while some vegetation within the delivery pipeline corridor at the mouth of Richters Creek is mapped as 'essential habitat' for this species, pervious work (Biotropica Australia 2014, Aquis Resort at The Great Barrier Reef 2014) suggests that cassowaries are extremely unlikely to be present.

Also as discussed above, in terms of impacts, it is assumed that the remnant vegetation marked as essential habitat within the Northern Sands Project Area will be avoided during construction. Neither of the discharge options in the Northern Sands Project Area impact on any mapped essential habitat nor is the Tingira Street DMPA likely to be utilised by this species.

Mitigation is not required.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Short term
Level of risk: Negligible
Mitigation: Not required.

B8.4.5 Other Commonwealth Matters

B8.4.5.a Directory of Nationally Important Wetlands

Impacts on this matter are assessed in **Chapter B7** (Marine Ecology) and summarised in **Chapter B2** (Nature Conservation Areas).

B8.4.5.b Weeds of National Significance

Weeds of all categories are assessed in **Section B8.4.6.g**.

B8.4.6 Other State Matters

B8.4.6.a FNQ Regional Plan

The FNQ Regional Plan 2009-2031 mapping shows that neither project area is within an area mapped as HES.

Mitigation is not required.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Short term
Level of risk: Negligible
Mitigation: Not required.

B8.4.6.b Protected Areas

There are no protected areas that will be affected by the project. Refer to **Chapter B2** (Nature Conservation Areas).

B8.4.6.c Wetlands

There are no Referable Wetlands or their 'trigger areas' likely to be affected by the CSD Project.

However all of the remnant vegetation mangrove communities (mapped as RE7.1.1.1) within both of the study areas are mapped as wetlands under the EPR as being GES.

Approximately 0.27 ha of RE7.1.1.1 (and therefore mapped GES wetland) will be directly impacted by the Northern Sands delivery pipeline and Discharge Option 2. It is expected that this area will take greater than

five years to become a functioning wetland with values similar to those pre-disturbance.

Mitigation is not required. However, the in-scope rehabilitation will take several years to have effect and therefore the impact will have a long term duration as defined.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Minor
Likelihood: Likely
Duration: Long term
Level of risk: Medium
Mitigation: Not required.

B8.4.6.d Groundwater Dependent Ecosystems

Modelling of the seepage and salt flux as a result of the placement of the dredge material is outside of the scope of this chapter – refer **Chapter B6** (Water Resources). However initial indications are that the seepage and salt flux impacts to the river will be of short duration occurring during the period before the dredge materials rises above the level of the upper sand layer. While it is likely that the saline groundwater plume will discharge to the Barron River, as the river is tidal and saline, the discharging groundwater is likely to have a similar salt concentration for a short period during dredge placement. As such, a significant impact is not expected on the GDEs.

B8.4.6.e Waterways under the *Fisheries Act 1994* (Qld)

The Northern Sands delivery pipeline corridor will cross sections of Richters Creek mapped as a Major (Estuary) waterway. The proposed methodology for the construction of the pipeline does not required a temporary waterway barrier and is therefore likely to be compliant with the self-assessment code with no further mitigation required. In any case, this is an Operational Works issue that can be dealt with at a later date.

B8.4.6.f Wildlife Corridors

As noted previously, the two project areas are connected to the waters of the Great Barrier Reef (via the Barron River and Thomatis / Richters Creeks at Northern Sands and through Smiths Creek at Tingira Street. There are no movement corridors of significance that incorporate either of the project areas and development of the CSD Project will not change any barriers to movement for any species.

Northern Sands

The only vegetation that retains any intrinsic value is the fingers of riparian mangrove vegetation located between the Barron River and Lake Narelle. Lake Narelle itself has limited value due to its disturbance history, and the lack of shallow wading habitat which prevent it from being more extensively used by wading birds.

The proposed discharge options are located mostly in areas that have been cleared of native vegetation and are of very low environmental value. Option 1 is likely to impact only on anthropogenic grasslands consisting of mainly exotic grass species (Guinea grass), while Option 2 may affect a small section of mangrove adjacent to the outlet point (discharge point B).

The delivery pipeline corridor is located mostly in agricultural lands (approximately 2.3 km or two thirds of the route), while the remaining 1.3 km (approximately one third of the pipeline) is located in or adjacent to more sensitive environments, e.g., mangroves and other vegetation associated with inland extent and mouth of Richters Creek.

The Northern Sands Project Area is surrounded by agricultural land and embedded in a broadly agricultural and urban landscape, with some residual natural habitats. The ecological relationship of the project area to the larger landscape is largely determined by the degree of continuity between and amongst residual natural habitats.

Any connectivity that the site retains would be associated with the Barron River and Thomatis / Richters Creek that run adjacent to its south and west boundaries respectively. However there is very sparse terrestrial / vegetative connectivity between the project area and the extensive mangroves of Richters Creek, as a section of approximately 1.5 km of Richters Creek has had riparian / mangrove vegetation removed, leaving only a thin line of native vegetation on the edge of the creek. This is unlikely to be used by many species and creates a gap in connectivity between the project area and the downstream mangroves of Richters Creek. Similarly, downstream of the Northern Sands project area, the majority of riparian vegetation has been cleared to allow for agriculture to extend to the edge of the Barron River, leaving only the most tenuous of connections to the extensive mangrove system associated with the downstream extents of the Barron River delta.

Given the highly fragmented nature of the landscape in the Northern Sands Project Area, and the very small amount of vegetation clearing required, it is unlikely the overall project will have an effect on landscape connectivity. A possible, minor exception is the point where the delivery pipeline crosses Richters Creek. The creation of a 10 m wide clearing in this vegetation may cause an increase in fragmentation of habitat in this area, however given the very localised effect and the fact that rehabilitation is in-scope, this is not considered significant.

Mitigation is not required.

Tingira Street

The Tingira Street Project Area has restricted terrestrial environmental values within both sites due to the long history of disturbance and anthropogenic land use. The integrity of ecological processes within this project area is very low, with the composition and abundance of natural values severely diminished by previous clearing and industrial land uses. The structure, composition and function of the ecosystems on site are a function of the ongoing disturbance on the sites. However the surrounding mangrove vegetation is relatively undisturbed and retains ecological integrity.

The Tingira Street Project Area is surrounded to the north and west by urban industrial areas of the Cairns CBD. However to the south and east (and to a lesser extent the west) it is directly connected to the Trinity Inlet and associated wetlands. Although the waters and lands of Trinity Inlet have undergone a long history of disturbance and environmental change, at the current time they retain environmental values for native flora and fauna. This is recognised by their listing as a Nationally Important Wetland area, and the value of this area to migratory and wading birds is well known.

The project will directly impact on the two sites within the project area that have both been subject to previous clearing and industrial use. Therefore, the re-use of these sites as a DMPA would not significantly decrease the ecological connectivity of the site at a landscape scale.

Mitigation is not required.

Summary

Risk Assessment (Impact summary prior to mitigation)
Consequence: Negligible
Likelihood: Possible
Duration: Short Term (Northern Sands)
Level of risk: Negligible
Mitigation: Not required.

B8.4.6.g Exotic Flora

There were 64 species of exotic flora recorded during the site surveys. Of these, five species are considered serious and invasive weed species. The majority of weed species were recorded within the Northern Sands Project Area. There were also four species of invasive animals recorded during the two completed surveys.

Weed species thrive in disturbed areas and the increase in site traffic, clearing of vegetation and areas of bare ground during the construction phase are likely to increase the spread of these species if appropriate management measures are not applied. Management of weeds is in-scope (i.e. is not a separate mitigation measure). Refer to **Section B8.5.1.b**. Accordingly, there will be a beneficial impact in both project areas.

Risk Assessment (Impact summary prior to mitigation)
Consequence: Beneficial
Likelihood: Almost certain
Duration: Medium term
Level of risk: Beneficial
Mitigation: N/A.

B8.4.6.h Exotic Fauna

The four pest fauna species that were recorded during the surveys are all species that are ubiquitous across the Cairns City and surrounding areas. The project is unlikely to cause the ingress or establishment of further pest species within the project areas if basic management measures such as the careful storage and removal of rubbish from the construction sites. These and other standard practices are in-scope (i.e. is not a separate mitigation measure). Refer to **Section B8.5.1.b**. Accordingly, there will be a beneficial impact in both project areas (refer **Section B8.4.2**).

Risk Assessment (Impact summary prior to mitigation)
Consequence: Beneficial
Likelihood: Almost certain
Duration: Medium term
Level of risk: Beneficial
Mitigation: N/A.

B8.5 Recommended Mitigation Measures

B8.5.1 Introduction

B8.5.1.a The Nature of Mitigation

Some comments are made above regarding the need or opportunity for mitigation. Mitigation can also be thought of as 'risk treatment'. The national standard for risk management is AS/NZS ISO 31000:2009 Risk management—Principles and guidelines. AS/NZS ISO 31000:2009 defines risk treatment as a 'process to modify risk'. It notes that risk treatment can involve:

- avoiding the risk by deciding not to start or continue with the activity that gives rise to the risk
- taking or increasing risk in order to pursue an opportunity
- removing the risk source
- changing the likelihood
- changing the consequences
- sharing the risk with another party or parties (including contracts and risk financing)
- retaining the risk by informed decision.

It also notes that:

- Risk treatments that deal with negative consequences are sometimes referred to as 'risk mitigation', 'risk elimination', 'risk prevention' and 'risk reduction'.
- Risk treatment can create new risks or modify existing risks.

Recommended mitigation strategies are described below for each relevant matter (those with negligible risks or outside the scope of this report are no longer considered), along with an assessment of the effect of mitigation on risk level. Risks that are unable to be mitigated are also discussed.

The mitigation measures proposed below have been applied in a number of projects of similar scale, intensity and duration within the greater Cairns area. All of these mitigation measures are considered appropriate and likely to be effective in countering the impacts described above.

B8.5.1.b Mitigation Assumed to be In-scope

The previous assessment of impacts has assumed that certain aspects that could potentially be thought of as mitigation, are project commitments (i.e. are in-scope for the CSD Project). These include:

- Rehabilitation of areas of natural vegetation to be cleared for the construction of the inlet and tailwater pipelines. This includes all associated site preparation.
- Standard 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.)
- Standard measures to avoid injuries to fauna species during construction such as the covering of holes / cavities overnight, and/ or provision of ladders to enable fauna to escape the hole should they fall, together with standard responses (e.g. contact details and arrangements).
- Site inductions (during construction, commissioning and operation, all staff should undertake an environmental site induction which canvasses the flora and fauna values of the site, and actions to minimise impacts).

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

The mitigation described below is over and above these standard responses to construction.

B8.5.1.c Matters Where Mitigation is Recommended

Mitigation of impacts is either not required or is not appropriate for some matters assessed above. Only those matters where mitigation is relevant are described below. A summary of un-mitigated and mitigated impacts is shown in **Table B8-19**.

B8.5.2 MNES

B8.5.2.a Listed Threatened Species

Flora

M. beccarii

Due to the high frequency of occurrence of *M. beccarii* (Ant plant) (refer **Photo B8-1**) within the mangroves associated with Richters Creek pipeline crossing and Melaleuca wetland areas, it is unlikely that clearing of this species can be completely avoided. As a mitigation measure, it is recommended that any individuals that are to be directly impacted are translocated to suitable nearby habitat. These individuals will then require monitoring to determine the success of this mitigation measure (refer **Section B8.6.5**). Thus both the consequence and the likelihood of impact on this species will decrease, as will the duration of the impact. Translocation of this species occurs often in FNQ and is highly successful.

Photo B8-1 *Myrmecodia beccarii* in Melaleuca.

Photo courtesy of Biotropica Australia.

A further mitigation option is to construct the crossing of Richters Creek using Horizontal Directional Drilling (HDD) techniques. This would prevent any loss of *M. beccarii* habitat (in addition to minimising impacts on other MNES (discussed below)). However, HDD may not be feasible if the pipeline is to be removed at the end of the placement campaign. The assessment of mitigated impacts assumes that HDD is not employed.

Risk Assessment (Impact summary following mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Short term
Level of risk: Negligible

Fauna

E. magnirostris

Due to the likely presence of breeding *E. magnirostris* (Beach stone-curlew) at the mouth of Richters Creek, construction work should be planned so that the construction of this section of the delivery pipeline is completed outside of the breeding season for this species (September to February). This is consistent with the construction program. It will be important to ensure that the original landform and soil profile is in place when construction is completed, to ensure that habitat quality and soil stability are encouraged. This is in-scope via the rehabilitation commitment. HDD technology would significantly reduce impacts but has not been assumed at this time.

Risk Assessment (Impact summary following mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Temporary
Level of risk: Negligible

P. conspicillatus

To minimise impacts on *P. conspicillatus* (Spectacled flying fox), any new fences should have a plain wire as a top strand, rather than barbed wire to reduce the risk of entanglement. This mitigation will reduce the consequence and likelihood of risk of impact on this species.

The night works proposed at the Northern Sands project area and Tingira Street study area may have a temporary impact on the foraging behaviour of this species. Although this impact is likely to be minor to negligible, it is recommended that, if possible, works should be completed outside of the flying fox breeding season where practicable to minimise any impact due to changes in foraging effort on breeding success. *P. conspicillatus* give birth between October and December and the juveniles are nursed for approximately five months. This is consistent with the construction program.

Risk Assessment (Impact summary following mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Short term
Level of risk: Negligible

Listed Threatened Species Summary

The overall risk assessment for listed threated species is shown below. This is based on the highest level of mitigated risk for all of the species considered. In this case, all are equal with a risk level of Negligible.

Risk Assessment (Impact summary following mitigation)
Consequence: Negligible
Likelihood: Unlikely
Duration: Short term
Level of risk: Negligible

B8.5.3 MSES

B8.5.3.a Threatened Wildlife

Flora

M. beccarii

This is also a listed threated species under the EPBC Act. Recommended mitigation for this species is discussed in **Section B8.5.2.a**.

Fauna

P. conspicillatus

This is also a listed threated species under the EPBC Act. Recommended mitigation for this species is discussed in **Section B8.5.2.a**.

B8.6 Residual Impacts and Assessment Summary

B8.6.1 Introduction

The previous sections have documented the assessment of impacts on all relevant terrestrial ecology matters using the project's risk-based approach and assuming that certain in-scope environmental management measures are in place. Where relevant, mitigation opportunities are recommended and a revised impact assessment undertaken. This section summarises the findings of this work and discusses the project implications, along with recommendations for offsets and monitoring as required.

B8.6.2 Summary

TABLE B8-19 SUMMARY OF UN-MITIGATED AND MITIGATED RISKS

MATTER	WITHOUT MITIGATION				RECOMMENDED MITIGATION	WITH MITIGATION			
	Consequence	Likelihood	Duration	Level of Risk		Consequence	Likelihood	Duration	Level of Risk
MNES									
World Heritage properties									
• GBRWHA	N/A (Note 1)	-	-	-	N/A	-	-	-	-
• WTWHA	Negligible	Highly unlikely	N/A	Negligible	Nil	Negligible	Highly unlikely	N/A	Negligible
National Heritage places									
• GBR NHP	N/A (Note 1)	-	-	-	N/A	-	-	-	-
• WT NHP	Negligible	Highly unlikely	N/A	Negligible	Nil	Negligible	Highly unlikely	N/A	Negligible
Listed threatened species	Minor	Almost certain	Permanent	Medium	Translocation of *Myrmecodia beccarii* Low-impact fencing for *Pteropus conspicillatus*	Negligible	Almost certain	Medium term	Low
Listed threatened communities	Moderate	Highly unlikely	N/A	Negligible	Nil	Moderate	Highly unlikely	N/A	Negligible
Listed migratory species	Negligible	Almost certain	Permanent	Negligible	Nil.	Negligible	Almost certain	Permanent	Negligible
MSES									
Marine Parks	N/A (Note 2)	-	-	-	N/A	-	-	-	-
Fish Habitat Areas	N/A (Note 2)	-	-	-	N/A	-	-	-	-
Threatened wildlife	Minor	Almost certain	Long term	Medium	Translocation of *Myrmecodia beccarii* Low-impact fencing for *Pteropus conspicillatus*	Negligible	Almost certain	Medium term	Low
Vegetation management (REs)	Negligible	Almost certain	Short term	Low	Nil	Negligible	Almost certain	Short term	Low
Marine plants	Minor	Almost certain	Medium term	Medium	Nil	Minor	Almost certain	Medium term	Medium

MATTER	WITHOUT MITIGATION				RECOMMENDED MITIGATION	WITH MITIGATION			
	Consequence	Likelihood	Duration	Level of Risk		Consequence	Likelihood	Duration	Level of Risk
Essential habitat	Negligible	Unlikely	Short term	Negligible	Nil	Negligible	Unlikely	Short term	Negligible
Other									
Directory of Important Wetlands	N/A (Note 2)								
FNQ Regional Plan 2009-2031	Negligible	Unlikely	Short term	Negligible	Nil	Negligible	Unlikely	Short term	Negligible
Wetlands	Minor	Likely	Long term	Medium	Nil	Minor	Likely	Long term	Medium
Groundwater Dependent Ecosystems	Minor (Note 3)	Possible	Medium term	Low	Nil	Minor	Possible	Medium term	Low
Wildlife corridors	Negligible	Possible	Short term	Negligible	Nil	Negligible	Possible	Short term	Negligible
Exotic flora	Beneficial	Almost certain	Medium term	Beneficial	Nil	Beneficial	Almost certain	Medium term	Beneficial
Exotic fauna	Beneficial	Almost certain	Medium term	Beneficial	Nil	Beneficial	Almost certain	Medium term	Beneficial
Birdstrike (Northern Sands)	N/A (Note 4)	-	-	-	N/A	-	-	-	-

Notes:

1. Impacts in these matters are addressed in **Chapter B2** (Nature Conservation Areas) and summarised in **Chapter B19** (EPBC Act Issues).
2. Impacts on these matters are addressed in **Chapter B7** (Marine Ecology) and in **Chapter B2** (Nature Conservation Areas).
3. Impacts on groundwater are further addressed in **Chapter B6** (Water Resources).
4. Impacts on this matter are addressed in **Chapter B17** (Hazard and Risk).

B8.6.3 Discussion

B8.6.3.a Matters Not Assessed

Some matters involving terrestrial ecology are more relevant to other chapters of this Revised Draft EIS and cross references are provided. These matters are:

- The Great Barrier Reef World Heritage Area and Great Barrier Reef National Heritage Place (**Chapter B2** (Nature Conservation Areas), **Chapter B7** (Marine Ecology), and **Chapter B19** (EPBC Act Issues).
- Issues arising from the delivery pipeline corridor crossing of Richters Creek (**Chapter B5** (Marine Water Quality), **Chapter B7** (Marine Ecology)).

B8.6.3.b Major Findings

For those matters assessed, the highest level of risk without mitigation is Medium, for:

- Listed threatened species (MNES)
- Threatened wildlife (MSES)
- Marine plants (MSES)
- Wetlands (not statutory).

With basic mitigation, the first two can be reduced to Low. The risks for Marine plants and Wetlands occur on the Tingira Street DMPA and cannot be mitigated due to the end use commitments.

The residual risk of all other matters is Negligible.

Referring to **Table B8-17**:

- Medium risk is defined as 'An issue requiring project specific controls and procedures to manage'
- Low risk is defined as 'Manageable by standard mitigation and similar operating procedures'
- Negligible risk is defined as 'No additional management required'.

B8.6.3.c Implementing Mitigation

In order to ensure that the recommended mitigation take place, the management framework for the CSD Project includes the following elements:

- a range of in-scope measures described in **Section B8.5.1.b**
- recommended mitigation measures described in **Section B8.5**.

Both of these categories are incorporated into **Chapter C1** (Construction Environmental Management Plan).

B8.6.3.d Risks Not Able to be Mitigated

In conclusion, the risks for Marine plants and Wetlands cannot be mitigated due to the end use commitments at the Tingira Street DMPA.

Such a use, in the absence of the CSD Project, would occur without any specific mitigation actions other than during construction. In addition, the stiff clay will act as a fill / preload and will replace similar material that would have to be imported from a local quarry for the purpose should the CSD Project not proceed. The selection of this site as a DMPA was made precisely for this reason, i.e. that it has been earmarked for future development and its biodiversity values are already scheduled for loss. Under these circumstances, the use of the site for placement of stiff clay should not be considered in itself to be a significant impacting process, even at the Medium risk level. This is discussed **Chapter B18** (Cumulative Impacts Assessment).

B8.6.4 Offsets

B8.6.4.a Basic Concepts

Both the Commonwealth Government and Queensland Government have offsets policies. The basic principle of both is that offsets are required when the residual impact (i.e. that which remains after all possible avoidance and mitigation measures have been taken) are 'significant'. Each policy has criteria for determining the meaning of this term.

B8.6.4.b Commonwealth Offsets Policy

Background

Offsets under the EPBC Act are covered by the EPBC Act Environmental Offsets Policy produced by the former Department of Sustainability, Environment, Water, Population and Communities (SEWPaC 2012b). According to this policy, offsets are only required if residual impacts are 'significant'. Significance is determined by reference to the significant impact guidelines prepared by the former Department of the Environment (Commonwealth) (DoE 2013).

If it is determined that an offset is required under the EPBC Act, then an offsets package should be proposed. This is a suite of actions that a proponent undertakes to compensate for the residual significant impact of a project. It can comprise a combination of direct offsets and other compensatory measures. Direct offsets are those actions that provide a measureable conservation gain for an impacted protected matter. Direct offsets are required to make up a minimum of 90% of the offset requirement for any given impact.

Direct offsets deliver a net conservation gain to the protected matter which maintains or increases it viability or reduces any threats of damage, destruction or extinction. A conservation gain may be achieved by:

- improving existing habitat for the protected matter
- creating new habitat for the protected matter
- reducing threats to the protected matter
- averting the loss of a protected matter or its habitat that is under threat.

Other compensatory measures are those actions that do not directly offset the impacts on the protected matter, but are anticipated to lead to benefits for the impacted protected matter e.g. funding for research or educational programs.

Need for Offsets

In the risk assessment used in this chapter, only Extreme Risk and High Risk are defined as having a significant impact on a MNES. The highest risk rating of residual risk for any MNES is Low as defined in **Table B8-17** 'Manageable by standard mitigation and similar operating procedures'.

Subject to a formal self-assessment to determine whether offsets are required, preliminary indications suggest that significant impact criteria will be met. Therefore, under these circumstances there is no need to consider offsets.

Therefore, under these circumstances there is no need to consider offsets for those MNES relevant to terrestrial ecology. Refer also to **Chapter B18** (Cumulative Impacts Assessment) where a whole-of-project assessment is undertaken.

B8.6.4.c State Offsets Policy

Background

As described in the Queensland Government Environmental Offsets Policy (EHP 2016) (QGEOP), under several Queensland laws, offsets may be required for certain developments where there is an unavoidable impact on significant environmental values. To counterbalance this loss, offset actions, which can include improvement and protection of alternative sites and/or actions that improve environmental viability, can provide a conservation outcome that is equivalent to the value being lost.

An 'avoid, mitigate, offset' framework applies to development and this means that offsets are only required where there is an impact that cannot be mitigated.

Once an administering agency has decided that a prescribed environmental activity is required to provide an offset, the offset will be delivered in accordance with the Queensland environmental offsets framework established under the *Environmental Offsets Act 2014 (Qld)* (EO Act), Environmental Offsets Regulation 2014 (Qld) and the QGEOP. An environmental offset can only be required if residual impacts from a prescribed activity constitute a significant residual impact (this term is defined). There are two cases where offsets apply:

- prescribed environmental matters (other than a protected area)
- a protected area.

Prescribed environmental activities are listed in Schedule 1 of the Environmental Offsets Regulation 2014 (Qld)) while MSES (including protected areas) are listed in Schedule 2. Note that the definition of MSES for the purposes of the EO Act differs from that under the SPP (see **Section B8.3.3.a**).

If a matter has been offset under the Commonwealth offsets policy then it does not also have to be offset under the state policy.

Significant Residual Impact

The 'Significant Residual Impact Guideline for matters of state environmental significance and prescribed activities assessable under the SPA' (Queensland Environmental Offsets Policy December 2014) is produced by the Department of State Development, Infrastructure and Planning (now DILGP) and is used for the assessment of the significance of the proposed works.

A self-assessment under this guideline would be required to determine whether, after avoidance and mitigation, there are significant residual impacts. The residual impacts need to be assessed under each prescribed environmental matter (e.g. regulated vegetation, protected wildlife habitat, declared FHA / waterway providing for fish passage and marine plants). This is a future task.

Need for Offsets

Offsets are only required where there are significant residual impacts as defined under the EO Act.

As noted above, it is almost certain that individuals of the species Ant plant (*Myrmecodia beccarii*) (V-NC Act) will be impacted. However, this impact is unlikely to be significant and translocation is known to be practical and effective.

The clearing of the mangrove and Melaleuca vegetation associated with the construction of the delivery pipeline triggers the assessment of multiple prescribed environmental matters. In this instance the significance of the residual impact on each environmental matter will need to be identified and individually assessed as the nature and scale of impacts on each environmental matter may be different and require a different response (DILGP 2014). However multiple offset conditions should not be imposed for the 'same or substantially the same impact' on the 'same or substantially the same' prescribed environmental matter (DILGP 2014).

The major (not able to be mitigated) risk to an MSES is the clearing of approximately 0.76 ha of non-remnant (tidally influenced) land at the Tingira Street DMPA. Schedule 2 Section 11 (2) states that 'a marine plant is not an MSES if the plant is in an urban area'. Based on the Regional Landuse Categories as set out in the FNQ Regional Plan 2009-2031, the Tingira Street DMPA is part of the urban footprint of Cairns. Therefore the marine plants at Tingira Street are not MSES under the Environmental Offsets Regulations 2014 and do not require an offset.

B8.6.5 Monitoring

The following monitoring is recommended:

- A weed monitoring program to record the abundance of the weed species within the Northern Sands DMPA project area and Tingira Street DMPA should be established. Should the monitoring record an increase in abundance or spread of the key weed species, this should trigger the requirement for a weed control program.
- Should *E. magnirostris* be recorded as breeding at the Richters Creek mouth area, the threat abatement actions in SPRING suggest that a monitoring program for this species should be established.
- Should *M. beccarii* individuals be translocated to avoid impact on this species, the translocated individuals should be monitored to determine the success of the translocation procedure.

Should monitoring of the residual impacts of the CSD Project be required, the field studies completed for this study can be used as baseline study data. The studies are based on best practice guidelines and are repeatable and scientifically robust. The data has been systemically collected and stored and can be produced as a database.

Monitoring adopted as a project commitment is described in (**Chapter C1** (Construction Environmental Management Plan).

B8.7 References

AGE. 2007. Far North Queensland Draft Regional Water Supply Strategy. Technical Document 6: Far North Queensland Water Strategy Groundwater Aspects.

Aquis Resort at The Great Barrier Reef. 2014. Environmental Impact Statement. Submitted to Office of the Coordinator-General, June 2014.

Bamford M., D. Watkins, W. Bancroft, G. Tischler & J. Wahl. 2008. Migratory Shorebirds of the East Asian - Australasian Flyway: Population estimates and internationally important sites. Canberra, ACT: Department of the Environment, Water, Heritage and the Arts, Wetlands International-Oceania. Available from: http://www.environment.gov.au/biodiversity/migratory/publications/shorebirds-east-asia.html.

Biotropica Australia. 2014. Aquis Resort at the Great Barrier Reef - Terrestrial Ecology. Prepared for Flanagan Consulting Group, April 2014.

Biotropica Australia. 2016. Cairns Shipping Development Project Revised Draft EIS Dry Season Terrestrial Flora and Fauna. Prepared for Ports North, October 2016.

Biotropica Australia. 2017a. Stiff Clay DMPA Tingira Street Terrestrial Ecology Assessment Technical Report. Prepared for Ports North, March 2017.

Biotropica Australia. 2017b. Cairns Shipping Development Project Terrestrial Ecology Assessment Technical Report. Prepared for Ports North, May 2017.

Bostock, PD and Holland, AE (eds). 2013. Census of the Queensland Flora 2013. Queensland Herbarium, Department of Science, Information Technology, Innovation and the Arts, Brisbane. Open digital database viewed 5th September 2013, available at https://data.qld.gov.au/dataset/census-of-the-queensland-flora-2013

Cairns Regional Council. 2012, Biodiversity Strategy 2012-2022, Cairns Regional Council, Cairns.

CDM Smith. 2013. Desktop Groundwater Dependent Ecosystem Assessment for Aquis Resort Great Barrier Reef Project. Prepared for Biotropica Australia, October 2013.

Curtis, L. K., Dennis, A. J., McDonald, K. R., Kyne, P. M., & Debus, S. J. 2012. Queensland's Threatened Animals. Collingwood: CSIRO Publishing.

Department of Environment and Heritage Protection. 2017a. Beach stone-curlew, Vulnerable animals. https://www.ehp.qld.gov.au/wildlife/animals-az/beach_stonecurlew.html. Accessed 4/4/17.

Department of Environment and Heritage Protection. 2017b. Queensland Crocodile Management Plan. https://www.ehp.qld.gov.au/wildlife/livingwith/pdf/wl-mp-croc-manage-plan.pdf. Accessed 7/5/2017.

Department of Environment and Heritage. 2011, Queensland biodiversity and vegetation offsets special features, GIS information, Queensland Government, Brisbane.

Department of Infrastructure, Local Government and Planning. 2014. Significant Residual Impact Guideline For matters of state environmental significance and prescribed activities assessable under the Sustainable Planning Act 2009. Queensland Environmental Offsets Policy. December 2014.

Department of Primary Industries and Fisheries. 2007. Fish Habitat Management Operational Policy FHMOP001.

Department of Sustainability, Environment, Water, Population and Communities. 2012a. National Wildlife Corridors Plan: A framework for landscape-scale conservation, Commonwealth of Australia, Canberra.

Department of Sustainability, Environment, Water, Population and Communities. 2012b. Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy. October 2012.

Department of Sustainability, Environment, Water, Population and Communities. 2013. Australian Heritage Database: Great Barrier Reef, viewed online 11th September 2013, available at

Department of the Environment, Water, Heritage and the Arts. 2009. Significant impact guidelines for 36 migratory shorebird species. EPBC Act policy statement 3.21. Canberra.

Department of the Environment. 2013. Matters of National Environmental Significance Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999.

Department of the Environment. 2017. Gallinago hardwickii in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Wed, 19 Apr 2017 11:04:03 +1000.

Fisk, P. 2013. Coastal bird habitat near Trinity Inlet – Identification, assessment and mapping of the habitat of selected bird species. Consultancy report to Ports North. December 2013.

Forster, P.I. 2000. The ant, the butterfly and the ant-plant: notes on Myrmecodia beccarii (Rubiaceae), a vulnerable Queensland endemic. Haseltonia, vol.7, pp2-7.

Geering, A., L. Agnew & S. Harding, eds. 2007. Shorebirds of Australia. Melbourne: CSIRO Publishing. (PR)

GHD. 2012. Common User Barge Facility Flora and Fauna Assessment. Prepared for Ports North.

Golder Associates. 2017. Values and Constraints Assessment – Groundwater Report Northern Sands Cairns Shipping Development Project. Prepared for Flanagan Consulting Group, January 2017.

Great Barrier Reef Marine Park Authority. 2014. Great Barrier Reef Region Strategic Assessment: Strategic Assessment Report. Final report. GBRMPA, Townsville.

Neldner, VJ, Wilson, BA, Thompson, EJ. and Dillewaard, HA. 2012. Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland. Version 3.2. Updated August 2012. Queensland Herbarium, Queensland Department of Science, Information Technology, Innovation and the Arts, Brisbane.

Olsen, P.D. 1998. Australia's raptors: diurnal birds of prey and owls. In: Birds Australia Conservation Statement 2. Supplement to Wingspan, 8(3).

Pizzey, G and Knight, F 2006, The Field Guide to the Birds of Australia, Seventh Edition, Harper Collins, Sydney.

Ports North. 2015. Risk Management Framework (adopted March 2015).

Prideaux, B. & Falco-Mammone, F (2007). Economic Values of Tourism in the Wet Tropics World Heritage Area, Cooperative Research Centre for Tropical Rainforest Ecology and Management, James Cook University, Cairns.

Sinclair Knight Merz. 2011a. Environmental Water Requirements to Maintain Groundwater Dependent Ecosystems. Environmental Flows Initiative Technical Report. Report Number 2.

Sinclair Knight Merz. 2011b. Australian Groundwater-Dependent Toolbox Part 1: Assessment Framework. Waterlines Report Series No 69.

Slater, PJ. 1994. 'Factors affecting the efficiency of the area search method of censusing birds in open forests and woodlands', Emu, vol. 94, pp. 9–16. (PR)Threatened Species Scientific Committee. 2008. Conservation advice for *Myrmecodia beccarii*. Available at: http://www.environment.gov.au/biodiversity/threatened/species/pubs/11852-conservation-advice.pdf.

Threatened Species Scientific Committee. 2016. Conservation advice for *Cyclopsitta diophthalma coxeni*.

Available at: http://www.environment.gov.au/biodiversity/threatened/species/pubs/59714-conservation-advice-15072016.pdf.

Wannan, B. 2012. Guidelines for Flora Survey and Assessment in Northern Queensland. Department of Environment and Heritage Protection.