

Terrestrial Ecology Assessment



Cape Flattery Silica Pty Ltd
Cape Flattery Silica Sands Project
Cape Flattery
BE210151.01
26 September 2022

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EXECUTIVE SUMMARY

Cape Flattery Silica Pty Ltd propose to develop and operate the Cape Flattery Silica Sands Project (the Project) at Cape Flattery, located approximately 42 km north-east of Hope Vale and 56 km north north-east of Cooktown on Cape York Peninsula. The overall area of the Project Mine Lease Application (MLA) is approximately 616 ha which encompasses the known geological resource for the silica sands deposit. The Project is on freehold land which is extensively covered with remnant native vegetation with no permanently occupied habitation. The Project is located adjacent to the existing Cape Flattery Silica Mine.

Desktop assessment of the Study area identified a number of matters of national or state environmental significance associated with terrestrial ecological values as occurring or possibly occurring in or near the Study area, including:

- The *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia Threatened Ecological Community* (TEC)
- High Ecological Significance (HES) wetlands
- Threatened wildlife habitat
- Vegetation identified as Of Concern under the EP Act and/or VM Act
- Threatened fauna species
- Threatened or near threatened flora species
- Fauna species listed as Migratory under the EPBC Act

The Study area has historically experienced minimal disturbance, and vegetation clearing appears to be limited to the vehicle tracks, and small-scale tree removal around campsites along the Connies Beach foreshore (which lies outside the ML). Within or adjacent to the Study area, field assessment identified the following ecological values associated with terrestrial habitats:

- Nine field verified REs including one vegetation community considered analogous to the *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia* TEC (Critically Endangered under the EPBC Act)
- 55.36 ha of vegetation listed as Of Concern under the EP Act
- Occurrence of two threatened plant species - *Acacia solenota* (Vulnerable under the NC Act) (very common) and *Myrmecodia beccarii* (Vulnerable under the NC Act and EPBC Act) - and habitat that may possibly support a further three threatened plant species
- Occurrence of the following threatened fauna species:
- Greater Sand Plover and Lesser Sand Plover (listed as Vulnerable or Endangered under the EPBC Act and/or NC Act respectively) were recorded outside but adjacent to the Study area
- Beach Stone Curlew and Estuarine Crocodile (both Vulnerable under the NC Act) also recorded outside but adjacent to the Study area
- Cape Heath Ctenotus (Vulnerable under the NC Act) was commonly recorded within the Study area
- A further three threatened species have potential to occur within the Study area
- Occurrence of seven bird species listed as Migratory under the EPBC Act recorded outside but near the Study area and habitat that may support six bird species listed as Migratory under the EPBC Act
- In addition, the southern boundary of the Project intersects two wetlands considered as of HES although these were not able to be accessed during the site surveys.

The overall Disturbance area for the Project (i.e. the area to be mined and areas to be modified for infrastructure) encompasses 309.03 ha. The main impact from the Project is expected to be from vegetation clearing. Mining will be carried out sequentially over a 26 year period. Rehabilitation of mined areas will occur as mining progresses over the life of the Project. As such, the extent of habitat loss at any one time will be much less than the overall Disturbance area and no loss of connectivity at the local or landscape scale is anticipated. Most other potential impacts of the Project are considered to be manageable with the application of Project-specific mitigation measures. Other likely impacts to terrestrial ecological values from the Project may include fauna mortality, impacts to local surface water flows and groundwater values.

The TEC is located outside the Disturbance area and no impacts are anticipated. Based on Commonwealth impact guideline criteria no significant impact is anticipated for any observed or predicted threatened or migratory species listed as a MNES.

The Project will impact potentially suitable habitat for Cape Heath Ctenotus (a skink). The potential for Cape Heath Ctenotus to use rehabilitated areas is uncertain but its life history is promising in that regard. Nevertheless, an assessment under the State impact guidelines indicates there is potential for the Project to have a significant residual impact on this species. *Acacia solenota* is considered to have a high likelihood of successful rehabilitation based upon its life history. As such, given the progressive nature of the Project mining, significant residual impacts have been assessed as unlikely to occur on the species. No significant residual impacts are predicted to occur on any other fauna or flora species listed as a MSES.

The Project may require offsets as per the Queensland Environmental Offsets Policy for the following terrestrial MSES (overlapped areas will need to be investigated):

- 0.34 ha of vegetation listed as Of Concern under the EP Act
- 8.68 ha of Category B (remnant) vegetation located within 10 m of a mapped watercourse (stream order 1 and 2) on the VM Act mapping layer
- 230.04 ha of field verified potentially suitable habitat for Cape Heath Ctenotus (listed as Vulnerable under the NC Act)
- 4.29 km of regulated vegetation (Category B – remnant vegetation) intersecting watercourses

ACRONYMS

Acronyms	Description
ABRS	Australian Biological Resources Study
AHD	Australian Height Datum
ALA	Atlas of Living Australia
AVH	Australasian Virtual Herbarium
BoM	Bureau of Meteorology
BPA	Biodiversity Planning Assessments
CAMBA	China-Australia Migratory Bird Agreement
CEEVNT	Critically Endangered, Endangered, Vulnerable or Near Threatened
CEMP	Construction Environmental Management Plan
CFS	Cape Flattery Silica Pty Ltd
CFSM	Cape Flattery Silica Mine
CYP	Cape York Peninsula
DAF	Department of Agriculture and Fisheries
DAWE	Former Department of Agriculture, Water and the Environment (now CCEEW)
CCEEW	Department of Climate Change, Energy, the Environment and Water (formerly DAWE)
DoE	Department of the Environment
DEHP	Department of Environment and Heritage Protection
DES	Department of Environment and Science
DEWHA	Department of the Environment, Water, Heritage and the Arts
DoR	Department of Resources
EA	Environmental Authority
EO Act	<i>Environmental Offsets Act 2014</i>
EOP	<i>EPBC Act Environmental Offsets Policy October 2012</i>
EP Act	<i>Environmental Protection Act 1994</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ERA	Environmentally relevant activity
ESA	Environmentally sensitive area
GBO	General biosecurity obligation
GBRMPA	Great Barrier Reef Marine Park Authority
GSSP	Galalar Silica Sand Project
ha	Hectare
HVASC	Hope Vale Aboriginal Shire Council
JAMBA	Japan-Australia Migratory Bird Agreement
km	Kilometre
LC	Least Concern
LGA	Local Government Area

ML	Mining lease
MLA	Mine lease application
MLES	Matters of Local Environmental Significance
mm	Millimetres
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
Mtpa	Million tonnes per annum
OEMP	Operation Environmental Management Plan
OZCAM	Online Zoological Collections of Australian Museums
PMR	Protected Matters Report
PMST	Protected Matters Search Tool
QG	Queensland Government
RE	Regional Ecosystem
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
sp	Species
spp	multiple species
TEC	Threatened Ecological Community
TSSC	Threatened Species Scientific Committee
VM Act	<i>Vegetation Management Act 1999</i>
WoNs	Weeds of National Significance

1 INTRODUCTION

This report details terrestrial ecology values associated with the Cape Flattery Silica Sands Project (the Project). The Project is located on the east coast of Cape York Peninsula, approximately 42 kilometres (km) northeast of Hope Vale, 56 km north-northeast of Cooktown, and 200 km north of Cairns, north Queensland, on land described as Lot 35 on Plan SP232620 and Mining Lease Application (MLA) 100284. MLA100284 lies within Hope Vale Aboriginal Shire Local Government Area (LGA) (refer **Figure 1**).

The proponent is Cape Flattery Silica Pty Ltd (CFS), wholly owned by Metallica Minerals Limited (Metallica). CFS intend to mine high quality silica sand from an area at Cape Flattery by means of dry-mining on MLA 100284. The Project involves a processing facility onsite, with associated accommodation, access, and support infrastructure. The total area of MLA 100284 is 616 hectares (ha) and is also referred to in this report as the Project area. The MLA will encompass all Project infrastructure excepting elements associated with the port infrastructure which extend into the marine environment.

Ecological values identified in this report are based on desktop review of available information followed by site surveys to confirm the presence of vegetation communities, native flora and fauna species, and their habitats. The survey covered accessible habitats within the MLA and extended to coastal habitats to the north and some terrestrial habitats to the east (hence forth referred to as the Study area).

The land-based elements of the Project disturbance footprint are to be restricted to the MLA and will be subject to an application to the State for establishment of a Mining Lease (ML) specific to the Project.

Flora surveys and proposed flora clearance areas are referred to in terms of disturbance within the immediate MLA100284 area (also referred to as the Project area). Whereas, fauna surveys were undertaken across the broader Study area, the extent of which is shown on **Figure 2**.

1.1 Purpose

This report details the existing terrestrial ecological values found within the Study area that are formally recognised by legislation, policy, plans and guidelines, including the following:

- Matters of National Environmental Significance (MNES) as defined under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) including conservation significant flora and fauna species and their habitat, including those listed as Critically Endangered, Endangered or Vulnerable
- Regional Ecosystems (REs) defined under the *Vegetation Management Act 1999* (VM Act)
- Conservation significant flora and fauna species and their habitat, including animals listed as Critically Endangered, Endangered, Vulnerable, Near Threatened or Special Least Concern under the NC Act
- Matters of State Environmental Significance (MSES) as defined by the *Environmental Offsets Regulation 2014*
- Matters of Local Environmental Significance (MLES) as defined by the local government planning scheme
- Environmental values as defined under the *Environmental Protection Act 1994* (EP Act) and the *Environmental Protection Regulation 2019* (EP Regulation)
- Bioregional terrestrial and riparian corridors identified in Biodiversity Planning Assessments (BPAs)
- Strategic environmental areas under the *Regional Planning Interests Act 2014*.

1.2 Scope

Epic Environmental Pty Ltd (Epic) was engaged by CFS to undertake desktop analysis and terrestrial ecology surveys within the Study area. The scope of this report is to support a site-specific Environmental Authority (EA) application under the *Environmental Protection Act 1994* (EP Act) and referral of the Project under the EPBC Act to the former Commonwealth Department of Agriculture, Water and Environment (DAWE), now the Department of Climate Change, Energy, the Environment and Water (DCCEEW).



Data Source:
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Legend

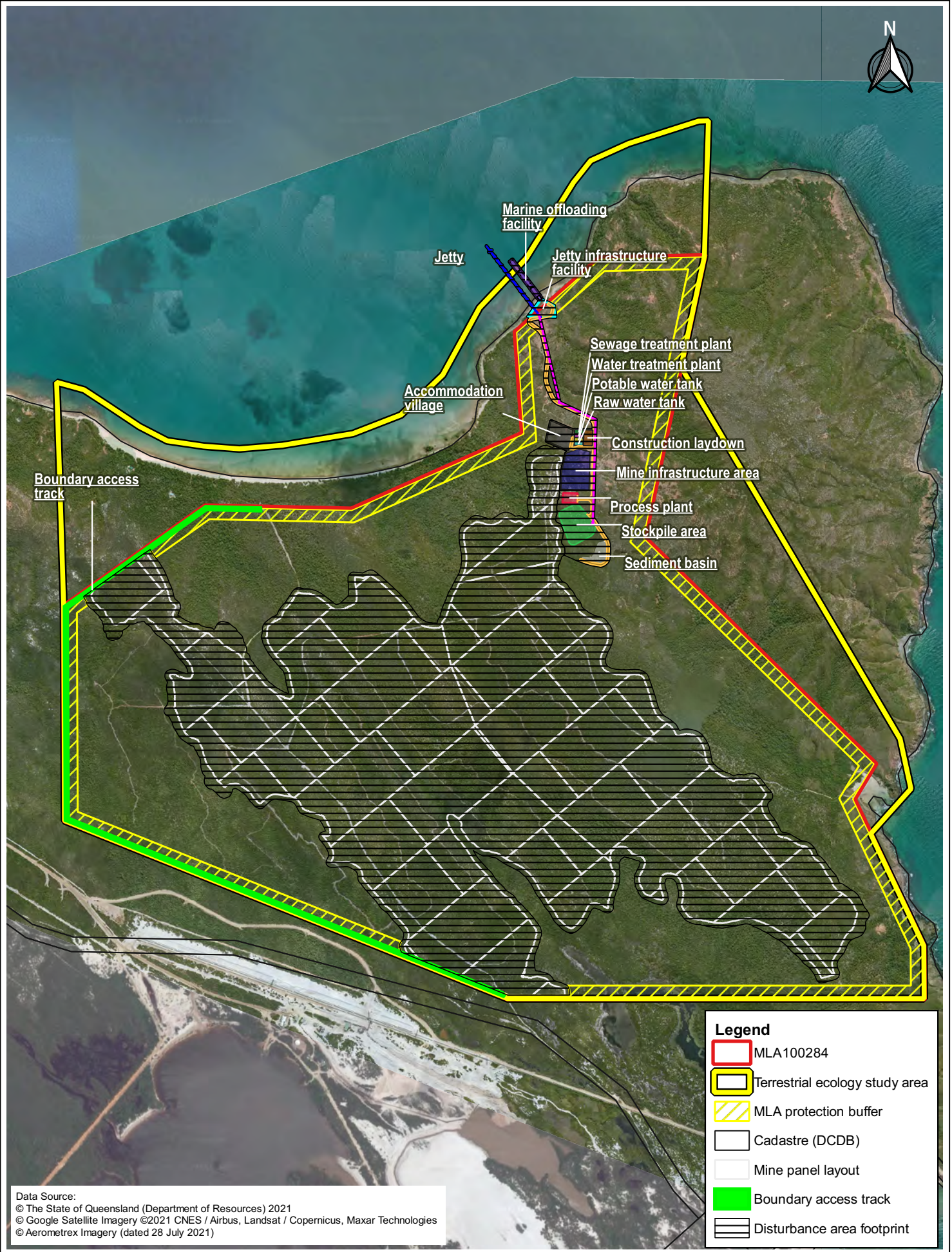
- MLA100284
- Roads



0 5 10 15 km
 Scale: 1: 300,000@ A4
 Datum: GDA2020 Projection: MGA zone 55

**Cape Flattery Silica Pty Ltd
 Cape Flattery Silica Sands Project
 Terrestrial Ecology Assessment**

Figure 1
 Regional Location

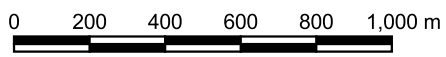


Legend

- MLA100284
- Terrestrial ecology study area
- MLA protection buffer
- Cadastre (DCDB)
- Mine panel layout
- Boundary access track
- Disturbance area footprint

Data Source:
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 © Aerometrex Imagery (dated 28 July 2021)

©QGIS 2019 File Path: G:\GIS\2021\BE2021\BE210151\01 CFS Cape Flattery Silica Sands Project\Workspaces\BE210151\02 Technical Studies\Terrestrial Ecology\Assessment\Rev 0\Figure 2 Study Area.OGZ



Scale: 1: 20,000@A4

Datum: GDA2020 Projection: MGA zone 55

**Cape Flattery Silica Pty Ltd
 Cape Flattery Silica Sands Project
 Terrestrial Ecology Assessment**

Figure 2
 Study Area

1.3 Project Description

The Project is a silica sand mining and processing operation located for the most part within MLA100284, covering an area of approximately 616 ha.

The Project is located on a greenfield site within the Cape Bedford/Cape Flattery dunefield complex which is characterised by large northwest trending transgressive elongated and parabolic sand dunes. The Project is located on Lot 35 SP232620 within the Hope Vale Aboriginal Shire Council LGA, adjacent to the existing silica sand mining and shipping operation owned by Mitsubishi, approximately 42 km northeast of Hope Vale and 200 km north of Cairns, Queensland.

Outside of MLA100284 on the north-eastern side of the site (but still connected to the site), a jetty and marine offloading facility (MOF) are proposed to be constructed on land within the Hope Vale Aboriginal Shire Council LGA, and inside the tidal areas of Cook Shire Council and the Port of Cape Flattery limits which is owned and operated by Ports North.

The Project involves mining and processing approximately 1.8 Mtpa of high-quality silica sand on site over a 20 to 26-year LOM with approximately 1.35 Mtpa of saleable product to be shipped offsite. Shipping frequency will be approximately one ship every two weeks, accessing the Port via established shipping routes under Great Barrier Reef and Torres Strait Vessel Traffic Service (REEFVTS) pilotage and Australian Maritime Safety Authority (AMSA) regulations. Estimated shipping size is Supramax (55,000 deadweight tonnage (DWT)) with a loading time per ship of around 3-4 days.

1.3.1 Infrastructure

On-lease Project infrastructure that will be assessed under the EA process will include a Mine Infrastructure Area (MIA) for general mine service facilities, mining panels, stockpile areas, laydown areas, processing plant, worker's accommodation for up to 80 persons, sediment basin, water storages, sewage treatment plant, conveyors, access tracks and a jetty infrastructure facility (JIF) to service the off-lease project infrastructure.

Off-lease Project infrastructure that will be assessed under the DA process includes an approximately 350 metre (m) long jetty supporting a conveyor from the JIF to the jetty hopper, 200 m long MOF, residual JIF area, and transhipment from the jetty to a swing basin with mooring / anchorage capability. The jetty will be supported by 11 single piles over the total length and eight dolphins (piles) installed at the end of the jetty in an arc formation for the barges to moor against while being loaded. Additional piles will support the barge loading and jetty hopper infrastructure which extends an additional 10 m from the end of the jetty.

The MOF is a purpose built structure to facilitate the delivery of equipment and goods to the Project during both construction and operations. From the JIF, an access road will lead down to the shoreline and a steel ramp will be constructed and extended to the edge of the rocky shore area where it will meet a series of floating jack up barges (approximately three). These barges are self-supporting on top of the seafloor via piles and will allow the barges to move up and down as needed, allowing tide and flow underneath. Seafloor disturbance is therefore constrained to the immediate location at each jack up barge support pile. The last barge will be at a sufficient depth to allow for loading and unloading of materials from appropriately sized barges and ships. During inclement weather, the barges can be relocated to deeper water if required to prevent damage.

Further description of the key infrastructure within and outside of the MLA is provided in **Table 4** of the Environmental Authority application.

1.3.2 Construction

Construction is expected to commence in 2023 and will run for approximately six months. A construction workforce of around 35 persons per swing will be required and will work on a roster basis with transport to the Project from Cooktown by fast passenger boat.

1.3.3 Operations

Operations are expected to commence in 2024 with a 20 to 26-year LOM. The mining method would involve sequential excavation using a front-end loader feeding a mobile tracked hopper-feeder which connects to the processing plant via a pipeline system. Water is added to the hopper-feeder to slurry the material and transport it from the mining face to the processing plant, via the pipeline. Development of the active mine area would be staged with progressive rehabilitation occurring behind the advancing mine face. Clearing and grubbing activities will occur during daylight hours. Mining and processing will operate as a continuous process for 24 hours per day and 360 days per year.

Processing of silica will occur within the MIA which will consist of separation processes, and recovery/reuse of water used in the processing plant where possible. Non product materials generated through processing such as organics, would be directed to storage for use in rehabilitation activities.

Silica sand will be directly loaded from the product stockpile onto a covered conveyor and transported to the jetty where it is loaded onto barges via a stacker. From there, silica sand will be transported offshore and transhipped onto bulk carrier ships within the Cape Flattery Port area and exported.

An operational workforce of approximately 65 staff per roster will be required and will work on a roster basis with transport to the Project from Cooktown by a weekly fast passenger boat. The workforce will largely be recruited from local areas including Hopevale, Cooktown, and Cairns, and transported to the port of embarkation via plane from Cairns, or via bus from Cooktown and Hope Vale.

1.3.4 Ancillary Aspects

The MIA will include site office, workshop, laboratory, crib room, amenities building, emergency accommodation buildings, potable water treatment plant, fuel storage facilities, diesel power supply, roads, water supply, settling pond and sewage treatment facilities. Installed equipment and buildings are modular and minimal maintenance is required during operations.

A 36 ML sediment basin is located to the south of the MIA and will collect rainfall run-off from the MIA and store process water for recycling purposes.

A detailed description of ancillary aspects of the Project is provided in **Section 2.4** of the Environmental Authority application.

1.4 Legislative Context

An overview of the legislative context for the Project has been provided in **Table 1**.

Table 1. Legislative Context

Legislation	Overview
Commonwealth Legislation	
<i>Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)</i>	The EPBC Act is the key piece of Commonwealth legislation governing environmental protection in Australia. Administered by the Commonwealth Government Department of Climate Change, Energy, the Environment and Water (CCEEW, formerly DAWE) the EPBC Act defines and protects nine matters considered to be of National Environmental Significance (MNES) including: <ul style="list-style-type: none"> • World Heritage properties • National Heritage places • Wetlands of international importance (listed under the RAMSAR Convention) • Listed threatened species and ecological communities • Migratory species protected under international agreements • Commonwealth marine areas • Great Barrier Reef Marine Park • Nuclear actions (including uranium mines)
<i>Environment Protection and Biodiversity Conservation Regulations 2000</i>	

Legislation	Overview
	<ul style="list-style-type: none"> A water resource in relation to coal seam gas development and large coal mining development <p>Under Part 3 of the EPBC Act, a person must not undertake an action (e.g. a project, development, an undertaking, an activity or a series of activities, or an alteration of any of these things) that will have, or is likely to have, a significant impact on a protected matter, without approval from the Minister for CCEEW (the Minister).</p>
<i>Environmental Offsets Policy October 2012 (EOP)</i>	<p>The <i>EPBC Act Environmental Offsets Policy October 2012</i> (EOP) provides upfront guidance on the role of offsets in environmental impact assessments, and how the CCEEW considers the suitability of a proposed offset. The EPBC Act EOP aims to improve environmental outcomes through the consistent application of best practice offset principles, provide more certainty and transparency, and encourage advanced planning of offsets.</p>
State Legislation	
<i>Environmental Protection Act 1994 (EP Act) and Environmental Protection Regulation 2019 (EP Regulation)</i>	<p>The objective of the EP Act is to protect Queensland's environment and to promote ecologically sustainable development. The EP Act defines a General Environmental Duty under which all persons in Queensland have a responsibility to not carry out an activity that causes or is likely to cause environmental harm, and to take all reasonable and practicable measures to prevent or minimise the harm. The EP Act also regulates Environmentally Relevant Activities (ERAs). ERAs are activities that require an Environmental Authority (EA) prior to activities commencing. Resource activities (mining) are defined under the EP Act as a resource ERA for which an EA is required.</p> <p>The objective of the EP Regulation is to provide the basis for effective and efficient administration and enforcement of the provisions of the EP Act.</p>
<i>Environmental Offsets Act 2014 (EO Act)</i>	<p>The EO Act is intended to counterbalance significant residual impacts of particular activities on prescribed environmental matters by way of environmental offsets. This is achieved primarily through establishment of a framework for environmental offsets, recognition of protection given to prescribed environmental matters under other legislation; provision for National, State and local matters of environmental significance to be prescribed environmental matters, and coordination of implementation of the framework in conjunction with other legislation.</p>
<i>Nature Conservation Act 1992 (NC Act)</i> <i>Nature Conservation (Animals) Regulation 2020</i> <i>Nature Conservation (Plants) Regulation 2020</i>	<p>The NC Act regulates environmental impacts of the mining industry through requirements for vegetation clearing permits, species management programs and other permits.</p> <p>A clearing permit is required to clear protected plants unless an exemption applies. In general, clearing of Critically Endangered, Endangered, Vulnerable or Near Threatened protected plants will require a clearing permit. Clearing permit applications are assessed on a case-by-case basis and approvals will be subject to conditions.</p> <p>Where mining activities involve tampering with animal breeding places, the tampering may be authorised by application to DES through an approved species management program.</p>
<i>Vegetation Management Act 1999 (VM Act)</i>	<p>The VM Act regulates clearing of vegetation in Queensland. The VM Act aims to conserve Queensland's biodiversity through vegetation management. The VM Act does not apply on mining leases and assessment of the application for the mining lease will assess the vegetation clearing activities required as part of mining activities at the site.</p>
<i>Biosecurity Act 2014 (Biosecurity Act)</i> <i>Biosecurity Regulation 2016</i>	<p>The Biosecurity Act ensures a consistent, modern, risk-based and less prescriptive approach to biosecurity in Queensland. The Biosecurity Act provides comprehensive biosecurity measures to safeguard the economy, agricultural and tourism industries, environment, and way of life from pests, diseases, and contaminants. Decisions made under the Biosecurity Act will depend on the likelihood and consequences of risk, allowing for more appropriate management of risks.</p> <p>Under the Biosecurity Act a person who has control over a 'Restricted Matter' must not do the following:</p>

Legislation	Overview
	<p>1. Category 3: You must not distribute this restricted matter. This means it must not be given as a gift, sold, traded or released into the environment unless the distribution or disposal is authorised in a regulation or under a permit;</p> <p>2. Category 4: You must not move this restricted matter to ensure that it does not spread into other areas of the state;</p> <p>3. Category 5: You must not keep or be in possession or control of this restricted matter; and</p> <p>4. Category 6: You must not feed this category of restricted matter. Feeding for the purpose of preparing for or undertaking a control program is exempted.</p> <p>The Proponent has a statutory duty of care ‘general biosecurity obligation (GBO)’ under the Biosecurity Act (s23). Under the GBO, the Proponent must:</p> <ol style="list-style-type: none"> 1. Take all reasonable and practical steps to prevent or minimise each biosecurity risk 2. Minimise the likelihood of causing a ‘biosecurity event’, and limit the consequences if such an event is caused 3. Prevent or minimise the harmful effects a risk could have, and not do anything that might make any harmful effects worse

2 ECOLOGICAL ASSESSMENT

Ecological assessment of the Project consisted of desktop review of publicly available data sources and information. The desktop review was followed by seasonal field surveys carried out within the Study area to describe ecological values present and to aid in identification and evaluation of potential impacts. A summary of assessment methods is provided in the following sections.

2.1 Desktop Assessment

2.1.1 Database Sources

A desktop assessment was carried out to identify relevant ecological values, including species and ecological communities of conservation significance that potentially occur within the Study area. Database and information sources utilised in the desktop assessment are listed in **Table 2**. Relevant database search results are provided in **Appendix A**.

Table 2. Database sources

Databases		Search Area / Coordinates	Search Date
CCEEW (formerly DAWE)	Protected Matters Search Tool (EPBC Act)	25 km radius ¹ of -14.9687, 145.3343	4 August 2022
DES	Wildlife Online Database	MLA100284	20 September 2022
DES	Matters of State Environmental Significance	MLA100284	20 September 2022
Department of Resources (DoR)	Regulated Vegetation Management Map (VM Act)	Based on Study area	20 September 2022
DoR	Vegetation Management Report	Based on Study area	20 September 2022
DoR	Regional Ecosystem mapping (VM Act)	MLA100284	20 September 2022
DoR	Map of Environmentally Sensitive Areas (EP Act)	MLA100284	21 September 2022
DES	WetlandMaps	Based on Study area	20 September 2022
DES	Protected Plants Flora Trigger Map	Based on Study area	20 September 2022

1. A 25 km radius captures habitats not relevant to the Study Area but is required as the general area is comparatively poorly surveyed.

2.1.2 Other Resources

Other desktop resources were investigated to provide insight into species that were likely to inhabit the Study area. These included:

- *Atlas of Living Australia* (ALA 2022)
- CCEEW's *Species Profile and Threats Database* (CCEEW 2022a)
- *Online Zoological Collections of Australian Museums* (OZCAM 2022)
- Biodiversity Planning Assessment for the Cape York Peninsula Heritage Area - Flora, fauna and landscape expert panel report (DEHP 2013).

2.1.3 Reliability and Accuracy of Desktop Assessment

Data sources have highly variable reliability. WildNet (*Wildlife Online*) data recently collected is subject to a vetting process and is generally considered to be of high quality. Historical records may also no longer be relevant if land use and vegetation cover have changed markedly, or species distribution has contracted substantially. Therefore, only records since 1980 are included in the desktop assessment. It is possible to search species profiles (QG 2022) for many species and download spatial data to map records. Some threatened species are considered 'sensitive' due to the threat of illegal collection or disturbance and their

records are not available. However, less than half the data held in WildNet are available to the public and there may be substantial discrepancies between the number of records within a selected radius and the number of records for which details are available.

The *Atlas of Living Australia* (ALA 2022) and *Online Zoological Collections of Australian Museums* (OZCAM 2022) provide coordinates, often of high precision. Unfortunately, a significant proportion of ALA records are unreliable, either being misidentifications or even the submission of a captive animal record. In addition to records submitted directly to ALA, it also includes much of the data in WildNet, OZCAM, *eBird* and *Birdlife Australia's Atlas* data.

Also searched was the Protected Matters Search Tool (CCEEW 2022b, formerly DAWE), which generates a Protected Matters Report (PMR) of matters protected by the EPBC Act considered likely to occur within an area of interest. The Protected Matters Search Tool, while based on some species records, relies on predictive modelling of suitable habitats and does not necessarily reflect an actual record of the species in question for a particular location. In some instances, it generates predictions of species for which there are no records, including historical, based on habitat.

2.1.4 Nomenclature and Taxonomy

The common names of many flora and fauna species frequently vary between regions, and many species lack them altogether. Taxonomy of flora presented in this report follows that currently endorsed by the Queensland Herbarium in the *Census of Queensland Flora 2020*. The taxonomy of fauna follows the *Australian Faunal Directory* (ABRS 2021). For common and scientific names of flora, refer to **Appendix D** and for fauna species, refer to **Appendix F**.

In this report, flora and fauna species are referred to initially by both their common and scientific names and then for ease of reading, only by their common name (where the species has a common name).

2.2 Field Survey Method

2.2.1 Survey Timing and Conditions

In accordance with the *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (Eyre et al. 2018) surveys in the Cape York Peninsula (CYP) bioregion should be carried out in early wet season (November to January) and early dry season (May to July). The wet season flora and fauna survey was delayed by a day due to inclement weather which initially precluded access by helicopter and was abandoned a day early due to an impending cyclone which was situated to the northeast of the Study area. Consequently, the survey was conducted over a three night period from 26 to 28 February 2021. Due to weather conditions, trapping was conducted for one night only. The dry season fauna survey was conducted from 23 to 29 June 2021, with trapping conducted over a four night/five day period. The dry season flora survey was carried out from 15 to 19 August 2021.

2.2.2 Wet Season Survey Conditions

During the wet season survey, minimum temperatures at Cooktown (56 km to the south) ranged from minimums of 24.6 to 24.9 degrees Celsius (°C) and maximums from 29.0 to 31.9°C. Rainfall totalled 11.6 millimetres (mm) (BoM 2021) during the wet season survey period. Temperatures would have been very similar in the Study area however, there was significant rainfall with some sustained torrential downpours.

2.2.3 Dry Season Survey Conditions

During the dry season fauna survey, minimum temperatures at Cooktown ranged from minimums of 18.3 to 22.5°C and maximums from 26.0 to 28.2°C. No rain was recorded (BoM 2021). Temperatures would have been similar in the Study area but there was significant rainfall, with some sustained and heavy falls (which were not measured). Rain fell every day except for 23 June.

During the dry season flora survey temperatures at Cooktown ranged from a minimum of 20.7°C to a maximum 27.2°C. No rainfall was recorded at Cooktown in the survey period although it is noted there is no weather data available for the dates from 15 to 17 August 2021 (BoM 2021).

2.2.4 Flora Survey Methods

To satisfy minimum mapping requirements outlined by Queensland herbarium guidelines (Neldner et al. 2020), floristic data was collected to allow mapping at a spatial scale of approximately 1:50,000. Data were collected from a total of 44 quaternary sites, nine BioCondition/secondary sites and rapid observation data (field data is provided in **Appendix E**). Flora survey methods are described in the following sections.

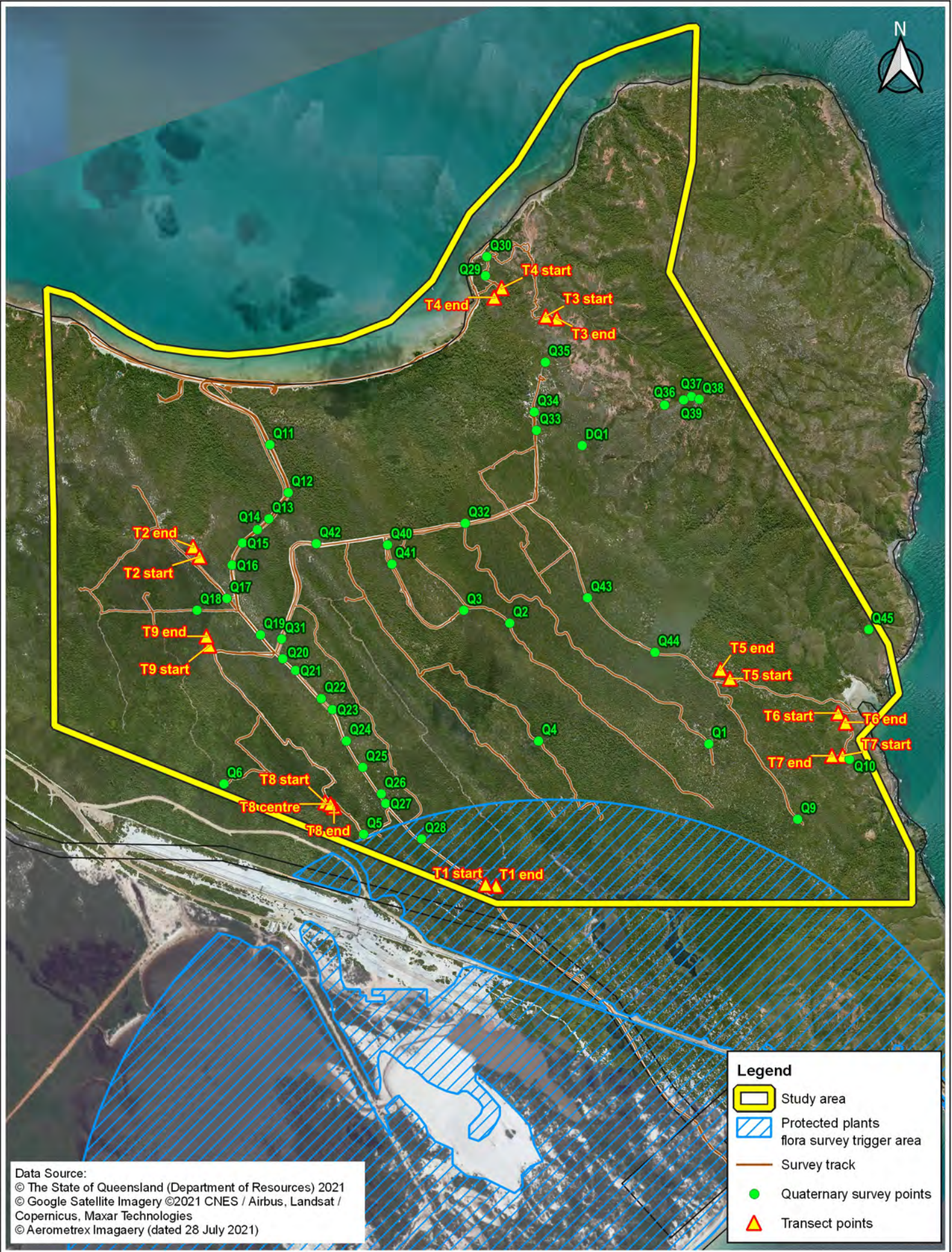
2.2.5 Quaternary and Secondary Transect Assessment Sites

The validity of Queensland Government vegetation community (RE) mapping was assessed using quaternary assessments, as defined in the *Methodology for surveying and mapping regional ecosystems and vegetation communities in Queensland, Version 5.1* (Neldner et al. 2020). Dominance of species within the ecologically dominant layer used in combination with surface soil type, landscape position and surficial geology was used to determine the RE, with reference to the Queensland Herbarium's RE description database (Version 12). A total of 44 quaternary assessments were collected across the Study area.

BioCondition/secondary sites were used to sample representative habitats of varying conditions of vegetation within the Study area. Surveys were undertaken in accordance with the Queensland Herbarium *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland, Assessment Manual, Version 2.2* (Eyre et al. 2015). Structural and floristic data consistent with the requirements for secondary survey sites was collected at BioCondition sites. Nine BioCondition/secondary assessments were collected across the Study area (**Figure 3**).

In addition to the assessment methods mentioned above, RE observations were recorded throughout the Study area during traverses. Observations comprised informal rapid assessments of the surrounding vegetation to categorise it to the most suitable RE.

Drone flyovers were conducted over the proposed tailings storage and processing facilities. Interpretation of the high-resolution images and videos obtained during the flyovers was used to assist with the delineation of the verified vegetation communities.



Data Source:
 © The State of Queensland (Department of Resources) 2021
 © Google Satellite Imagery ©2021 CNES / Airbus, Landsat / Copernicus, Maxar Technologies
 © Aerometrex Imagery (dated 28 July 2021)

Legend

- Study area
- Protected plants flora survey trigger area
- Survey track
- Quaternary survey points
- ▲ Transect points



0 250 500 750 1,000 m
 Scale: 1:20,000@ A4
 Datum: GDA2020 Projection: MGA zone 55

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Figure 3
 Flora Survey Sites

2.2.6 Fauna survey methods

The fauna survey approach for the Project were developed based on the results of the desktop review and the methods described in the *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (Eyre et al. 2018).

One team, consisting of a fauna ecologist and assistant scientist, carried out wet and dry season surveys. Due to inclement weather, the wet season survey was limited to a three night period with a single night of trapping. As a result, only three trap sites were established. The three sites each had box traps and a line of pitfall and funnel traps. Ten camera traps and two Anabat units (for recording microbat calls) were also deployed for a single night.

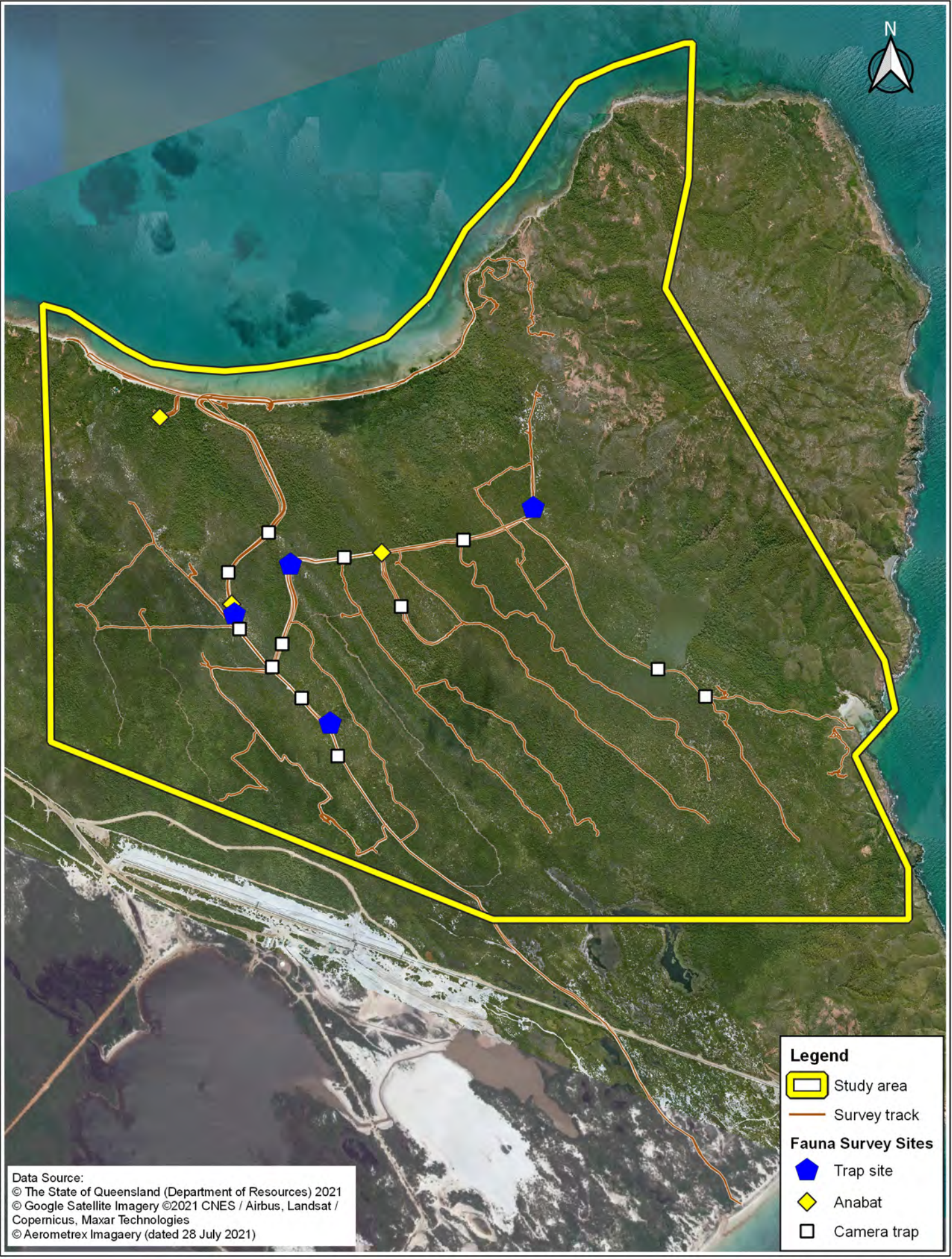
The dry season survey was conducted over seven days, with trapping conducted over a four night/five day period on four systematic trap sites. Four targeted sites were also implemented for camera traps and/or Anabat (**Figure 4**).

The fauna survey sites were focused on heathland within the proposed mining area, although all terrestrial vertebrate fauna present in the overall Study area were documented. Observational data was collected in coastal scrub and along the shoreline of Connies Beach and fringing rocky areas. No trapping was conducted in these areas, although Anabat data were collected in coastal scrub.

The heath on site was so dense it precluded trapping any distance in from the edges (refer typical depiction of habitat in **Plate 1**). Substantial removal of vegetation would have been required to establish trap lines of pitfall and funnel traps with a drift fence. This was not considered appropriate or necessary. Instead, existing open areas within heath were used. This limited trap locations to four sites, though trap effort was doubled at one of the four sites to compensate for lack of a fifth site.



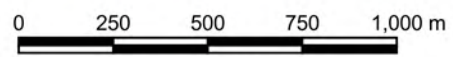
Plate 1. View across heath vegetation dominating Cape Flattery area



Data Source:
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© Aerometrex Imagery (dated 28 July 2021)

Legend

- Study area
- Survey track
- Fauna Survey Sites**
- Trap site
- Anabat
- Camera trap



Scale: 1: 20,000@A4
Datum: GDA2020 Projection: MGA zone 55

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Figure 4
Fauna Survey Sites

Trap sites were accessed in the early morning and late afternoon each day of the surveys. Trapping methods implemented at these sites are outlined in **Table 3**.

Table 3. Project Fauna Trapping Methods

Survey method	Description	Target taxa/species
Elliott trapping	<p>At each trap site, 25 box traps (generic Type-A Elliott Traps) were placed 10-20 m apart and baited with standard small mammal mix (peanut butter, oats, oil, sardines, and honey). All traps were placed in heath. Each trap was opened late each afternoon and checked and closed the following morning before 0900. Traps were operational for four nights per site in the June survey. Only a single night's trapping was conducted in February due to wet weather.</p> <p>Total of 575 trap nights carried out during the surveys.</p>	<p>Small mammals</p> <p>Reptiles and some frog species may also be captured</p>
Pitfall/funnel trap lines	<p>Six or eight funnel traps and four 20 L pitfall buckets were placed per trap site. Pitfall traps were arranged along (bisected) a 20 m long drift fence. Funnel traps were arranged in two parallel lines either side of the drift fence or scattered around targeted habitat (i.e. vegetation, fallen timber and rocky areas) if that better suited the trap site location. Shade cloths were placed over each funnel trap to protect trapped animals during the day. Traps were operational for four consecutive nights at each survey site. Traps were checked and cleared each morning and late afternoon.</p> <p>Total of 182 funnel trap nights and 92 pitfall trap nights carried out during the surveys</p>	<p>Frogs, small / mid-size reptiles and snakes and small mammals</p>
Remote sensory cameras	<p>Remote-sensing camera 'traps' were used to complement the box traps in an effort to detect medium to large mammals. Each camera site was operational for four consecutive days and nights. Ten cameras deployed on the wet season survey and 12 cameras were deployed during the post-wet season survey.</p> <p>Total of 58 camera nights carried out during the surveys.</p>	<p>Range of small to large fauna species</p>
Microbat call recording	<p>Microbat calls were recorded using two Anabat Swift recorders over five nights during the post-wet and dry season surveys (combined). The Anabat units were operational for the entire night, ensuring that recording took place during periods of peak activity. These recorders were located at trap sites and target sites.</p> <p>Total of 10 call recording nights across two surveys.</p>	<p>All microbats</p>
Spotlighting	<p>Spotlighting was undertaken on foot and via vehicle along tracks.</p> <p>Approximately 8 person hours of spotlighting during the dry season survey.</p>	<p>Nocturnal fauna including arboreal mammals</p>
Habitat searches for herpetofauna	<p>Inspections of potential shelter sites (e.g. fallen timber, debris, leaf litter) were carried out during the day to search for additional species (largely herpetofauna) not recorded using other survey techniques.</p>	<p>All herpetofauna</p>
Bird surveys	<p>Bird species were recorded at each systematic site during the twice-daily visits to check traps. Birds were identified by sight or call. An area with an approximate radius of 100 m around each trap-line was included in these bird censuses. At least two hours of survey effort was devoted to each site. Additional surveys carried out opportunistically throughout Study area.</p>	<p>All bird species</p>
Opportunistic records	<p>In addition to censuses of each systematic fauna site, many species were recorded during targeted and opportunistic searches of the entire Study area. Searches were carried out opportunistically in all REs and included opportunistic records located outside the immediate boundary of the Study area.</p>	<p>All fauna</p>

2.2.7 Suitably qualified personnel

2.2.7.1 Flora survey

The flora survey was coordinated by Daniel Hede and Paul Williams, both suitably qualified persons.

Daniel Hede

Daniel holds a Bachelor of Science in Ecology and has nine years of experience as a botanist. He has been involved on projects for government and non-government organisations, as well as projects for mining and other infrastructure. He has conducted ecological surveys in New South Wales and in eight of Queensland's bioregions. His expertise includes baseline survey, habitat assessment and targeted survey for conservation significant species.

Dr Paul Williams

Paul has undertaken vegetation surveys and research across Queensland, and helped implement bushfire programs in north Queensland, over the last 20 years. These vegetation surveys and research include evaluations of fire regimes and weed management in coastal woodlands, montane heath, tall eucalypt forests, spinifex woodlands and grasslands. He has assisted with the implementation of fire programs in a broad range of open and shrubby woodlands and forests, and grasslands across north Queensland. Vegetation surveys also include RE mapping for Environmental Impact Assessments, mine site rehabilitation and threatened flora surveys.

Paul holds a PhD in vegetation ecology from James Cook University, his thesis examined the role of different fire regimes in eucalypt woodlands of the Townsville region. Through his role as an Adjunct Senior Research Fellow with James Cook University, Paul helps undertake research into land management issues, especially relating to fire and weed management.

2.2.7.2 Fauna survey

The fauna surveys were led by fauna ecologist Terry Reis with support from environmental scientist Maria Mahon.

Terry Reis

Terry has a Bachelor of Science in Australian Environmental Studies (Honours I) and has been a fauna ecologist for more than 20 years. He is skilled in the identification of mammals, birds, reptiles and frogs and has conducted fauna surveys in all of Queensland's 13 bioregions. His expertise includes baseline survey, habitat assessment and targeted survey for conservation significant species. He has extensive experience in impact assessment, environmental regulation, specialist ecological studies, technical review and project management and design. Terry has provided expert advice to a number of organisations/bodies including the *Squatter Pigeon Recovery Team* and *Brigalow Belt Reptile Recovery Team* (Commonwealth and Queensland Governments, respectively). Terry is on the *Birds Queensland Records Appraisal Committee* and assesses records of rare birds for the State.

Maria Mahon

Maria is a Senior Environmental Scientist with eight years of experience in environmental consultancy. Maria has various ecological field experience focussing on fauna and habitat surveys throughout Queensland (specifically within nine of Queensland's bioregions). Maria also has prepared documents reporting on ecological records, impacts and recommending appropriate and practical approvals, permits and mitigation measures for projects. Maria holds a Bachelor of Environmental Engineering and Bachelor of Marine Science from the University of Queensland.

2.2.8 Survey limitations

Eyre et al. (2018) recommend fauna surveys in the Cape York Peninsula bioregion should be carried out in the early wet season (November to January) and early dry season (May to July). The wet season survey could only be undertaken in February due to Project timing, logistical considerations and access restrictions. The dry season Project fauna survey was undertaken in June 2021 during the recommended period.

Flora surveys carried out north of the Tropic of Capricorn should be carried out following the wet season, preferably from March to May, to ensure adequate coverage of ground cover species (Neldner et al. 2004 in Eyre et al. 2017). Although the dry season flora survey was carried out in August it is considered sufficient survey effort was applied to describe the vegetation communities present.

Due to weather conditions and safety concerns, fauna trapping was conducted over one night during the wet season survey. Trapping was conducted for four nights in the dry season, although unseasonably heavy rain may have affected capture rates of some fauna species while increasing the likelihood of frog captures. It is acknowledged the curtailed wet season survey may have reduced the overall number of fauna species detected during the Project surveys. Nevertheless, this is not considered to have adversely affected the observations within this report, particularly those regarding the presence of threatened species and/or their supporting habitat.

Some trapping methods, such as pitfalls and funnel traps, were implemented to a comparatively limited degree due to the density of the vegetation. Suitable locations for drift fences were confined to the sides of tracks, which generally were too narrow for trap site establishment. Nevertheless, sun-loving reptiles such as *Ctenotus* species may be more common along the edges of tracks, rather than in the heavily shaded areas of heath.

Similarly, flora surveys were largely restricted to existing tracks due to the density of the heath vegetation. Given the spread of tracks through the Study area this is not considered to have an effect on vegetation community identification and mapping (which also utilised analysis of aerial imagery). It is acknowledged this limited the extent to which searches for threatened flora could be carried out.

2.2.9 Scientific permits and ethics approval

Surveys were conducted under the following permits:

1. Scientific Use Registration Certificate (Department of Agriculture and Fisheries) – (Registration No. SUR001535)
2. Research Permit (Department of Environment and Science) – (Permit Number – WA0027840)
3. Animal Ethics Approval (Department of Agriculture and Fisheries) – (Reference No. CA 2020/06/1377)

3 DESKTOP ASSESSMENT RESULTS

3.1 Regional Overview

The Study area lies in Hope Vale Aboriginal Shire in the Starke Coastal Lowlands subregion of Cape York Peninsula bioregion. It is located on the east coast of Cape York Peninsula in north Queensland, approximately 42 km north-east of Hope Vale and 56 km north north-east of Cooktown. Approximately half of the bioregion is used for pastoral activities. Other tenures include Aboriginal land and national parks. Other land uses include bauxite and silica mining. The Cape York Peninsula bioregion has hot and humid wet seasons with higher rainfall reliability than most rangeland bioregions.

3.1.1 Existing land use and tenure

The Project is on Freehold land which is extensively covered with remnant native vegetation with no permanently occupied habitation. The only land-based commercial enterprise near the Study area is CFSM, though cattle are grazed in suitable areas some distance to the west and south. The existing mine is adjacent to the Study area. There is an existing port located to the south-east of the Study area established solely for the export of silica sand from the mine. The port comprises a single berth serviced by a travelling ship loader.

3.1.2 Topography

Topography across the Study area ranges from approximately sea level in the east to 100 m Australian Height Datum (AHD) in the north on a rocky hill. The Study area is bounded to the west, north-east and east by rocky hills. Otherwise, it is dunefields of varying height, rising to 90 m (AHD).

3.1.3 Soils and geology

There are two soil units mapped within the Study area under the Atlas of Australian Soils classification (Northcote et al. 1960-68) (Table 4 and Figure 5).

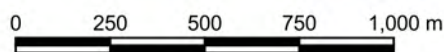
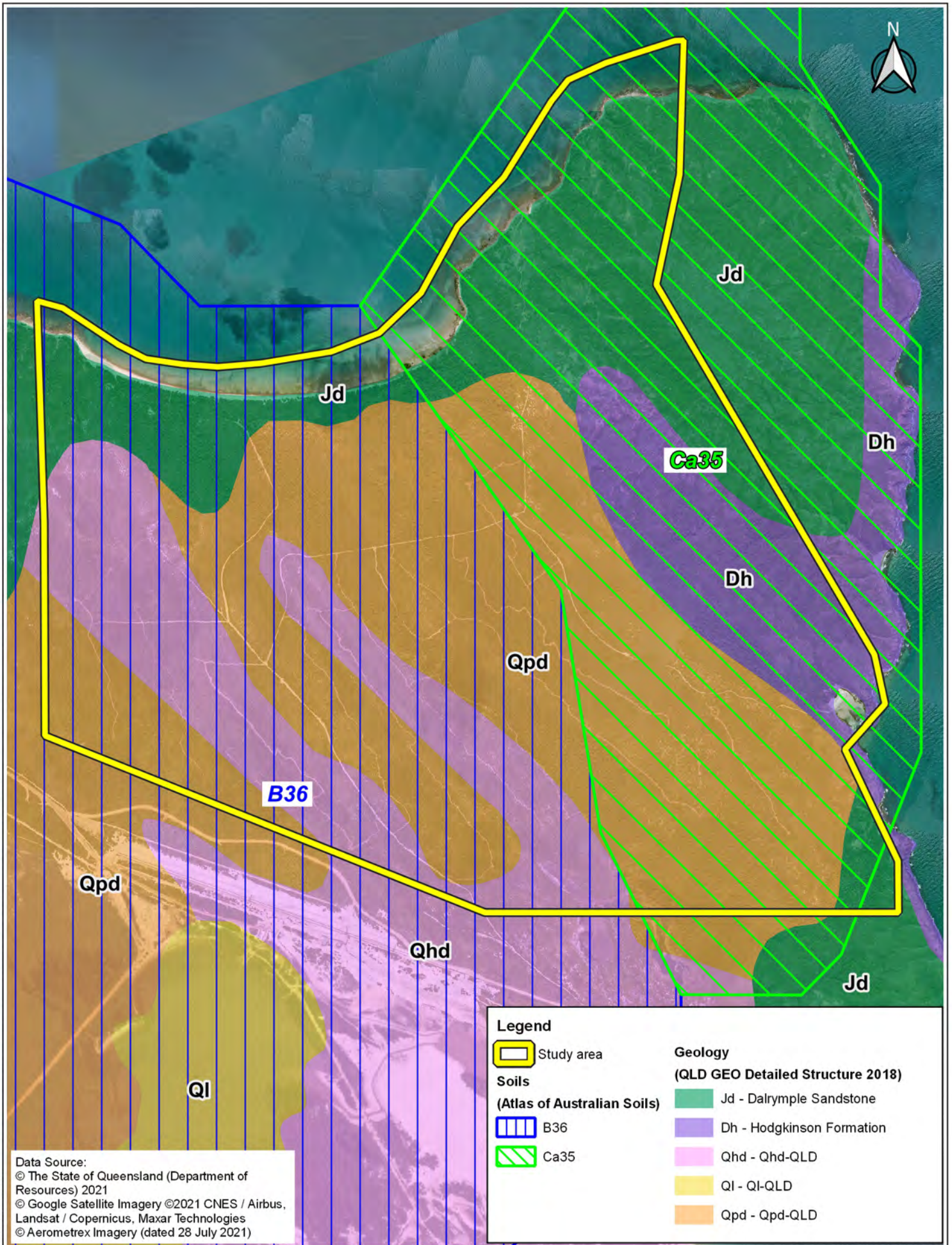
Table 4. Soil types

Code	Description	Soil Type	General Description
Ca35	Hilly or high hilly lands many sandstone mesas bounded by steep scarps. Area often dissected by streams to form narrow steep-sided ravines & deep valleys	Uniform coarse, non calc, A2 horizon conspic bleached with B horizon value/chroma=2, 4/ 5	Bleached sands with a colour B horizon
B36	Extensive areas of siliceous sand dunes aligned in a NW-SE direction-Dunes often of elongated parabolic form ridges	Uniform coarse, non calc weakly coherent below A1 horizon of value/chroma=2/3	Siliceous sands

Source: Atlas of Australian Soils (Northcote et al, 1960-68) Queensland – 1:2000 000 (QG 2021)

Reference to the Queensland Government's 'Detailed Survey Geology' layer presented on Queensland Globe indicates the Study area and surrounding areas are underlain by four dominant lithologies:

- The majority of the Study area is Pleistocene quartz sand forming high parabolic sand dunes
- The eastern portion of the Study area includes Early Devonian to Late Devonian Hodgkinson formation, composed of mainly pale to dark or greenish grey, fine to medium-grained, medium to thick-bedded, quartz-intermediate greywacke, rhythmically interbedded with siltstone and mudstone; minor conglomerate, conglomeratic greywacke
- The northern portion and a very small area in the south of the Study area include Middle Jurassic Dalrymple Sandstone, composed of cross-bedded quartz and sublabilite sandstone locally labile, conglomerate, minor shale; rare skolithos beds
- The central and western portions of the Study area include Holocene Qhd-QLD, composed of quartzose and locally shelly sand; aeolian sand dunes



Scale: 1: 20,000@A4

Datum: GDA2020 Projection: MGA zone 55

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Figure 5
 Soils and Geology

3.1.4 Wetlands

There is a small area of natural wetlands that are considered as 'High Ecological Significance' (HES) on the Map of Queensland Wetland Environmental Values present on the southern boundary of the Study area. In accordance with the QLD wetland mapping categorisation, there are two aquatic habitat types occurring within the Study area:

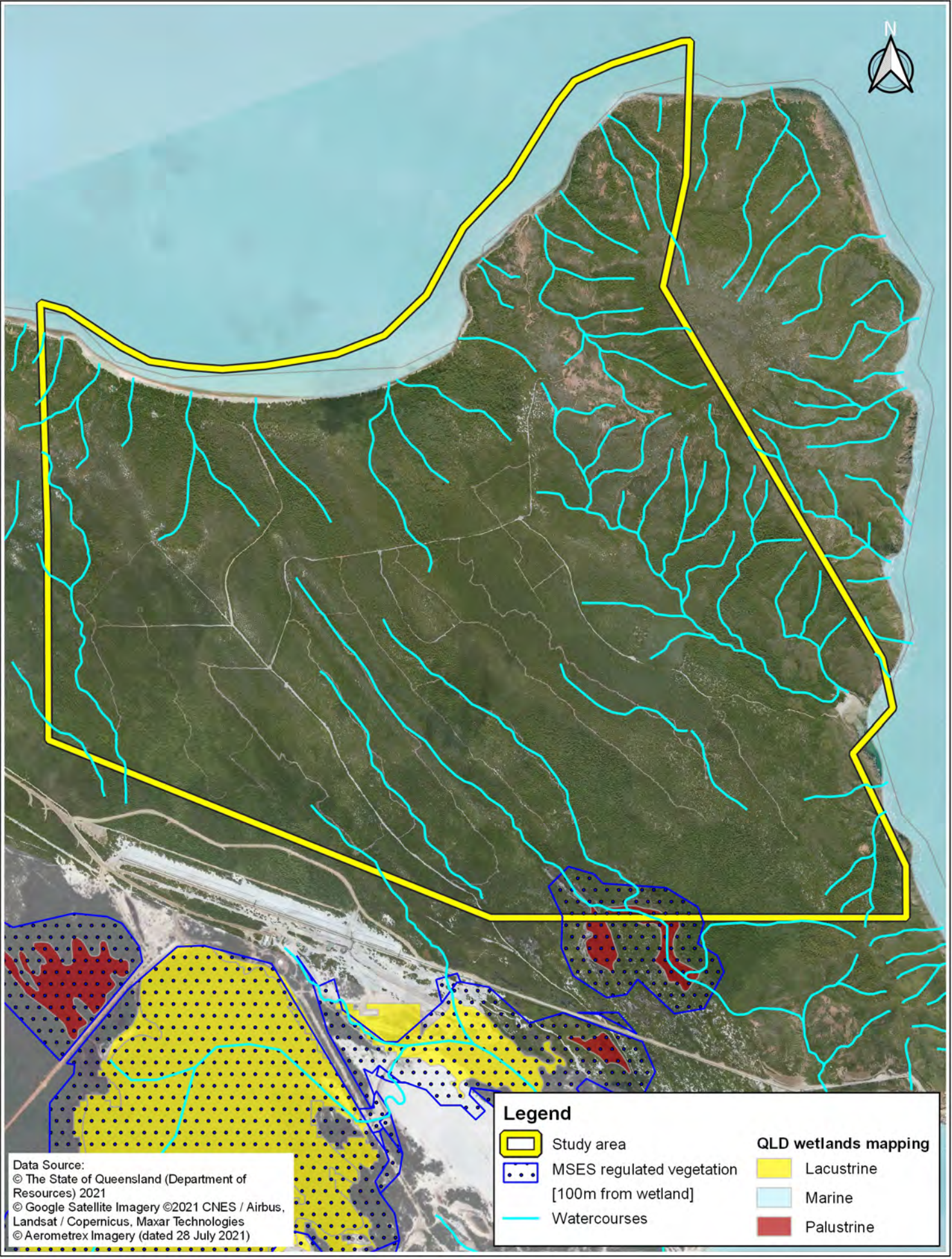
- Several unnamed freshwater watercourses throughout the Study area which drain north, north-west and in south-east directions to the open coastal environment (refer **Figure 6**)
- Two palustrine dune lake wetlands (mapped as HES) intersected by the southern boundary of the Study area that experience discharge from two watercourses within the mine footprint. Aerial photography shows that the two dune lakes are connected via a thin inland channel (Hydrobiology 2022a) (refer **Figure 6**).

3.2 Matters of National Environmental Significance

The EPBC Act Protected Matters Report (PMR) (**Appendix A**) identified the following MNES as relevant to the Study area:

- One world heritage property and national heritage place, the Great Barrier Reef
- Great Barrier Reef Marine Park
- Commonwealth Marine Area
- One TEC having the potential to occur:
 - Littoral Rainforest and Coastal Vine Thickets of Eastern Australia
- 37 threatened fauna species and nine flora species
- 54 Migratory species

Thirteen of the threatened fauna species are fish and/or marine species. Thirty-three of the Migratory species are fish and/or marine species. This report assesses terrestrial ecology only and does not include fish (marine or freshwater) or marine species such as Dugong (*Dugong dugon*), cetaceans, marine turtles and sea snakes. Marine species listed as MNES are addressed in the Project's Marine Ecology Technical Report (Hydrobiology 2022b). Bird species listed solely under the EPBC Act as Migratory Marine or Marine are also excluded from discussion in this report.



Data Source:
 © The State of Queensland (Department of Resources) 2021
 © Google Satellite Imagery ©2021 CNES / Airbus, Landsat / Copernicus, Maxar Technologies
 © Aerometrex Imagery (dated 28 July 2021)

Legend

Study area	QLD wetlands mapping Lacustrine
MSES regulated vegetation [100m from wetland]	Marine
Watercourses	Palustrine



0 250 500 750 1,000 m
 Scale: 1: 20,000@ A4
 Datum: GDA2020 Projection: MGA zone 55

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Figure 6
 Mapped Watercourses and Wetlands

3.3 Matters of State Environmental Significance

A DES MSES report (**Appendix A**) extracted for the Study area identified the following MSES values (**Table 5**). A summary of MSES currently mapped in the Study area is shown on **Figure 6** and **Figure 7**.

Table 5. Summary of MSES values mapped as present within the Study area

MSES	Search Result
Protected areas (estates, nature refuges and special wildlife reserves) under the <i>Nature Conservation Act 1992</i> (NC Act)	None present
State Marine Parks – highly protected zones under the <i>Marine Parks Act 2004</i>	None present
Fish habitat areas (management A and B areas) under the <i>Fisheries Regulation 2008</i>	None present
Strategic Environmental Areas under the <i>Regional Planning Interests Act 2014</i>	None present
High Ecological Significance wetlands on the map of Referable wetlands under the <i>Environment Protection Regulation 2019</i>	Two High Ecological Significance wetlands covering 5.7 ha intersected by the southern boundary of the Study area (1.13 ha (0.2% of the Study area) is located within the Study area)
High Ecological Value wetlands and waterways under the <i>Environmental Protection (Water) Policy 2009</i>	None present
Habitat for threatened wildlife species listed as endangered or vulnerable under the NC Act	Under State mapping, there are several patches of threatened wildlife habitat within the Study area, totalling 552.96 ha. The mapped wildlife habitat is inclusive of records submitted for Cape Heath Ctenotus (<i>Ctenotus rawlinsoni</i>) during the Epic 2021 seasonal flora and fauna surveys (Section 4.2.1.3) and associated buffer area, as well as wildlife habitat mapped for Estuarine Crocodile (<i>Crocodylus porosus</i>) based on a previous record and buffer area. Both species are listed as Vulnerable under the NC Act (refer to Sections 4.2.1.6 and 4.2.2)
Habitat for wildlife species listed as special least concern (SLC) under the NC Act	161.66 ha of wildlife habitat is based on records submitted for SLC bird species identified offsite, flying over marine waters during the Epic 2021 seasonal flora and fauna surveys and associated buffer area (refer to Sections 4.2.1.2 and 4.2.2).
Regulated Vegetation – Endangered/Of concern in Category B (remnant) under the <i>Vegetation Management Act 1999</i>	55.36 ha (9.0%) of two dominant/subdominant vegetation polygons identified as Of concern under the EP Act and/or VM Act (refer Figure 7 and Section 7.2.1)
Regulated Vegetation – (Endangered/Of concern in Category C; Category R (GBR riverine regrowth) and Essential habitat)	457.07 ha of essential habitat for two fauna species, Cape Heath Ctenotus (<i>Ctenotus rawlinsoni</i>) and Mclvor River Slider (<i>Lerista ingrami</i>), and one plant species, <i>Acacia solenota</i> . This mapped essential habitat is inclusive of records submitted for Cape Heath Ctenotus and <i>Acacia solenota</i> during the Epic 2021 seasonal flora and fauna surveys (Sections 4.2.1.3 and 4.1.4.1 , respectively) and associated buffer area.
Regulated Vegetation – intersecting a watercourse identified on the vegetation management watercourse and drainage feature map	11.3 km of mapped watercourse intersecting regulated vegetation within the Study area

Regulated Vegetation – within 100 m of a Vegetation Management Wetland identified on the vegetation management wetlands map	8.2 ha (1.4%) of remnant vegetation within 100 m of a Vegetation Management Wetland within the Study area
VM Act – 10 m buffer for first and second order watercourses	22.62 ha of watercourses, including the buffer area, within the Study area
Legally secured offset areas (offset register areas and vegetation offsets through a Property Map of Assessable Vegetation)	None present

3.4 Matters of Local Environmental Significance

Cape Flattery is included in the *Hope Vale Aboriginal Shire Council planning scheme* (HVASC 2014). The planning scheme does not specifically identify any matters of local environmental significance. The planning scheme only identifies environmental matters associated with mapped MSES and wetland areas.

3.5 Matters of Conservation Significance at the Bioregional Level

The *Biodiversity Planning Assessment for the Cape York Peninsula Heritage Area - Flora, fauna and landscape expert panel report* (DEHP 2012) identifies the following additional matters as potentially relevant to the Study area:

- *Eucalyptus brassiana* is nominated as a species of regional significance
- *Hibbertia banksii* is nominated as a species of regional significance
- *Leucopogon yorkensis* is nominated as a species of regional significance
- *Melaleuca arcana* is nominated as a species of state significance
- Heath vegetation communities are nominated as state significant
- The Cape Flattery location is nominated as state significant
- Bioregionally rare, naturally restricted REs, such as RE 3.12.7 are nominated as state significant
- Chestnut-breasted Cuckoo (*Cacomantis castaneiventris*) is a migrant to New Guinea with the Australian population restricted to Cape York Peninsula (CYP) and is nominated as regionally significant
- Red-necked Crake (*Rallina tricolor*) is a disjunct population and is nominated as regionally significant
- White-streaked Honeyeater (*Trichdere cockerelli*) is restricted to CYP and is nominated as state significant
- Lewin's Honeyeater (*Meliphaga lewinii amphochlora*) is a disjunct subspecies confined to CYP and is nominated as state significant
- Sandy Rainbow-skink (*Carlia dogare*) is restricted from Mclvor to Bathurst and Lizard Islands, heath/low woodlands, and is state significant

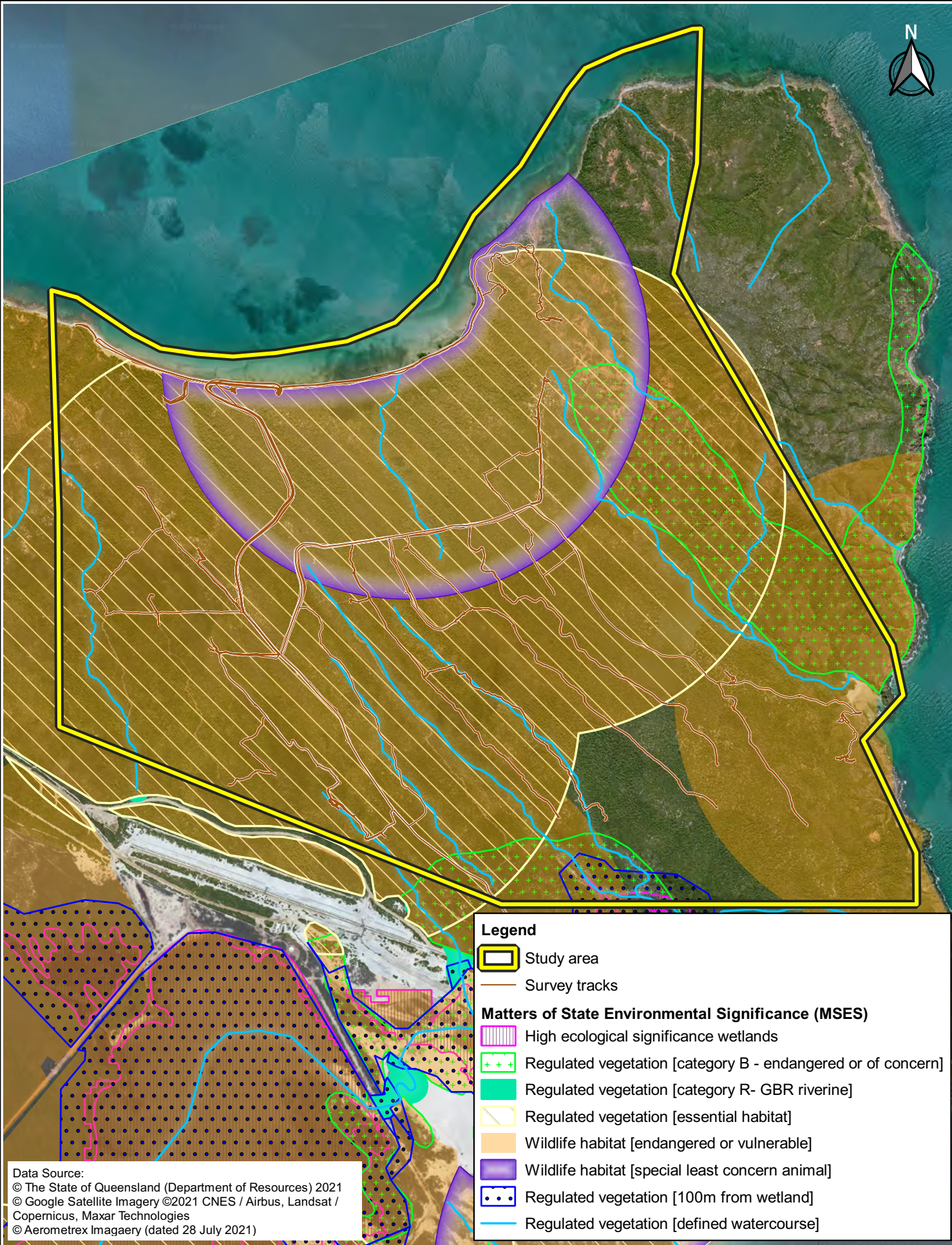
3.6 Environmentally Sensitive Areas

The following DES environmentally sensitive area (ESA) overlays (**Appendix A**) are present in or surrounding the Study area:

- 1 Category A ESA: none
- 2 Category B ESA: marine plants mapped as occurring at the boundary of the Study area
- 3 Category C ESA:
 - a) 'Coastal management district' occupies the entirety of the Study area
 - b) 'Directory of important wetlands' area is mapped as occupying the entirety of the Study area – the Cape Flattery Dune Lakes area



File Path: G:\GIS\2021\BE210151.01_CFS Cape Flattery Silica Sand Project\Workspaces\BE210151.02 Technical Studies\Terrestrial Ecology\Terrestrial Ecology2 - Terrestrial Ecology Assessment\Rev 0\Figure 7 MSES.qgz
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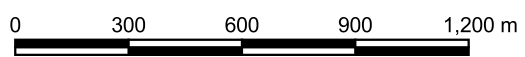
Data Source:
© The State of Queensland (Department of Resources) 2021
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© Aerometrex Imagery (dated 28 July 2021)

Legend

- Study area
- Survey tracks

Matters of State Environmental Significance (MSES)

- High ecological significance wetlands
- Regulated vegetation [category B - endangered or of concern]
- Regulated vegetation [category R- GBR riverine]
- Regulated vegetation [essential habitat]
- Wildlife habitat [endangered or vulnerable]
- Wildlife habitat [special least concern animal]
- Regulated vegetation [100m from wetland]
- Regulated vegetation [defined watercourse]



Scale: 1:20,000@ A4
Datum: GDA2020 Projection: MGA zone 55

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Figure 7
Matters of State Environmental Significance

3.7 Flora Values

3.7.1 Vegetation Communities

The Project area encompasses approximately 616 ha. State vegetation mapping indicates the entire Project area is covered with Category B vegetation (remnant vegetation). Nine REs are currently mapped as present under DoR vegetation mapping (refer **Figure 8**). These occur largely as codominant polygons (more than one RE mapped as present). **Table 6** describes vegetation communities mapped within the Project area including relative areas for each RE mapped within the Project area and the proposed disturbance area.

Table 6. Regional Ecosystems currently mapped (DoR) across Project area

RE	Description ¹	VM Act Status ²	EP Act Status ²	Project area extent (ha)
3.2.10	Woodland to low woodland (and sometimes open forest) of Darwin Stringybark (<i>Eucalyptus tetradonta</i>) +/- Clarkson's Bloodwood (<i>Corymbia clarksoniana</i>). There is usually a sparse sub-canopy tree layer and the shrub layer is sparse. Occurs on stabilised dunes on the east and west coasts of Cape York Peninsula.	LC	NC	116.29
3.2.12b	Hoop Pine (<i>Araucaria cunninghamii</i>) low closed forest to open forest with a variety of species that can also occasionally be co-dominant. Hoop Pine often forms a noticeable emergent layer. A wide range of heath and rainforest species can also occur in the very sparse to mid-dense subcanopy and/or shrub layers along with canopy species. A range of vines and epiphytes can also occur. The ground cover is very sparse and commonly includes <i>Arthrostylis aphylla</i> , <i>Dianella</i> spp., <i>Lomandra</i> spp. and seedlings of woody species. Occurs on coastal dunefields and beach ridges.	LC	NC	15.26
3.2.21a	Yellow Teatree (<i>Neofabricia myrtifolia</i>) and <i>Neoroepera banksii</i> open to closed heath, usually with Broombush (<i>Jacksonia thesioides</i>) and <i>Leucopogon ruscifolius</i> . Range of other commonly occurring species. An emergent layer often contains Toothbrush Grevillea (<i>Grevillea pteridifolia</i>), Black Sheoak (<i>Allocasuarina littoralis</i>) and <i>Acacia</i> spp. Very sparse ground layer. Extensive on dunefields.	LC	NC	390.47
3.2.22	Mixed dwarf open heath to dwarf shrubland including combinations of the species Toothbrush Grevillea, <i>Neoroepera banksii</i> , <i>Dodonaea malvacea</i> , <i>Jacksonia thesioides</i> and <i>Leucopogon yorkensis</i> . Occasional taller shrubs may be present in sheltered positions. The ground layer is frequently indistinct from the dwarf shrub layer. Sparse to dense ground layer. Associated with windswept coastal dunes and headlands.	OC	OC	2.09
3.2.26	Sparse herbland/shrubland which can include <i>Acacia crassicarpa</i> , <i>Alyxia spicata</i> , <i>Leucopogon</i> spp. and <i>Sersalisia sericea</i> in the shrub layer with a very sparse ground layer. The majority of this RE is devoid of vegetation and consists of actively moving wind-blown sand blows and sand cays that are inundated during very high tides. Areas naturally devoid of vascular plants, predominantly sand blows.	LC	NC	4.18
3.10.6x4	Gum topped Bloodwood (<i>Corymbia stockeri</i>) ± Cullen's Ironbark (<i>Eucalyptus cullenii</i>). A very sparse sub-canopy of canopy species, <i>Acacia platycarpa</i> , <i>Erythrophleum chlorostachys</i> , <i>Melaleuca viridiflora</i> or <i>Planchonia careya</i> is usually present. A very sparse shrub layer is dominated by <i>Acacia</i> spp., <i>Jacksonia thesioides</i> and <i>Grevillea</i> spp. Sparse to very sparse ground layer. Occurs on sandstone plateaus and hills.	LC	NC	24.36

RE	Description ¹	VM Act Status ²	EP Act Status ²	Project area extent (ha)
3.10.19	Mixed species dwarf open heath often with <i>Asteromyrtus lysicephala</i> , <i>Jacksonia thesioides</i> and <i>Xanthorrhoea johnsonii</i> . A <i>Schizachyrium pachyarthron</i> and <i>Lomandra longifolia</i> closed tussock grassland may sometimes occur. Occurs on exposed plateaus and headlands of a variety of geology types, including sandstone.	LC	NC	28.85
3.11.19a	Kangaroo Grass (<i>Themeda triandra</i>) and/or <i>T. arguens</i> and/or Black Spear Grass (<i>Heteropogon contortus</i>) closed tussock grassland which varies in height depending on exposure to the prevailing winds. Scattered shrubs may be present, but are generally windsheared and do not emerge much above the ground layer. Restricted to rocky headlands and islands.	OC	OC	6.88
3.11.19b	Back to Front Bush (<i>Asteromyrtus lysicephala</i>), Yellow Teatree, <i>Golden grevillea</i> (<i>Grevillea pteridifolia</i>) and Broad-leaved Teatree (<i>Melaleuca viridiflora</i>) dwarf open heath, with <i>Leucopogon ruscifolius</i> locally dominant. The ground layer is very sparse and dominated by graminoids, mostly <i>Schoenus sparteus</i> . Occurs on exposed plateaus and headlands.	OC	OC	13.76
3.11.21	Deciduous vine thicket often dominated by Pink Poplar (<i>Euroschinus falcatus</i>), and Tingletongue (<i>Dinosperma erythrococtum</i>), Native Olive (<i>Chionanthus ramiflorus</i>) and Shiny-leaved Canthium (<i>Psydrax odorata</i>). These species can also occur as emergents along with <i>Acacia disparrima</i> and <i>A. polystachya</i> . The sparse shrublayer contains a range of vine thicket species. Occurs on metamorphic hillslopes.	OC	OC	13.76

¹Derived from REDD – Regional Ecosystem Description Database (V12.0) (Queensland Herbarium 2021)

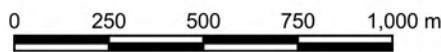
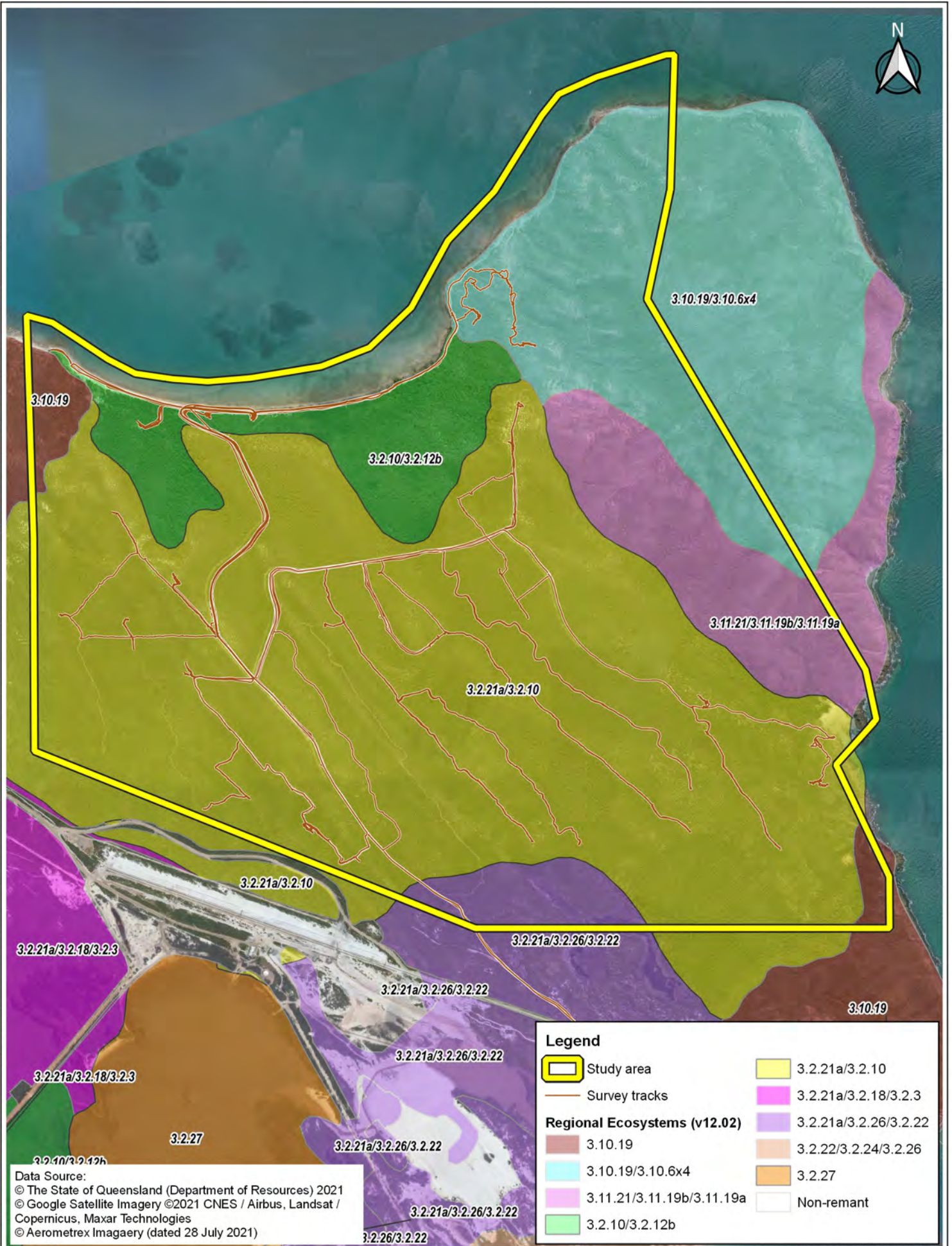
²LC = Least Concern, NC = No Concern, OC = Of Concern, E = Endangered.

3.7.2 Threatened Ecological Communities

A single threatened ecological community (TEC) is described as likely to occur in the Study area as per the PMR: *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia* (listed as Critically Endangered under the EPBC Act). One of the REs mapped as present within the Study area (refer **Figure 9**) is analogous to the TEC (RE 3.2.12) as identified within the Commonwealth listing advice for the TEC (TSSC 2008). The field-verified presence of this community within the Study area is discussed in **Section 4.1.2**.

3.7.3 Protected Plants Flora Survey Trigger Map

The DES protected plants flora survey trigger map identifies high-risk areas where endangered, vulnerable or near threatened native plants are present or are likely to be present. A substantial area of lands (563.3 ha) mapped under the high-risk overlay is currently mapped over the Study area, associated with the individual records of *Acacia solenota* identified during the Epic 2021 flora surveys, and is shown in **Figure 7**.



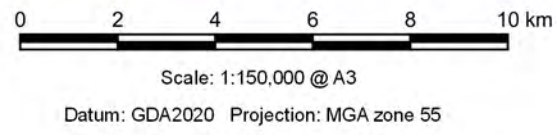
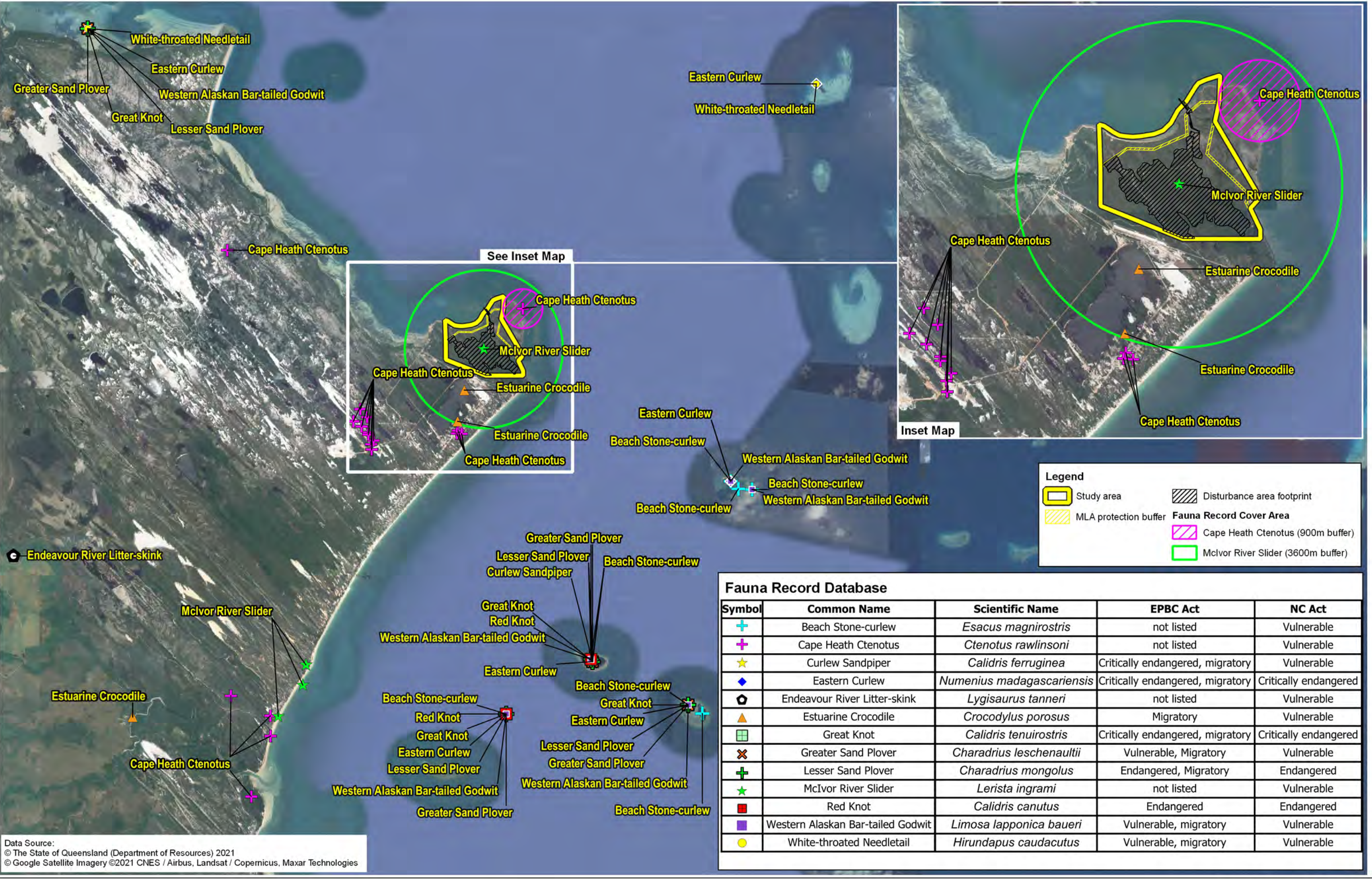
Scale: 1: 20,000@ A4

Datum: GDA2020 Projection: MGA zone 55

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Figure 8
 Mapped Regional Ecosystems
 within the Study area

©CGIS 2019 File Path: G:\GIS\2021\BE210151_01_CFS-Cape Flattery Silica Sands Project\Workspaces\BE210151_02_Technical Studies\Terrestrial Ecology\Assessment\Rev 0\Figure 9 Threatened Species Database Records ngz



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Figure 9
Threatened Fauna Species Database Records

3.7.4 Threatened Flora Species

Database search results identified 12 flora species listed as threatened or near threatened under the NC Act and/or EPBC Act potentially occurring within the Study area, including nine threatened species predicted to occur in the PMR (DAWE 2022a) and a further three species (listed only under the NC Act) recorded in the WildNet search results (**Appendix A**). Database search results identified records of the following threatened species within 25 km of the Study area:

- *Acacia solenota* (Vulnerable – NC Act) – includes three records within the Study area recorded in February 2021 during the Project surveys and three records clustered 8.5 km south-west of the Study area from 2019. There is a single record from 1978 located 10 km south-west of the Project (close to 12 Mile Beach). There are records of varying age (1984- 2006) clustered around the Mclvor River between 16 and 22 km south-west of the Study area
- *Xanthostemon arenarius* (Near Threatened – NC Act) – Two nearby records (within 2.5 km of Study area) with large or unknown coordinate precision applied (both records are in marine waters). Five more spatially accurate records to the south-west of the Study area between 15 and 20 km from the Study area. Includes records from 1972 to 1997
- *Stackhousia* sp. (Mclvor River J.R. Clarkson 5201) – (Endangered – NC Act) – only known from four records from the 1980s all located in dunefields over 20 km south-west of the Study area

In addition, there are several ALA records of threatened species listed under the EPBC Act (and NC Act) in the wider area which have a spatial uncertainty of 10 km on the location to protect the species from collectors. These records have no detailed location information provided and include the following:

- Pale Chandelier Orchid (*Acriopsis emarginata*) (Vulnerable – EPBC Act) – one 1962 record located approximately 17 km north of Study area
- Chocolate Teatree Orchid (*Dendrobium johannis*) (Vulnerable – EPBC Act) – three 1981 records (uncertain if records are duplicates) located approximately 14 km west and 1987 record 20 km southwest of the Study area
- Ant Plant (*Myrmecodia beccarii*) (Vulnerable – EPBC Act) – two records from search area including a 1984 record approximately 5 km south-west and a 2020 record 25 km south of the Study area (located in marine waters)

Assessments of the likelihood of these species, and additional species predicted by the Protected Matters Report, to occur within or near the Study area based on observed habitat values within the Study area and known distributions are provided in **Section 4.1.4.3** and **Appendix C**.

3.8 Threatened Fauna Species

The database search results identified records of 13 terrestrial fauna species listed as threatened under the NC Act and/or EPBC Act potentially occurring within the Study area and surrounds. This includes five species listed only under the NC Act. An additional 15 threatened species are predicted to occur in the PMR (DAWE 2022a) (**Appendix A**). The PMR includes 13 species considered as ‘known’ or ‘likely’ to occur in the area and a further 10 species considered as ‘may occur’ only. An additional 30 fauna species listed as Migratory (under the EPBC Act) and Special Least Concern (under NC Act) are identified in the database search results. The WildNet search results (refer **Appendix A**) identified records of 37 threatened species within 25 km of the Study area. Records listed hereunder are taken from the species profiles (QG 2022) unless otherwise noted. The species are:

- White-throated Needletail (*Hirundapus caudacutus*) (Vulnerable – EPBC Act and NC Act; Migratory – EPBC Act) from South Direction Island in 1995, two records, the closest is approximately 17 km east of the Study area
- Beach Stone-curlew (*Esacus magnirostris*) (Vulnerable – NC Act), 34 records, the closest is from Two Islands (West), approximately 21 km south-east of the Study area
- Lesser Sand Plover (*Charadrius mongolus*) (Endangered – EPBC Act and NC Act; Migratory – EPBC Act), 11 records, the closest known is from Low Wooded Island, 25 km south-east of the Study area
- Greater Sand Plover (*Charadrius leschenaultii*) (Vulnerable – EPBC Act and NC Act; Migratory – EPBC Act), five records, the closest known is from Low Wooded Island, 25 km south-east of the Study area

- Eastern Curlew (*Numenius madagascariensis*) (Critically Endangered – EPBC Act and NC Act; Migratory – EPBC Act), the closest known records are 3 from Two Islands (West) approximately 10 km south-east of the Study area. The most recent of these is from 2015
- Western Alaskan Bar-tailed Godwit (*Limosa lapponica baueri*) (Vulnerable – EPBC Act and NC Act; Migratory – EPBC Act), five records, the closest known record is from 1995 from Two Islands (West) approximately 10 km south-east of the Study area
- Great Knot (*Calidris tenuirostris*) (Critically Endangered – EPBC Act and NC Act; Migratory – EPBC Act), four records, the closest known record is from Low Wooded Island, approximately 25 km south-east of the Study area in 2018
- Red Knot (*Calidris canutus*) (Endangered – EPBC Act and NC Act; Migratory – EPBC Act), two records, the closest known record is from Low Wooded Island, approximately 25 km south-east of the Study area in 1996
- Curlew Sandpiper (*Calidris ferruginea*) (Critically Endangered – EPBC Act and NC Act; Migratory – EPBC Act), the only record is from Low Wooded Island, approximately 25 km south of the Study area in 2016
- Estuarine Crocodile (*Crocodylus porosus*) (Vulnerable – NC Act; Migratory – EPBC Act), two records, the closest known record is from approximately 1 km south of the Study area in 1988
- Cape Heath Ctenotus (*Ctenotus rawlinsoni*) (Vulnerable – NC Act), there are four QM specimens from 1991 from within the Study area (OZCAM 2022)
- Mclvor River Slider (Ingram's Lerista) (*Lerista ingrami*) (Vulnerable – NC Act), there is a pre-2004 record from within the Study area although the record has a 3.6 km uncertainty placed on the location
- Endeavour River Litter-skink (*Lygisaurus tanneri*) (Vulnerable – NC Act), there is a pre-1994 record approximately 22 km from the Study area

There are records of the following bird species listed as Migratory (EPBC Act) and Special Least Concern (NC Act) within the search area:

- Oriental Cuckoo (*Cuculus optatus*)
- Pacific Golden Plover (*Pluvialis fulva*)
- Oriental Plover (*Charadrius veredus*)
- Whimbrel (*Numenius phaeopus*)
- Little Curlew (*Numenius minutus*)
- Ruddy Turnstone (*Arenaria interpres*)
- Sharp-tailed Sandpiper (*Calidris acuminata*)
- Red-necked Stint (*Calidris ruficollis*)
- Sanderling (*Calidris alba*)
- Terek Sandpiper (*Xenus cinereus*)
- Common Sandpiper (*Actitis hypoleucos*)
- Grey-tailed Tattler (*Tringa brevipes*)
- Wandering Tattler (*Tringa incana*)
- Common Greenshank (*Tringa nebularia*)
- Wood Sandpiper (*Tringa glareola*)
- Gull-billed Tern (*Gelochelidon nilotica*)
- Caspian tern (*Hydroprogne caspia*)
- Bridled tern (*Onychoprion anaethetus*)
- Little tern (*Sternula albifrons*)
- Common Tern (*Sterna hirundo*)
- Crested Tern (*Thalasseus bergii*)
- (Eastern) Osprey (*Pandion cristatus*)
- Rufous Fantail (*Rhipidura rufifrons*)
- Satin Flycatcher (*Myiagra cyanoleuca*)
- Spectacled Monarch (*Symposiarchus trivirgatus*)
- Black-winged Monarch (*Monarcha frater*)
- Black-faced Monarch (*Monarcha melanopsis*)
- Lesser frigatebird (*Fregata ariel*)

- Wilson's storm-petrel (*Oceanites oceanicus*)
- Brown booby (*Sula leucogaster*)

Locations of threatened species' WildNet records are depicted in **Figure 9**. Coordinates provided for one of the records of Cape Heath Ctenopus places it in the ocean. The record has a 900 m spatial error. A buffer has been placed around the record to indicate from where on Cape Flattery the record may originate. Similarly, the record of Mclvor River Slider has a 3.6 km spatial error. The record is buffered as it may not have been within the Study area. Buffers are not considered necessary for the other records shown on **Figure 9**.

Assessments of the likelihood of these species, and additional species predicted by the PMR, to occur within or near the Study area based on observed habitat values within the Study area are provided in **Section 4.2.1.6** and **Appendix C**.

4 FIELD ASSESSMENT RESULTS

4.1 Flora Assessment

The Study area has experienced minimal disturbance and clearing appears to be limited to the vehicle tracks, and small-scale tree removal around campsites along the Connies Beach foreshore. All vegetation observed was remnant vegetation in good condition, excepting areas cleared for tracks.

Minimal evidence of recent fire was observed throughout the Study area. The lack of recent fire limits post-fire species recruitment and species diversity, particularly in heath dominated vegetation communities. The fire mapping service *North Australia & Rangelands Fire Information* (NAFI 2022) indicates there has been only one fire in the last 20 years, which burnt in 2013 and only over a small portion of the Study area.

Therefore, most of the vegetation has been unburnt for at least 20 years, with a small area of heath and eucalypt woodland unburnt for seven years. These are much longer fire intervals than recommended for heath vegetation (recommended to burn every five to ten years) and eucalypt woodlands (to burn every one to five or two to five years) (Queensland Herbarium 2021). In addition to potentially reducing the health and species diversity of the vegetation in the Study area, it may also leave the flora and fauna susceptible to the damaging effects of a single, high intensity wildfire.

4.1.1 Flora species diversity

The flora survey recorded 166 species of vascular plant across the post-wet, and dry season surveys. Of these, eight are introduced species. Two flora species listed as Endangered, Vulnerable or Near Threatened under the EPBC Act and/or NC Act were recorded. A further four species are listed as Special Least Concern under the NC Regulation (plants) (**Appendix D**).

4.1.2 Field-verified vegetation communities

Nine field verified REs were recorded within the Study area as described in **Table 7** and shown in **Figure 10**. Due to a lack of previous assessments by botanists in the Cape Flattery area, ground-truthed RE mapping from the Project surveys is a substantial refinement of current State RE mapping (refer **Figure 8**). This includes seven REs that were not previously mapped as occurring.

Broad discussions were held between field personnel and the Queensland Herbarium regarding the composition of the vegetation observed and the underlying geology/soil composition. The Queensland Herbarium personnel who coordinate RE mapping and descriptions for Cape York Peninsula were sent samples to ensure the vegetation observed within the Study area was allocated to the most appropriate REs.



Due to the density of heath-dominated vegetation across much of the Study area, flora assessment sites were often restricted to existing tracks. Consequently, the field verified RE mapping is based on a combination of field observations and analysis of detailed aerial imagery (**Figure 10**). Two of the observed REs are listed as Of Concern status under the EP Act. These are largely associated with the eucalypt woodlands in the rocky headland areas (RE 3.12.39a) and a small patch of *Melaleuca*-dominated open forest (RE 3.2.14) occurs on the southern edge of the Study area. All other REs verified as present in the Study area are listed as Least Concern under the VM Act and No Concern under the EP Act (**Table 7**).



4.1.3 Threatened Ecological Communities



One vegetation community identified in the Study area contains floristic elements analogous to the *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia* TEC: RE 3.2.12a. The TEC is listed as Critically Endangered under the EPBC Act. A small pocket of closed canopy vegetation containing vine thicket species was recorded in the east of the Study area during the wet season flora survey.



Analysis of detailed aerial imagery indicated the potential for the TEC to be present in small pockets in partially sheltered sections across the steep, rocky outcrops north-east of the Study area and in partially sheltered dune sites. Subsequent assessment during the dry season survey expanded the size of the area identified during the wet season survey and identified the presence of two patches of RE 3.2.12a in the south of the Study area, totalling approximately 11.41 ha.


Table 7. Field-verified REs recorded in the Study area

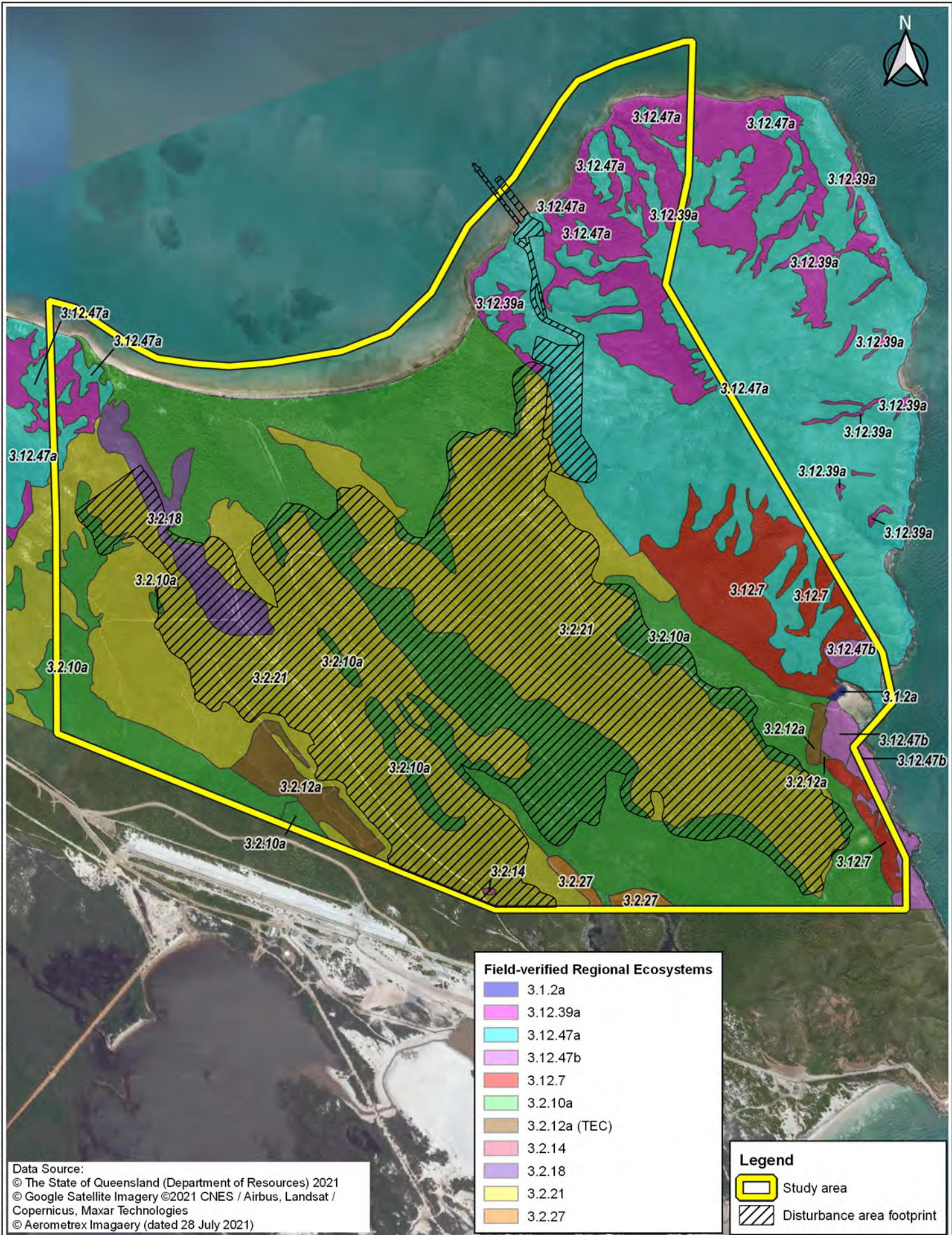
RE	RE description (field observations)	VM Act status	EP Act status	Total area (ha)	Representative photo
3.1.2a	Small patch of Grey Mangrove (<i>Avicennia marina</i>) community on eastern edge of Study area located adjacent to small cove sheltered by coastal rocky outcrops.	LC	NC	0.28	N/A
3.2.10a	This RE occupies substantial portions of the dunal area dominating much of the Study area. The woodland canopy is dominated by Clarkson's Bloodwood (<i>Corymbia clarksoniana</i>) (10 m average height) with a dense mix of rainforest and heath species in the understorey and shrub layer including <i>Asteromyrtus angustifolia</i> , Scrub Cherry (<i>Exocarpos latifolius</i>), Rusty Guinea Flower (<i>Hibbertia banksii</i>) and Chain-fruit Vine (<i>Alyxia spicata</i>). The threatened <i>Acacia solenota</i> (Vulnerable – NC Act) recorded in this community. No weeds observed.	LC	NC	198.23	
3.2.12a	Occurs as two widely separated patches in the east and south of the Study area. Occurs in sheltered areas of dunal system. Dense low canopy (7.5 m average height) of rainforest taxa with a shrub layer of heath and rainforest species. The eastern patch is dominated by <i>Canarium australianum</i> , <i>Dillenia alata</i> , <i>Euroschinus falcatus</i> and Scrub Cherry in the canopy. Southern patch dominated by Joseph's Satinash (<i>Syzygium banksii</i>), <i>Asteromyrtus angustifolia</i> , Small-leaved Plum (<i>Planchonella pubescens</i>) and <i>Acacia crassicarpa</i> . No weeds observed. Analogous to Littoral rainforest and coastal vine thickets of eastern Australia TEC.	LC	NC	11.41	

RE	RE description (field observations)	VM Act status	EP Act status	Total area (ha)	Representative photo
3.2.14	<p>Small, isolated patch in south of Study area. Located on dunal drainage line. Relatively dense canopy dominated by <i>Melaleuca arcana</i> (between 5 and 7.5 m height). Patchy shrub layer present includes <i>Boronia alulata</i>, Chain-fruit Vine, Cape York Heath Plant (<i>Asteromyrtus lysicephala</i>) and Hop Bush (<i>Dodonaea polyandra</i>). Heavy leaf litter cover present throughout with scattered <i>Lomandra</i> and <i>Eriachne</i> species in the ground layer. A single Ant Plant (<i>Myrmecodia beccarii</i>) (listed as Vulnerable – NC Act and EPBC Act) observed in this habitat. No weeds observed.</p>	OC	OC	0.13	
3.2.18	<p>Occurs on an exposed dune ridge in the west of the Study area. Comprises a stunted heath community (average height of 1.3 m) dominated by <i>Thryptomene oligandra</i> with a range of species including Yellow Teatree (<i>Neofabricia myrtifolia</i>), Rusty Guinea Flower, <i>Boronia alulata</i> and Chain-fruit Vine. The threatened <i>Acacia solenota</i> (Vulnerable – NC Act) commonly occurs in this RE. No weeds observed.</p>	LC	NC	11.64	

RE	RE description (field observations)	VM Act status	EP Act status	Total area (ha)	Representative photo
3.2.21	<p>This RE dominates the dunal area occupying much of the Study area. This is a very dense heathland (average height of 2.5 m) dominated by Yellow Teatree with a range of other species including commonly the threatened <i>Acacia solenota</i> (Vulnerable – NC Act), as well as Rusty Guinea Flower, <i>Choriceras tricornis</i> and <i>Jacksonia thesioides</i>. No weeds observed.</p>	LC	NC	281.36	
3.2.27	<p>Presence of this community inferred from aerial imagery and observations elsewhere in the wider area. Access to the mapped areas was not possible at the time of the surveys due to the dense surrounding heath. Wetland vegetation associated with relatively deep perennial waterbodies in dunal depressions.</p>	LC	NC	3.26	

RE	RE description (field observations)	VM Act status	EP Act status	Total area (ha)	Representative photo
3.12.7	This RE occurs along the eastern edge of the Study area being associated with granitic rocks growing on south-west facing slopes and gully lines. Patches occur behind the rocky ridge along the eastern coastline and in the rocky hills further north. Woodland dominated by Cape York Red Gum (<i>Eucalyptus brassiana</i>) in canopy (average height of 7.5 m). Subcanopy includes rainforest taxa such as Brown Randia (<i>Attractocarpus sessilis</i>), <i>Psychotria polioSTEMMA</i> , and Hop Bush. <i>Melaleuca foliolosa</i> dominated along the exposed edges of this RE. Sword Grass (<i>Gahnia aspera</i>) was common in the ground layer. No weeds observed.	LC	NC	23.74	
3.12.39a	Community associated with exposed granite boulder areas in the rocky hills associated with the north of Study area. More sheltered pockets of this RE have greater density and larger canopy trees, many of which are hollow bearing. Woodland of Blotchy Bloodwood (<i>Corymbia stockeri</i>) (canopy height of 7.5 m). A sparse lower storey includes Broad-leaved Teatree (<i>Melaleuca viridiflora</i>). Relatively dense shrub layer (1.8 m tall) includes Yellow Teatree, <i>Jacksonia thesioides</i> , Cape York Heath Plant and <i>Xanthorrhoea johnsonii</i> .	OC	OC	22.11	

RE	RE description (field observations)	VM Act status	EP Act status	Total area (ha)	Representative photo
3.12.47a	<p>Community associated with exposed granite headland in the rocky hills associated with the north of Study area. Exposed site with stunted heath community of 0.3 m average height (no more than 0.5 m). Dense cover of stunted shrubs and native forb species with some areas of exposed rock. Species present include Yellow Teatree, Cape York Heath Plant, Rusty Guinea Flower, <i>Boronia alulata</i>, <i>Jacksonia thesioides</i> and (<i>Choriceras tricorne</i>). The threatened <i>Acacia solenota</i> (Vulnerable – NC Act) recorded in this community. No weeds observed.</p>	LC	NC	56.54	



The Commonwealth listing advice on littoral rainforest and coastal vine thickets of eastern Australia (TSSC 2008) identifies the following key diagnostic characteristics/condition thresholds as applicable to the community:

- Minimum patch size of 0.1 ha
- Cover of transformer weed species (as identified in TSSC 2008) is 70% or less – weed species in either patch were observed to be minimal to non-existent
- The patch must have at least 25% of the native plant species diversity characteristic of the TEC in that bioregion, or at least 30% canopy cover of one rainforest canopy (tree or shrub) species (as identified in TSSC 2008) – the canopy of the patch in the east is dominated by species including *Canarium australianum* and *Exocarpus latifolius* (identified in TSSC 2008). The canopy of the patch in the south is dominated by species including *Syzygium banksia*, *Asteromyrtus angustifolia* and *Acacia crassicarpa* (identified in TSSC 2008)

Therefore, the two identified patches of RE 3.2.12a are considered analogous with the TEC and are shown in **Figure 10**.

4.1.4 Threatened flora species

Two threatened flora species were detected during the Project flora surveys: *Acacia solenota* and an ant plant (*Myrmecodia beccarii*). The occurrence of these species within the Study area is addressed in **Section 4.1.4.1** and **Section 4.1.4.2**. The remaining species recorded onsite are listed as Least Concern (160 species) or Special Least Concern (four species) (refer **Appendix B**).

4.1.4.1 *Acacia solenota* (Vulnerable – NC Act)

A spreading shrub with fissured bark growing up to 6 m in height, *Acacia solenota* occurs in a narrow coastal band extending from Cooktown to Cape Flattery. This wattle has previously been collected 31 times from the Cooktown region. Locally common it forms dense stands in the Mclvor River area (20 km south-east of the Study area) and grows in dense heathland communities (often in pure stands) on dunal systems. The species is thought to regenerate quickly following disturbance (TSSC 2013).

Database records from the wider search area (AVH and ALA) include three records clustered approximately 8.5 km south-west of the Study area from 2019. There is a single record from 1978 located approximately 10 km south-west of the Project (close to 12 Mile Beach). There are a number of records of varying age (1984 – 2006) clustered around the Mclvor River between 16 and 22 km south-west of the Study area.

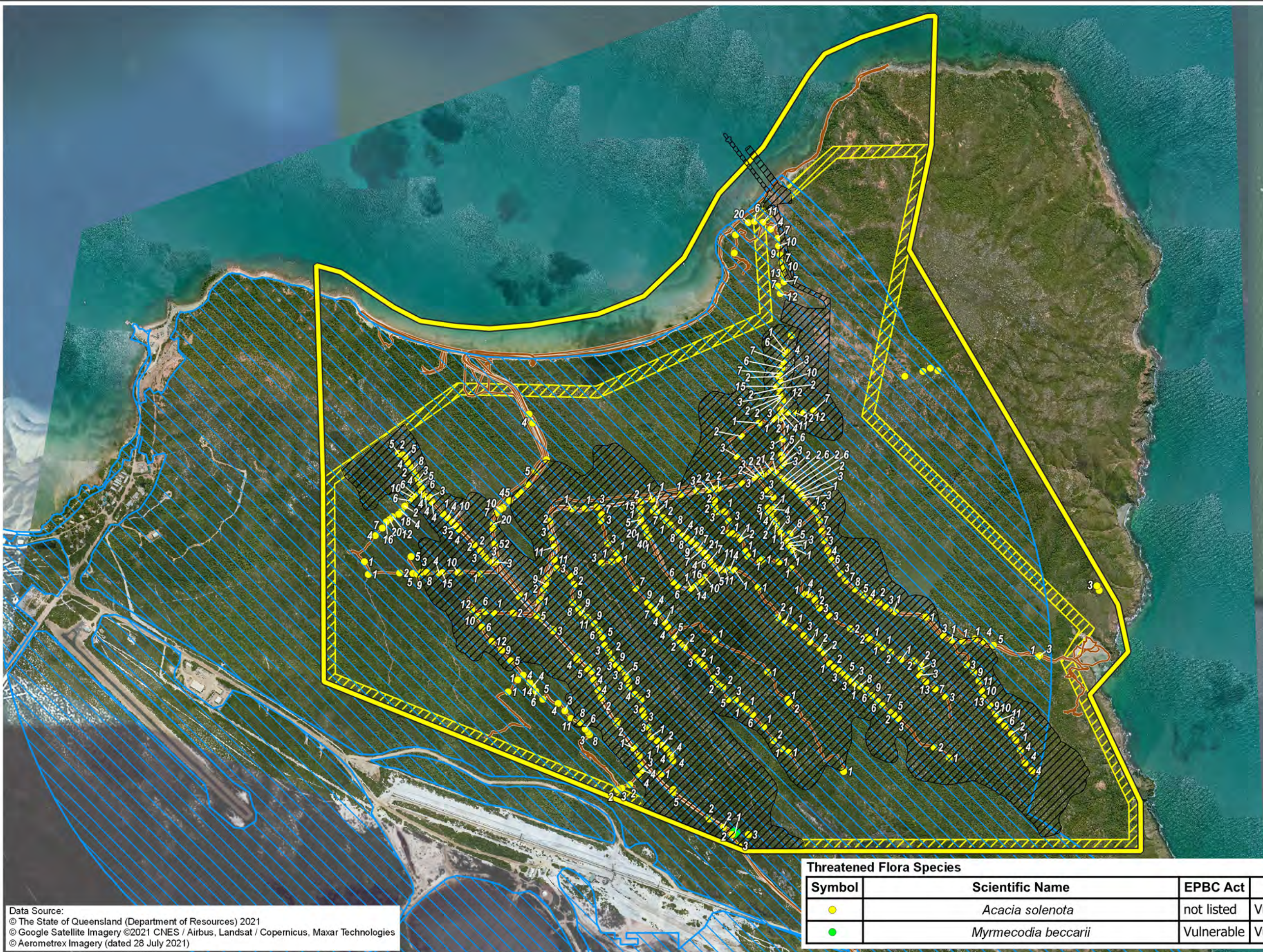
Over 2,000 individual plants were recorded during site surveys (**Figure 11**), largely along existing tracks to which surveys were generally restricted to due to the density of the undisturbed heathland dominating the Study area (**Plate 2** and **Plate 3**). It is likely the total number of plants in the Study area far exceeds the number recorded. Recorded commonly in the following vegetation communities in the area: RE 3.2.10a, 3.2.18 and 3.2.21. The species is also recorded in RE 3.2.12a and 3.12.47a.



Plate 2. *Acacia solenota* as commonly observed adjacent to tracks



Plate 3. *Acacia solenota* flowers and phyllodes



Data Source:
 © The State of Queensland (Department of Resources) 2021
 © Google Satellite Imagery ©2021 CNES / Airbus, Landsat / Copernicus, Maxar Technologies
 © Aerometrex Imagery (dated 28 July 2021)

Threatened Flora Species			
Symbol	Scientific Name	EPBC Act	NC Act
●	<i>Acacia solenota</i>	not listed	Vulnerable
●	<i>Myrmecodia beccarii</i>	Vulnerable	Vulnerable

Legend

- Study area
- MLA protection buffer
- Disturbance area footprint
- Protected plants flora survey trigger area
- Survey tracks

Threatened Flora Species

- ¶ Abundance



0 200 400 600 800 m
 Scale: 1:16,000@A3
 Datum: GDA2020 Projection: MGA zone 55



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Figure 11
 Location of Threatened Flora Species Records within Study Area

Most of the plants were observed along existing access tracks, an indication perhaps that ground disturbance and the opening of the canopy may enhance species recruitment and establishment. Evidence of this was noted during the dry season survey where regeneration of seedlings was observed on recently cleared tracks (**Plate 4**).



Plate 4. *Acacia solenota* resprouting on recently cleared track (August 2021)



Plate 5. Ant Plant observed within Project area during wet season survey

4.1.4.2 Ant Plant (*Myrmecodia beccarii*) (Vulnerable – EPBC Act and NC Act)

Ant Plant is an epiphytic plant with spiny and tuberous growth form. Fleshy leaves grow from stems arising from tuber and the tuber contains numerous small chambers utilised by the Golden Ant (*Iridomyrmex cordatus*). Ant Plant occurs in woodlands often dominated by Broad-leaved Paperbark (*Melaleuca viridiflora*) but it also occurs in mangroves (DEWHA 2008g). It is known to occur from the Ingham area north to the tip of Cape York Peninsula. There are two ALA records from the search area including a 1984 record approximately 5 km south-west and a 2020 record approximately 25 km south of the Study area (the coordinates provided place it in marine waters).

A single plant was observed during the wet season survey growing on *Melaleuca arcana* in a small patch of RE 3.2.14 (**Figure 11** and **Plate 5**). It was not recorded elsewhere but may occur, mainly in the canopy layer of sheltered pockets of woodlands with Broad-leaved Paperbark as a component.

4.1.4.3 Threatened flora species likelihood of occurrence

In addition to the two species recorded, database search results identified a further 10 flora species listed as threatened under the NC Act and/or EPBC Act as potentially occurring within the Study area. A likelihood of occurrence assessment was carried out to identify species that require further consideration for potential significant residual impacts from Project activities. The assessment was based on the presence of nearby species records and the presence of suitable habitat observed within the Study area. Three flora species listed as threatened are considered to possibly occur within the Study area (refer **Table 8**). The assessment of likelihood of the remaining seven species considered unlikely to occur is provided in **Appendix C**.

Of the three species identified as possibly occurring two are orchid species: *Dendrobium bigibbum* (listed as *Vappodes phalaenopsis*) (Vulnerable – EPBC Act and NC Act) and *Dendrobium johannis* (Vulnerable – EPBC Act and NC Act). Epiphytic orchids of at least two species were identified within the Study area at several locations during the wet season survey (**Appendix D**). Positive identification to species level was not possible at the time as the observed plants were not flowering and the survey was curtailed by poor weather. Given suitable habitat was observed for orchid species, it was deemed possible the observed plants were threatened species. The two orchids that are considered to have potential to occur in the Study area and their peak detectability as derived from the *Draft survey guidelines for Australia's threatened orchids – Guidelines for Detecting Orchids Listed as 'Threatened' under the EPBC Act 1999* (DAWE 2013) are:

1. *Dendrobium bigibbum* – peak flowering January to October (largely March to August)
2. *Dendrobium johannis* – peak flowering in Autumn with flowers lasting for a month

The dry season survey was carried out in August (suitable for potentially identifying *D. biggibum* should it be present) (**Plate 6** and **Plate 7**). Flowering recorded at the time definitively identified one species as *D. discolor*. Onsite examination of pseudobulbs and leaves allowed identification of the other orchid species as most likely to be *D. trimellatum* (**Plate 8**), though flowers are needed for overall taxonomic certainty (*D. jonesii* is a similar species that may occur in the region). Neither of the threatened orchid species were identified as present.



Plate 6. *Dendrobium discolor* recorded within Project area (February 2021)



Plate 7. *Dendrobium discolor* flowering recorded within Project area (August 2021)



Plate 8. *Dendrobium trimellatum* recorded within Project area (February 2021)

Table 8. Threatened flora species considered as possibly occurring within Project area

Species	Status ¹		Source ²	Likelihood of Occurrence Assessment
	EPBC Act	NC Act		
Chocolate Teatree Orchid (<i>Dendrobium johannis</i>)	V	V	PMR	<p>Possible. Epiphytic orchid species with spindle-shaped bulbs which are often dark or purplish brown in colour. Leaves are dark green to purplish green with a sheath often patterned with purple stripes. The flowers are brown and between 20-40 mm in size. Flowering occurs between March and July and is long-lasting. Distribution identified as tip of Cape York Peninsula south to McIlwraith Range (DEWHA 2008d), although database records (ALA 2022) indicate species occurs further south to the Cooktown area. Three records identified from the Cairns area appear questionable with one being derived from a specimen collected on the tip of Cape York Peninsula. Nearest records are three 1981 records (uncertain if records are duplicates) located 14 km west and 1987 record 20 km south-west of the Project area. Appears to grow in a variety of open humid habitats including woodlands on slopes, monsoon forest, vine thickets on dunes and <i>Melaleuca</i> woodlands (DEWHA 2008d).</p> <p>This species was not recorded during site surveys which included effort to identify epiphytic orchids (two species identified). Nevertheless, potential habitat for the species may be present.</p>
Cooktown Orchid (<i>Dendrobium bigibbum</i>)	V	V	PMR	<p>Possible. One of a group of species that are collectively referred to as Cooktown Orchid. Epiphytic orchid species with cylindrical bulbs which are green or purplish in colour. Stems can be up to 1.2 m long. Leaves are narrow and dark green often patterned with purple edges or suffused with purple. The flowers are large (3.5-5 cm) and usually lilac but may be white, blue or pink. Flowering occurs mostly from March to August, with flowers lasting two weeks. Grows on rocks as well as trees. Occurs on small trees in monsoon forests, vine forests and semi-evergreen vine thickets, particularly behind beaches and on rocky hillsides (Barker 1997). Often occurs along creek lines where fire doesn't penetrate. Distribution is identified as Princess Charlotte Bay south to areas north of Cairns (DEWHA 2008c), although database records (ALA 2022) indicate species occurs further north and south of this range. Species listed as may occur in Project area based on habitat mapping (CCEEW 2022c). Nearest records are three 2013 records (uncertain if records are duplicates) located 40 km north-west of the Project area. The next nearest record is from Cooktown area (60 km to the south). This species was not recorded during site surveys which included effort to identify epiphytic orchids (two species identified). Nevertheless, potential habitat for the species may be present.</p>
<i>Xanthostemon arenarius</i>	-	NT	WN	<p>Possible. Small to medium-sized tree, usually around 6 m tall but may occur as an emergent up to 20 m. Leaves are arranged spirally and flowers are yellow. Known only from the Cape Bedford and Cape Flattery area. Occurs in closed forests on sand dunes dominated by <i>Asteromyrtus augustifolia</i> or <i>Araucaria cunninghamiana</i> (Wilson 1993). There are two nearby records (within 2.5 km of Project area) with large or unknown coordinate precision applied (both records are in marine waters). The nearest accurate records are located in the McIvor River area and are between 15 and 20 km south-east of the Project area (ALA 2022). This species was not recorded during site surveys but suitable habitat occurs. There is closed forest with a canopy including <i>Asteromyrtus augustifolia</i> (RE 3.2.12).</p>

1. Status abbreviations: NT = Near Threatened, V=Vulnerable

 2. Source: PMR = Protected Matters Report (**Appendix A**), WN = WildNet (*Wildlife Online*) Extract

4.1.5 Pest plant species

Pest plant species have very limited distribution across the Project area and were mainly confined to camp sites along the foreshore of Connies Beach north of the Project area. None of the eight exotic species identified is a listed pest plant under the *Biosecurity Act 2014* or is a Weed of National Significance (WoNS). Pest plant species observed included *Cyperus eragrostis*, *Stachytarpheta cayennensis* and *Mesosphaerum suaveolens*.

4.2 Fauna Assessment

4.2.1 Fauna species assemblage

The two fauna surveys recorded 82 terrestrial fauna species, comprised of nine mammal, 50 bird, 20 reptile and three frog species in the Study area (**Appendix F**). CFS have entered into an agreement with the Traditional Owners to avoid any impacts to Connies Beach and adjacent coastal habitat. A buffer has been placed between Connies Beach and the proposed mine area. The port area is proposed on a rocky headland located east of Connies Beach. Shorebirds are included in this assessment due to possible impacts through construction and use of the jetty and MOF. The habitat associated with the port area is shown below in a representative photo (**Plate 9**).



Plate 9. Coastal habitat east of Connies Beach

As discussed in **Section 2.2.1** the wet season fauna survey was curtailed by poor weather, and the dense heath vegetation dominating the Study area made access difficult away from cleared tracks. Increased trapping effort and more time devoted to active searching and opportunistic recording would undoubtedly record more mammal, reptile and frog species. However, sun-loving species such as *Ctenotus* may be more common along the edges of tracks, rather than in the heavily shaded areas of heath.

There was a 28% increase in the number of birds recorded in the dry season compared to the wet season. This was undoubtedly due to increased survey effort, given that more terrestrial species would be present during the wet season. More coastal species, such as terns, boobies and frigatebirds, were also recorded in the dry season, though this was in part due to the presence of offshore fishing trawlers. Terrestrial bird species' assemblages were quite similar across the seasons, suggesting that the combined assemblage is a reasonable indication of what is present.

Three of the mammal species are introduced (**Section 4.2.4**). None is considered threatened under the EPBC Act or NC Act. Six of the 50 recorded bird species are marine species and another eight are restricted or largely restricted to coastal habitats, though there may be very occasional occurrence of some of these species on freshwater habitats. One bird species, Lesser Sand Plover, is listed as Endangered under both the NC Act and EPBC Act. Greater Sand Plover is listed as Vulnerable under both the NC Act and EPBC Act. Beach Stone-curlew is listed as

Vulnerable under the NC Act. Two recorded reptile species, Cape Heath Ctenotus (**Plate 10**) and Estuarine Crocodile, are listed as Vulnerable under the NC Act. None of the three is considered threatened under the EPBC Act, although Estuarine Crocodile is listed as Migratory. One recorded frog species is an introduced species. No frog species recorded is considered threatened under either the EPBC Act or NC Act. The locations of threatened fauna records are depicted in **Figure 12**.



Plate 10. Cape Heath Ctenotus (*Ctenotus rawlinsoni*) June 2021

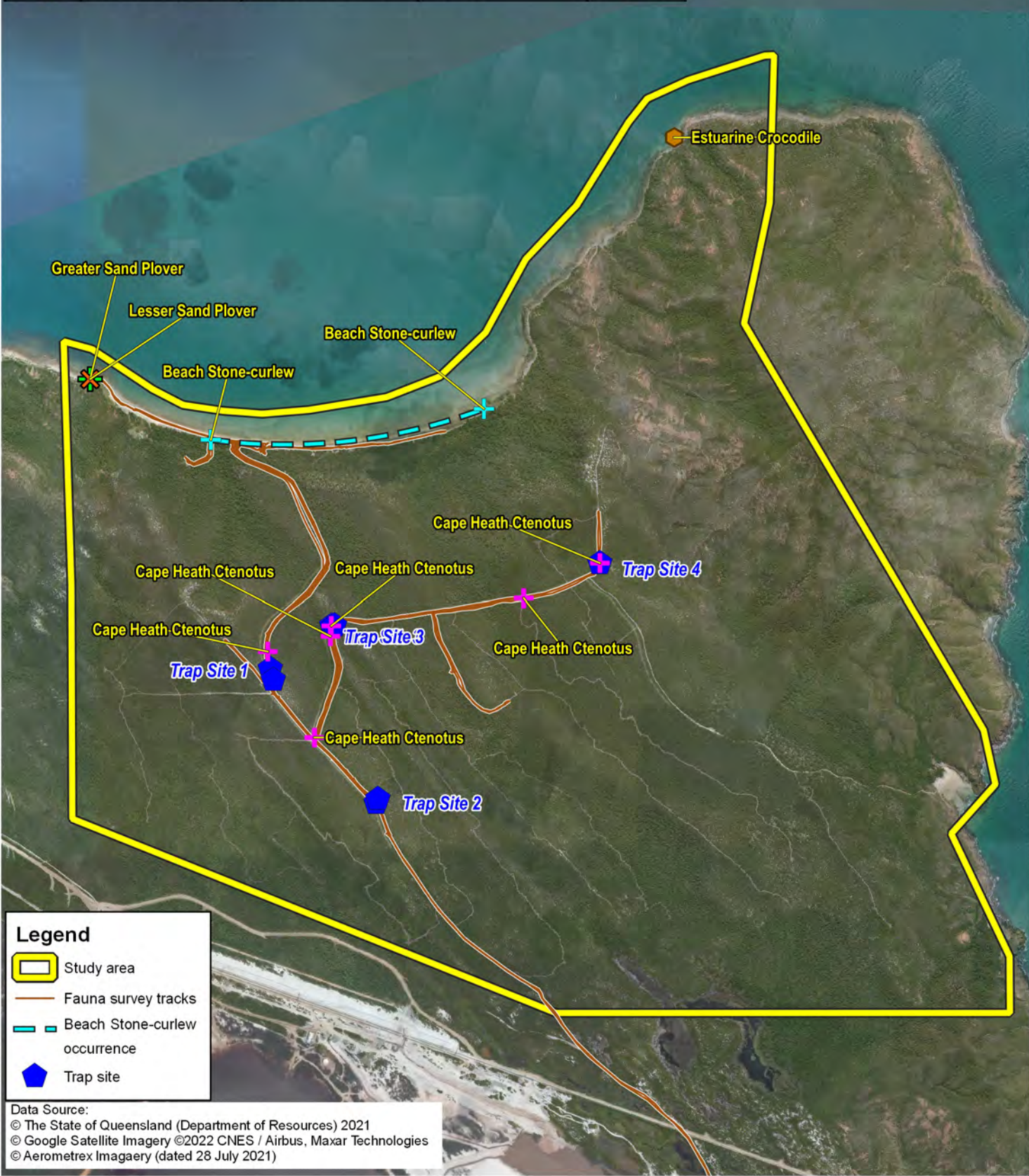
4.2.1.1 Mammals

The desktop assessment identified 12 species of mammal, including Dog and Pig. Native species included three rodents (one to genus only), two bats, one macropod, two dasyurid, one glider and one bandicoot species. The two bat species previously identified for the area are both flying-fox species.

Nine mammal species were recorded during the two fauna surveys, consisting of one dasyurid, one native rodent, four bats and three introduced species, Dog/Dingo (*Canis familiaris*), Cat (*Felis catus*) and Pig (*Sus scrofa*). A small mammal thought to be Northern Brown Bandicoot (*Isodon macrourus*) was seen briefly during the dry season survey but not positively identified. No evidence of macropods, such as tracks or scats, was found. The Project field surveys identified three species of microbat, all by call analysis, and one mega-bat, Black Flying-fox (*Pteropus alecto*). This is undoubtedly only a subset of the microbat species assemblage. There was substantial overnight rain during both field surveys, which restricts microbat activity.

Pale Field-rat (*Rattus tunneyi*) was captured during both wet and dry season surveys. There is no record of the species for the area though there are nine records of *Rattus* sp. Rodents (*Rattus* sp.) were recorded on camera traps but could not be identified to species, though they were not the introduced Black Rat (*Rattus rattus*). The two rodents previously recorded are *Melomys* species. In the general area, Grassland *Melomys* (*M. burtoni*) is most likely in the areas of coastal scrub, which was not trapped as the habitat is not typical of the areas of proposed disturbance. Fawn-footed *Melomys* (*M. cervinipes*) typically occurs in forest and woodland and most of the Study area is not suitable for the species. The two dasyurids known for the general area are also more typical of forest and woodlands. A dasyurid was recorded by camera trap and, based on size, was probably Common Dunnart (*Sminthopsis murina*), though it could have been a juvenile Red-cheeked Dunnart (*S. virginiae*). The latter species is known from the general area. Neither species is considered threatened.

Symbol	Common Name	Scientific Name	EPBC Act	NC Act
✕	Greater Sand Plover	<i>Charadrius leschenaultii</i>	Vulnerable, Migratory	Vulnerable
+	Lesser Sand Plover	<i>Charadrius mongolus</i>	Endangered, Migratory	Endangered
🦎	Estuarine Crocodile	<i>Crocodylus porosus</i>	Migratory	Vulnerable
+	Cape Heath Ctenotus	<i>Ctenotus rawlinsoni</i>	not listed	Vulnerable
+	Beach Stone-curlew	<i>Esacus magnirostris</i>	not listed	Vulnerable

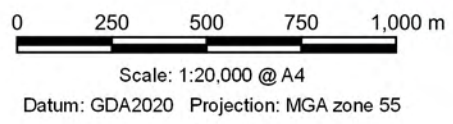


Legend

- Study area
- Fauna survey tracks
- Beach Stone-curlew occurrence
- ⬠ Trap site

Data Source:
 © The State of Queensland (Department of Resources) 2021
 © Google Satellite Imagery ©2022 CNES / Airbus, Maxar Technologies
 © Aerometrex Imagery (dated 28 July 2021)

©CGIS 2019 File Path: G:\GIS\2021\BE2021\BE210151.01_CFS_Cape Flattery Silica Sands Project\Worksheets\Terrestrial Ecology\2_Terrestrial Ecology Assessment\Rev.0\Figure 12 Threatened fauna species recorded_CGZ



**Cape Flattery Silica Pty Ltd
 Cape Flattery Silica Sands Project
 Terrestrial Ecology Assessment**

Figure 12
 Threatened Fauna Species
 Recorded during Field Surveys

4.2.1.2 Birds

Fifty bird species were recorded during the two fauna surveys, six of which are marine/pelagic species observed from the shore and are not applicable to the Project. Another eight are restricted or largely restricted to coastal habitats, though there may be very occasional occurrence of some of these species on freshwater habitats. The marine/pelagic species are listed in **Appendix F** but are not otherwise discussed in this report. One bird observed offshore was most likely Herald Petrel (*Pterodroma heraldica*). This is a marine/pelagic species which is not relevant to the Project as it occurs in offshore waters. It is listed as Critically Endangered under both the EPBC Act and NC Act. Marine species are included in the appendix simply to inform any future marine assessment.

The WildNet search identified 182 bird species within 25 km of a centre point. This suggests that the species assemblage recorded is a significant under-representation of the actual assemblage for the Study area. However, the search radius captures habitats not present in the Study area, namely islands and taller wooded areas. Based on species profile kml files (QG 2022) the islands provide resources for Migratory waders and other shorebirds that are not replicated by Connies Beach. The Study area is largely homogenous, consisting of heathland on dunefields, with some treed areas, albeit with low canopy heights. The lack of vertical structural complexity and habitat variety means that the site will have a small bird species assemblage.

The three threatened species definitely recorded, Lesser and Greater Sand Plovers and Beach Stone-curlew, are coastal species and occurrence in the proposed mine site is not expected. One species, White-streaked Honeyeater, is considered a non-CEEVNT (Critically Endangered, Endangered, Vulnerable or Near Threatened) priority taxon in the Cape York Peninsula bioregion (DEHP 2012). It is common in areas of heath in the Study area (**Plate 11**). Five coastal species that are listed as Migratory under the EPBC Act and as Special Least Concern under the NC Act were recorded. They are discussed in **Section 4.2.3**.



Plate 11. White-streaked Honeyeater (*Trichodere cockerelli*) June 2021

Twenty-two species were recorded in areas of heath within the proposed mine site. Some of the species recorded in coastal scrub are also considered likely to occur in such areas at times. Although heath is dense and structurally complex it is of low height and provides limited resources for species. No threatened bird species is considered likely to occur in the proposed mine site, though the aerial White-throated Needle-tail may forage above the area. Rufous Fantail, listed as Migratory under the EPBC Act and Special Least Concern under the NC Act, was recorded in coastal scrub. It possibly breeds in areas of heath with emergent trees and could occur throughout the proposed mine site on passage. The species assemblage of the heath is mostly comprised of common, widespread species. Some do not occur south of the Wet Tropics bioregion.

4.2.1.3 Reptiles

The desktop assessment identified 32 species of reptile, excluding marine species. The two fauna surveys recorded 20 species of reptile, excluding a marine turtle seen briefly in onshore waters during the dry season survey but not identified to species. These 20 species are quite diverse, comprising 10 families. Ten of the recorded species were not included in the WildNet data. It is typically difficult to compile a comprehensive reptile species assemblage for a given location without substantial field survey over a number of years and during suitable conditions. That the fauna surveys increased the known assemblage by such a large percentage is quite notable. Nonetheless, it is likely that a considerable number of species remain to be found.

The one recorded reptile species that is considered threatened, Cape Heath Ctenotus, is common in areas of heath in the Study area. For example, three different individuals were captured at one trap site. The species was not recorded in other habitats, though trapping was only conducted in heath. Its known life history suggests it will be restricted to heath on sand. It is thought that all other 19 species would occur in all terrestrial habitats in the Study area. One of the species recorded, Sandy Rainbow-skink is a non-CEEVNT priority taxon in the Cape York Peninsula bioregion (DEHP 2012). One reptile species, House Gecko (*Hemidactylus frenatus*) is introduced (**Section 4.2.4**). It was only recorded in coastal scrub, in areas disturbed by sporadic human activity. It was presumably brought in accidentally by humans. The other species are listed as Common (Least Concern) under the NC Act. None is listed under the EPBC Act.

4.2.1.4 Frogs

Three species of frog were recorded. Only the introduced Cane Toad was recorded during the wet season, despite the torrential rain, though there was only one trapping night and no spotlighting was conducted because of prohibitive weather conditions. During the dry season survey, when there was still substantial rain, Northern Banjo Frog (*Limnodynastes terraereginae*) was trapped in large numbers, despite none of the trap sites being close to waterbodies. Two individuals of Ornate Burrowing Frog (*Platyplectrum ornatum*) were also captured. These are both common, widespread species, especially Ornate Burrowing Frog. The desktop assessment identified an additional 14 species of frog although many of these are unlikely to occur in the heath present in the Study area. Nonetheless, it is expected that the actual frog species assemblage for the Study area is notably larger than what has been recorded. No threatened frog species is expected to occur in the Study area.

4.2.1.5 Fauna habitat values

The recorded species assemblage appears quite species poor, except for reptiles, which are quite species rich for a small area with limited habitat variability. The desktop assessment suggests that a larger overall species assemblage should be present, but the search radius captures islands, with numerous tern and wader species, and rainforest, with its associated increased species richness. The Study area is dominated by low heath on sand which provides less resources than more structurally complex habitat types such as woodland and rainforest. The heath in the Study area is comparatively little disturbed, despite some vehicle tracks. Only one of these would be traversed by most visitors. These tracks do not appear to be sufficiently wide to preclude fauna moving across the landscape. Reptiles were regularly observed crossing tracks, including the Vulnerable Cape Heath Ctenotus. It is likely that there was substantially increased vehicle use during the dry season previously, in which case the tracks may have resulted in some fauna death by vehicle strike. However, Connies Beach is now ostensibly closed without permission from Traditional Owners and traffic is probably greatly reduced. It was not likely to have been a significant threat given the limited extent of tracks, the difficulty of accessing the location and that most visitors would have been focussed on Connies Beach rather than the heathlands.

A paucity of tree hollows is likely to be a limiting factor for possums and gliders and may also affect the microbat assemblage, with few available roost or maternity sites. The apparent absence of macropods, of which only Agile Wallaby (*Notamacropus agilis*) is likely, is unsurprising given the density of the vegetation and the lack of areas suitable for grazing. That the field surveys added five species to the known mammal species assemblage indicates that the area has been comparatively little surveyed but also suggests that the habitats present may not be suitable for many species.

4.2.1.6 Threatened fauna species

Terrestrial vertebrate fauna species listed as CEEVNT species, Migratory and/or Special Least Concern under the EPBC Act and/or NC Act identified as possible, likely or known to occur are listed in **Table 9** and **Table 10**.

The tables provide a likelihood of occurrence assessment for relevant species in or near the Study area based on known distribution, ecology and habitat use. Species recorded near the Study area are relevant to the Project as possible off-site (indirect) impacts will need to be assessed as part of the impact assessment (**Section 5**).

The assessment identified 12 threatened species as possible, likely or known to occur (**Table 9**). The likelihood of occurrence assessment for the remaining 18 species considered as unlikely to occur is provided in **Appendix C**.

The assessment identified 34 bird species listed as Migratory (under the EPBC Act) as relevant to the Study area and surrounds (**Table 10**). Given that many of those species listed as Migratory under the EPBC Act do not occur in heath they are discussed in species groups (where appropriate), unless also a CEEVNT species.

This assessment does not include threatened/Migratory fish or marine species such as Dugong, cetaceans, seabirds, and marine turtles. These species are addressed in the *Project Marine Ecology Technical Report* (Hydrobiology 2022b).

Table 9. Threatened fauna species likelihood of occurrence

Species	Status ¹		Source ²	Likelihood of Occurrence Assessment
	EPBC Act	NC Act		
Ghost Bat (<i>Macroderma gigas</i>)	V	V	PMR	Possible. The closest known record is from approximately 56 km southwest of the Study area. It is an un-dated Queensland Museum (QM) specimen (OZCAM 2022). The next closest record is one of a cluster of 7 records from approximately 67 km south of the Study area on Kings Plains Station in 2013. The records are from 2013-2015 (QG 2022). Ghost Bat occurs in a broad range of habitats from arid spinifex hillsides to tropical rainforest (Churchill 2008; Richards et al. 2008a). Their distribution is influenced by availability of suitable roost sites. Ghost Bats will roost in shallow caves and under boulders (Churchill 2008) but prefer deep caves, abandoned mines and deep rock fissures (Armstrong & Anstee 2000; Richards et al. 2008a). They require particular structural and microclimatic features for permanent roosts and maternity sites (Churchill 2008). Only 14 maternity sites are currently known (Worthington Wilmer 2012), including on Kings Plains Station and Kuku Nyungkul-Kuku Bubogun south of Cooktown (Woinarski et al. 2014). There is no suitable roost site for the species within the proposed mine area. The project area would only be suitable for foraging for the species.
White-throated Needletail (<i>Hirundapus caudacutus</i>)	V, M	V	WN, PMR	Likely. In Australia, White-throated Needletail is almost completely an aerial species, possibly even sleeping on the wing. White-throated Needletails are found over a wide variety of habitat, including open areas, modified land and the ocean but are most often recorded over wooded areas (Higgins 1999).
Beach Stone-curlew (<i>Esacus magnirostris</i>)	-	V	WN	Known to occur. A single bird was seen on Connies Beach in the wet season and a pair was present throughout the dry season survey (Appendix B). It is not expected that the species would occur in the proposed mine area but may occur on occasion in the proposed port area. A brief profile (life history) is provided in Section 7.2.1 .
Lesser Sand Plover (<i>Charadrius mongolus</i>)	E, M	E	WN	Known to occur. Seventeen birds were found at a high tide roost west of Connies Beach in the wet season (Appendix B). The species is not expected to occur within the proposed mine

Species	Status ¹		Source ²	Likelihood of Occurrence Assessment
	EPBC Act	NC Act		
				area but may utilise habitat adjacent to the proposed port area. A brief profile is provided in Section 7.1.2.1 .
Greater Sand Plover (<i>Charadrius leschenaultii</i>)	V, M	V	WN	Known to occur. Two birds were roosting with the Lesser Sand Plovers (Appendix B). The species is not expected to occur within the proposed mine area but may utilise habitat adjacent to the proposed port area. A brief profile is provided in Section 7.1.2.2
Eastern Curlew (<i>Numenius madagascariensis</i>)	CE, M	CE	WN, PMR	Possible. Eastern Curlew is mostly confined to coastal habitats, particularly estuaries, harbours and coastal lagoons. They mainly forage on open intertidal mudflats, sandflats and saltmarsh, often near mangroves, and occasionally on ocean beaches (Finn et al. 2008). Roosting occurs on sandy spits and islets, in mangroves and saltmarsh, and along high water mark on beaches (Pringle 1987; Higgins & Davies 1996). Within Australia, Eastern Curlew occurs on suitable habitat on all coasts (Higgins & Davies 1996). The absence of Migratory waders on Connies beach, other than a single Whimbrel (<i>N. phaeopus</i>) in the dry season, suggests that it is not an important foraging location for sandpipers and plovers. Eastern Curlew may occasionally occur, but any occurrence is likely to be sporadic and brief. It is unknown if the lack of database records from the beach reflects this or is due to a lack of previous survey effort, though the wet season survey was conducted at a suitable time of year. This assessment is also relevant for the following four species.
Western Alaskan Bar-tailed Godwit (<i>Limosa lapponica baueri</i>)	V, M	V	WN, PMR	Possible. Western Alaskan Bar-tailed Godwit breeds in the northern hemisphere during the austral winter and occurs along the Australian coast when not breeding, particularly the north and east coasts. Habitats used include mudflats, estuaries, inlets, mangrove-lined lagoons and sheltered bays (Garnett et al. 2011). It rarely occurs inland or in areas of short grass, such as paddocks and airstrips. Roosting occurs on sandy beaches, bars and spits, saltmarsh and in sheltered bays (Higgins & Davies 1996). The species is not expected to occur within the proposed mine area but may utilise habitat adjacent to the proposed port area.
Great Knot (<i>Calidris tenuirostris</i>)	CE, M	CE	WN	Possible. Great Knot mostly occurs in sheltered coastal habitats with large intertidal mudflats or sandflats. It also uses sandy beaches with nearby mudflats, sandy spits and sometimes exposed reefs and rock platforms. It is rarely found inland (Higgins & Davies 1996). The species is not expected to occur within the proposed mine area but may utilise habitat adjacent to the proposed port area.
Curlew Sandpiper (<i>Calidris ferruginea</i>)	CE, M	CE	WN, PMR	Possible. In Australia, Curlew Sandpiper mostly occurs on intertidal mudflats in sheltered coastal areas, such as estuaries, bays and lagoons. It also uses swamps, lakes, saltworks and sewage ponds. Less often it is recorded inland, around lakes, dams and bore drains, usually with bare edges of mud or sand (Higgins & Davies 1996). The freshwater waterbody in the proposed mine area was not accessed during either survey due to time constraints and localised flooding in the wet season and safety concerns raised by a Traditional Owner in regard to presence of Estuarine Crocodile in the dry season. It was viewed from above from a helicopter in the wet

Species	Status ¹		Source ²	Likelihood of Occurrence Assessment
	EPBC Act	NC Act		
				season and did not look suitable due to high water levels which would preclude suitable edges for foraging. Such habitat may be present prior to the commencement of the wet season and the waterbody needs to be assessed. However, it is noted the wetland habitat is not within the area of proposed disturbance
Estuarine Crocodile (<i>Crocodylus porosus</i>)	M	V	WN	Known to occur. A brief species profile (life history) is provided in Section 7.1.3.
Cape Heath Ctenotus (<i>Ctenotus rawlinsoni</i>)	-	V	WN	Known to occur. The species was captured and observed during both surveys and is common. A brief species profile is provided in Section 7.2.1.
Mclvor River Slider (Ingram's Lerista) (<i>Lerista ingrami</i>)	-	V	WN	Possible. There is pre-2004 record possibly from within the Study area (QG 2022). A lack of more recent records probably reflects a lack of survey effort. A brief species profile is provided in Section 7.2.1.

¹Status abbreviations: CE= Critically Endangered, E= Endangered, V=Vulnerable, M= Migratory

²Source: PMR = Protected Matters Report, WN = WildNet (*Wildlife Online*) Extract

Table 10. Migratory and Special Least Concern species likelihood of occurrence

Species listed at Migratory under the EPBC Act and Special Least Concern under the NC Act		
Species	Source	Likelihood of Occurrence Assessment
Whimbrel (<i>Numenius phaeopus</i>)	PMR, WN	Known to occur. Whimbrel was recorded during the dry season survey with a single bird present on Connies Beach throughout. A brief species profile is provided in Section 7.1.3.
Grey Plover (<i>Pluvialis squatarola</i>) Pacific Golden Plover (<i>Pluvialis fulva</i>) Oriental Plover (<i>Charadrius veredus</i>) Little Curlew (<i>Numenius minutus</i>) Ruddy Turnstone (<i>Arenaria interpres</i>) Sharp-tailed Sandpiper (<i>Calidris acuminata</i>) Red-necked Stint (<i>Calidris ruficollis</i>) Sanderling (<i>Calidris alba</i>) Pectoral Sandpiper (<i>Calidris melanotos</i>) Latham's Snipe (<i>Gallinago hardwickii</i>) Terek Sandpiper (<i>Xenus cinereus</i>) Common Sandpiper (<i>Actitis hypoleucos</i>) Grey-tailed Tattler (<i>Tringa brevipes</i>) Wandering Tattler (<i>Tringa incana</i>) Common Greenshank (<i>Tringa nebularia</i>) Wood Sandpiper (<i>Tringa glareola</i>)	WN, PMR	Possible. Twelve of these waders are included in the WildNet search results. The other 4 are predicted by the PMR. Most of these species occur in saline habitats, particularly intertidal mudflats and sandflats. Some also occur on suitable freshwater waterbodies and Latham's Snipe is restricted to freshwater (Higgins & Davies 1996). Oriental Plover mostly occurs on open grasslands and other areas of short groundcover (Marchant & Higgins 1993). In the Study area, these species are most likely to occur on Connies Beach and adjacent rocky areas. However, the almost complete absence of Migratory waders on Connies beach suggests that it is not an important foraging location for sandpipers and plovers. The freshwater waterbody in the Study area was not accessed due to time constraints. It was viewed from above from a helicopter and did not look suitable for Migratory waders due to high water levels which would preclude suitable edges for foraging. Such habitat may be present prior to the commencement of the wet season, or early in the wet season, and the waterbody needs to be assessed.
Bridled Tern (<i>Onychoprion anaethetus</i>) Little Tern (<i>Sternula albifrons</i>) Caspian Tern (<i>Hydroprogne caspia</i>) Greater Crested Tern (<i>Thalasseus bergii</i>)	WN, PMR	Known to occur. A single Bridled Tern was observed offshore from Connies Beach in the dry season. Singletons of Little Tern and Caspian Tern were seen repeatedly along Connies Beach in the dry season. It was likely that only a single individual of each species was present. Greater Crested Tern was present in both wet and dry seasons and was always present along Connies Beach and over onshore waters. Brief species profiles of these species are provided in Section 7.1.3.

Common Noddy (<i>Anous stolidus</i>) Gull-billed Tern (<i>Gelochelidon nilotica</i>) Roseate Tern (<i>Sterna dougallii</i>) Black-naped Tern (<i>Sterna sumatrana</i>) Common Tern (<i>Sterna hirundo</i>)	WN, PMR	Possible. Most of these tern species are coastal and island species and any possible occurrence would be along the beach. Gull-billed does also forage on freshwater waterbodies and may occur on the freshwater waterbody in the Study area.
Rufous Fantail (<i>Rhipidura rufifrons</i>)	WN, PMR	Known to occur. One was seen in coastal scrub during the dry season survey. A brief species profile is provided in Section 7.1.3 .
Satin Flycatcher (<i>Myiagra cyanoleuca</i>) Spectacled Monarch (<i>Symposiachrus trivirgatus</i>) Black-winged Monarch (<i>Monarcha frater</i>) Black-faced Monarch (<i>Monarcha melanopsis</i>)	PMR, WN	Possible. These species variously occur in rainforest, wet sclerophyll forest, coastal scrub, open forest and mangroves (Higgins et al. 2006; Menkhorst et al. 2017). The 4 species are known from WildNet records and all could occur on passage and some could breed. Suitable habitat is present within the Study area.
Fork-tailed Swift (<i>Apus pacificus</i>)	PMR, WN	Likely. In Australia, Fork-tailed Swift is almost exclusively an aerial species, probably even sleeping on the wing, though individuals are occasionally recorded roosting in trees. Foraging occurs over a wide variety of habitats including towns and cities, open areas, farmland, coastal areas and sometimes forest (Higgins 1999). A brief species profile is provided in Section 7.1.3 .
Oriental Cuckoo (<i>Cuculus optatus</i>)	PMR, WN	Possible. Oriental Cuckoo occurs in rainforest, vine thicket and open forest and woodland. The species is sometimes found in mangroves and is often recorded in gardens and plantations (Blakers et al. 1984; Higgins 1999). Suitable habitat is present within the Study area.
(Eastern) Osprey (<i>Pandion cristatus</i>)	PMR, WN	Possible. Eastern Osprey may be found around almost the entire coastline and offshore islands. It sometimes occurs far inland on rivers and lakes (Marchant & Higgins 1993; Debus 1998).
Lesser frigatebird (<i>Fregata ariel</i>) Wilson's storm-petrel (<i>Oceanites oceanicus</i>) Brown booby (<i>Sula leucogaster</i>)	WN	Possible. Individuals of these species were sighted offshore, records are from the 2021 dry season survey. Individuals were sighted outside of the Study Area, following trawling ships. As such these species have not been considered further in this assessment.

¹Source: PMR = Protected Matters Report, WN = WildNet (Wildlife Online) Extract

4.2.2 Threatened fauna known or likely to occur in the Study area

Beach Stone-curlew (*Esacus magnirostris*)

EPBC Act: not listed; NC Act: Vulnerable

Beach Stone-curlew is found around the coastline of eastern and northern Australia (Marchant & Higgins 1993). A single bird was seen on Connies Beach in the wet season (**Plate 12**) and a pair was present along Connies Beach throughout the dry season survey. A brief life history and relevant threatening processes are provided in **Section 7.2**.



Plate 12. Beach Stone-curlew (*Esacus magnirostris*) Connies Beach June 2021

Lesser Sand Plover (*Charadrius mongolus*)

EPBC Act: Endangered, Migratory (Bonn, CAMBA, JAMBA, ROKAMBA); NC Act: Endangered

Lesser Sand Plover is mostly confined to coastal habitats, rarely occurring on inland wetlands (Marchant & Higgins 1993). Seventeen birds were found at a high tide roost west of Connies Beach in the wet season (**Appendix B**). No foraging was observed. A brief life history (species profile) and relevant threatening processes are provided in **Section 7.1.2.1**.

Greater Sand Plover (*Charadrius leschenaultii*)

EPBC Act: Vulnerable, Migratory (Bonn Convention, CAMBA, JAMBA, ROKAMBA); NC Act: Vulnerable

Habitat use and foraging behaviour of Greater Sand Plover are very similar to Lesser Sand Plover, and the two species are often found together (Lane 1987; Marchant & Higgins 1993). Two birds were seen roosting with Lesser Sand Plover in the wet season (**Appendix B**). No foraging was observed. A brief species profile and relevant threatening processes are provided in **Section 7.1.2.2**.

Estuarine Crocodile (*Crocodylus porosus*)

EPBC Act: Migratory; NC Act: Vulnerable

A small individual was observed in coastal waters to the east of Connies Beach by support staff during the dry season survey. Tracks of a larger individual were also seen in the same area (**Appendix B**). Estuarine Crocodile is expected to occur, at least occasionally, in the freshwater waterbody within the Study area, as advised by Traditional Owners. A brief species profile and known threats are provided in **Section 7.1.3**.

Cape Heath Ctenotus (*Ctenotus rawlinsoni*)

EPBC Act: not listed; NC Act: Vulnerable

During the field surveys Cape Heath Ctenotus was recorded at five locations (**Appendix B**). Ctenotus were often observed on the tracks fleeing as the vehicles used for traversing the Study area approached. It is possible that many of these animals were Cape Heath Ctenotus, but Straight-browed Ctenotus (*Ctenotus spaldingi*) was also present and identification to species was typically not possible. However, the number of captures and confirmed observations indicate Cape Heath Ctenotus is common in the proposed disturbance area.

A brief species profile and known threats are provided in **Section 7.2.1**.

Mclvor River Slider (*Lerista ingrami*).

EPBC Act: not listed: NC Act: Vulnerable

Mclvor River Slider is also known as Ingram's Lerista. This fossorial (burrowing) species is found only in the vicinity of the Mclvor River mouth on south-eastern Cape York Peninsula. There are only four records available through the Queensland Government's species profile, one of which is from Cape Flattery (QG 2022) and is within the Study area (**Appendix A**). The record has a 3.6 km spatial error and it is unknown if the record is within the Study area.

The species was not recorded during the survey but is included here as possibly present based on the pre-2004 record from the Study area. It is possible that little or no survey for the species has been conducted since that record. Targeted active searching including leaf litter raking was conducted in the dry season survey. There are substantial areas of apparently suitable habitat for the species.

A brief species profile and known threats are provided in **Section 7.2.1**.

4.2.3 Migratory species known to occur in the Study area

The following six species were recorded during the Project surveys and are all listed as Migratory under the EPBC Act based on their inclusion under one or more of the following:

- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
- China-Australia Migratory Bird Agreement (CAMBA)
- Japan-Australia Migratory Bird Agreement (JAMBA) and
- Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

They are all listed as Special Least Concern under the NC Act.

Brief species profiles and known threats are provided in **Section 7.1.3**.

Whimbrel (*Numenius phaeopus*)

Whimbrel occurs in most coastal areas of Queensland and inhabits intertidal mudflats of sheltered coasts, estuaries and harbours. It prefers mudflats with mangroves (Pringle 1987; Higgins & Davies 1996). In the Study area, Whimbrel will be restricted to coastal habitats and will not occur in the proposed disturbance area.

Bridled Tern (*Onychoprion anaethetus*)

Bridled Tern is usually found in offshore waters, often well away from land. It rarely occurs along mainland coasts (Higgins & Davies 1996). In the Study area, Bridled Tern will be restricted to onshore waters and may associate with fishing trawlers. Any occurrence in terrestrial habitats will be due to severe weather events, such as cyclones.

Little Tern (*Sternula albifrons*)

Little Tern is found along a variety of coastal areas, including open beaches, lagoons, estuaries, harbours and inlets, especially those with exposed sandbanks. They nest on open sandy beaches (Pringle 1987; Higgins & Davies 1996). In the Study area, Little Tern will be restricted to coastal habitats and will not occur in the proposed disturbance area.

Caspian Tern (*Hydroprogne caspia*)

There were repeated observations of a sole Caspian Tern foraging along Connies Beach during the dry season survey. It is likely that only one individual was present. In the Study area, Caspian Tern will mostly be restricted to coastal habitats. It could sporadically forage over the freshwater waterbody.

Greater Crested Tern (*Thalasseus bergii*)

Greater Crested Tern is mostly a coastal species, occurring on exposed beaches and in bays, harbours, inlets and estuaries (Higgins & Davies 1996). In the Study area, Great Crested Tern will mostly be restricted to coastal habitats. It may fly over the proposed disturbance area, but any occurrence would be brief.

Rufous Fantail (*Rhipidura rufifrons*)

Rufous Fantail occurs in moist habitats, including closed forests, coastal scrubs, mangroves and along watercourses and gullies (Pizzey 1980; Higgins et al. 2006). Rufous Fantail could occur throughout the Study area but is most likely in treed areas.

4.2.4 Introduced fauna

Five species of feral animal were recorded during the field survey (**Table 11**), although only Cane Toad appeared to be common. Of these species, three are pest species listed under Schedule 2 of the *Biosecurity Act 2014* as 'Restricted Matters'. Under the Biosecurity Act a person who has control over a 'Restricted Matter' must not do the following:

- Category 3: You must not distribute this restricted matter. This means it must not be given as a gift, sold, traded or released into the environment unless the distribution or disposal is authorised in a regulation or under a permit
- Category 4: You must not move this restricted matter to ensure that it does not spread into other areas of the State
- Category 5: You must not keep or be in possession or control of this restricted matter
- Category 6: You must not feed this category of restricted matter. Feeding for the purpose of preparing for or undertaking a control program is exempted.

Table 11. Introduced species identified during field surveys

Species Name	Biosecurity Act Categories	Density	Distribution
Dog/Dingo <i>Canis familiaris</i>	3, 4, 5, 6	Common	Widespread
Cat <i>Felis catus</i>	3, 4, 6	Occasional	Widespread
Pig <i>Sus scrofa</i>	3, 4, 6	Abundant	Widespread
House Gecko <i>Hemidactylus frenatus</i>	-	Not mapped	Not mapped
Cane Toad <i>Rhinella marina</i>	-	Common	Widespread

¹Taken from the distribution maps of a weed or pest animal (DAF 2021).

Dingo was recorded on two camera traps during the wet season. The animals photographed were both in poor condition and may have been the same individual. Dingoes or Dogs were present during the dry season survey but were only recorded by footprints along tracks. Dogs and Dingoes are known to use roads and tracks for hunting (Edwards et al. 2000). The apparent lack of medium-sized native mammals suggest that any wild Dogs/Dingoes are probably having a minor impact on native fauna, due to a lack of suitable prey species, and, if resident, may be playing a role in controlling feral Pig numbers.

Feral Cat was recorded on a camera trap in the wet season. No evidence of the species was found in the dry season despite substantially more survey effort. Cats are a significant predator of native wildlife and have been implicated in the extinction of native fauna species on offshore islands (Bloomer & Bester 1992; Algar et al. 2002) and mainland Australia (Dickman et al. 1993; Denny & Dickman 2013). In Australia, a single Cat kills, on average, 225 reptiles a year (Woinarski et al. 2018). Cats are adaptable and opportunistic predators. They prefer live prey, particularly animals of less than 200 grams but will kill animals up to two kilograms (Denny & Dickman 2013). Cats kill mammals, birds, reptiles and frogs and even free-ranging 'house' cats will continue to kill native wildlife, despite being fed (Barratt 1997; Lepczyk et al. 2003). It is unknown what level of predation by Cats is occurring in the Study area but Cats are likely to be a threat to Cape Heath Ctenotus and possibly Mclvor River Slider, though its fossorial habits probably protect it. However, given the number of Cape Heath Ctenotus observed in a comparatively short period of time it is assumed that Cat predation is not currently a problem for that species, possibly due to a small local Cat population.

The only evidence of the presence of Pigs in the Study area were tracks and diggings close to a beach during the dry season survey. It appears only one or two individuals were present. Feral Pig is a significant pest species in Australia and affects native fauna directly by eating terrestrial frogs and the eggs of ground-nesting birds (Heise-Pavlov 2008). But more important is indirect damage by habitat modification and degradation through selective feeding, trampling damage and rooting for underground parts of plants and invertebrates, as well as competition for resources (Choquenot et al. 1996). Pigs also act as a reservoir for diseases and parasites that affect humans and livestock, including Ross River virus, leptospirosis and tuberculosis (Choquenot et al. 1996; Heise-Pavlov 2008).

House Gecko was only recorded in coastal scrub, in areas disturbed by sporadic human activity. It was presumably brought in accidentally by humans. House Gecko may move into areas of heath with a tree overstorey as it has been recently colonising natural, undisturbed habitats (Hoskin 2010). It is an Asian species that has spread to become one of the world's most widespread reptiles and is considered a threat to native species through competition in both natural habitats and on buildings (Case et al. 1994; Hoskin 2010). House Gecko has had well documented detrimental impacts on native gecko species in other parts of its introduced range. It is a very strong competitor and may out-compete native geckos. The species also carries parasites that may deleteriously affect native reptile species (Hoskin 2010).

Cane Toad was very common, caught regularly in pitfall traps and seen along vehicle tracks. It occurred in heath and coastal scrub. Although listed as a non-declared pest by the Queensland Government, Cane Toad has caused extensive mortality, through poisoning, of native frog-eating species (Burnett 1997; Phillips et al. 2003), including through consumption of eggs and tadpoles (Crossland & Alford 1998). Cane Toads may be having significant effects on species such as Yellow-spotted Monitor (*Varanus panoptes*) (which was recorded once) and Northern Death Adder (*Acanthophis praelongus*), which was expected but not recorded. Monitors often die after eating or even simply mouthed Cane Toads (Phillips et al. 2003) and death adders are also very susceptible (Shine 2010). Death adders are ambush predators that use a wriggling tail tip to attract prey (Read & Shine 2002) and Cane Toads are attracted to the lure more readily than native frogs (Hagman et al. 2009). A Traditional Owner said that death adders are not present and if this is the case it is likely that Cane Toads played a role in their extirpation. Although the impacts of Cane Toads on native wildlife are complex and include benefits for some species and vary over space and time (Shine 2010), it is assumed that the species has had negative impacts on native fauna in the Study area.

5 POTENTIAL IMPACTS OF PROPOSED PROJECT

Possible impacts to terrestrial habitats and species are addressed in the following sections. Impacts to coastal and marine habitats and species are addressed in the Project Marine Ecology Technical Report (Hydrobiology 2022b). Impacts to aquatic freshwater habitats are addressed in the Project Aquatic Ecology Technical Report (Hydrobiology 2022a).

Project activities have potential to directly and indirectly impact a range of terrestrial ecological values, including vegetation communities and habitat for threatened flora and fauna. Impacts are expected to occur progressively over the life of the Project. The Project encompasses mine panels of varying size to be mined over 26 years.

Ancillary infrastructure required for the Project includes:

- MIA
- Processing plant
- Stockpile area
- Sediment basin
- Boundary access track
- Access track corridor, which will include pipelines and conveyors
- Accommodation village
- Jetty, material offloading facility (MOF) and jetty infrastructure facility (JIF)

The proposed layout of the Project is depicted in **Figure 13**.

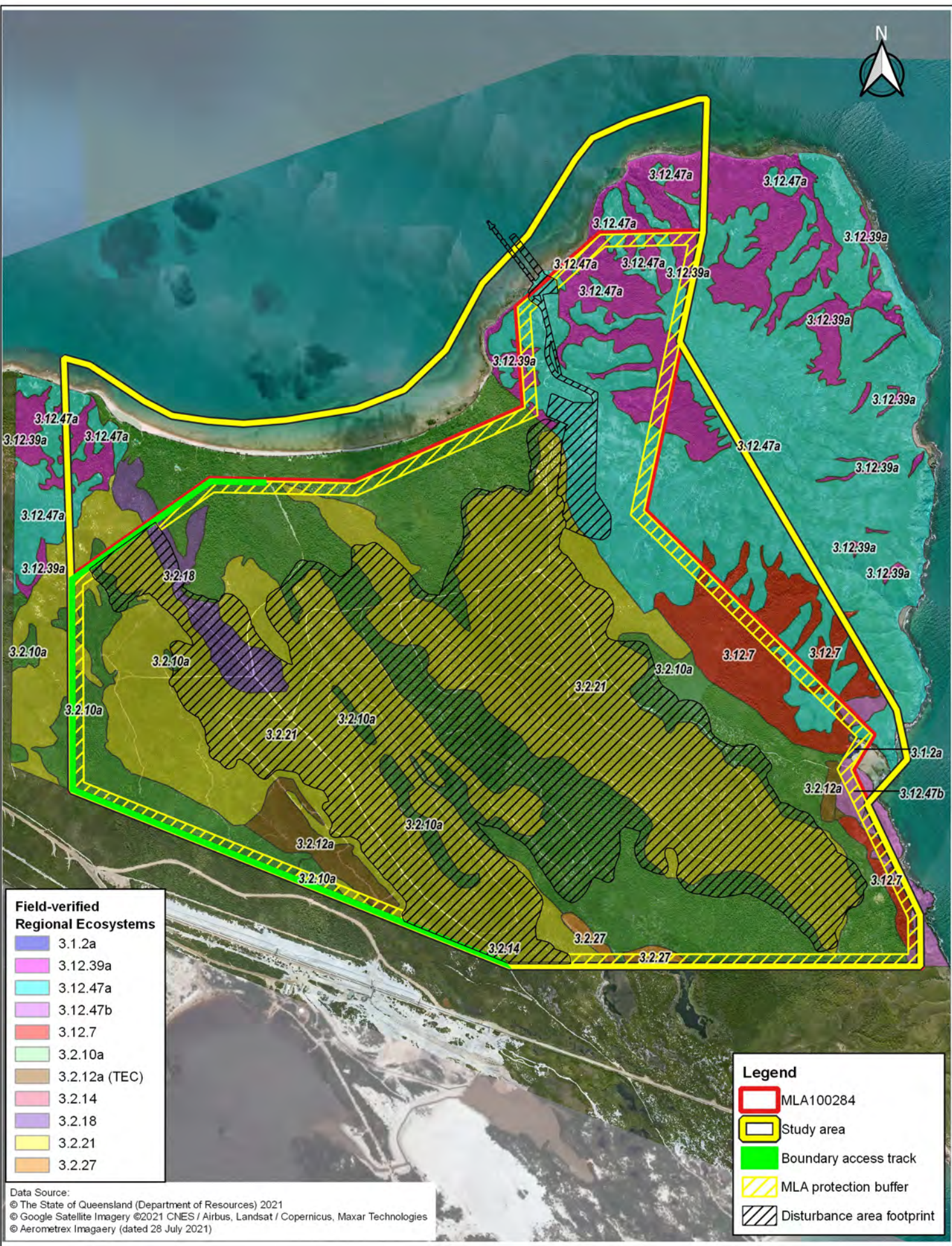
5.1 Vegetation Clearing and Habitat Disturbance

Clearing of vegetation is the most significant and direct impact of the Project on ecological values of the Project area. Land clearing is listed as a key threatening process under the EPBC Act. Removal of habitat reduces the size of local populations of flora and fauna dependent on that habitat. A number of species known or expected to occur in the Cape Flattery area have restricted distributions, including Cape Heath Ctenotus and *Acacia solenota*.

These impacts are immediate and significant in the short-term. Impacts may persist in the long-term if habitat created during rehabilitation does not closely resemble pre-disturbance ecosystems. The rehabilitation will be progressive, which will facilitate recolonisation of habitat by species such as Cape Heath Ctenotus. Progressive mining, over a period of 26 years, will provide habitat refuges. If sufficient habitat refuges are not maintained locally, prior to the maturation of rehabilitated land, local extinction of certain species may occur.

The layout of the Project currently encompasses a total of 309.03 ha of field-verified remnant vegetation communities (refer **Figure 13**). The predicted extent of overall impact to vegetation communities and habitat for threatened species is provided in **Table 12**. The Project is predicted to impact 0.34 ha of Of Concern vegetation (field-verified REs) and 308.69 ha of No Concern vegetation.

File Path: G:\GIS\2021\BE210151_01_CFS Cape Flattery Silica Sands Project\Workspaces\BE210151_02_Technical Studies\Terrestrial Ecology\2_Terrestrial Ecology Assessment\Rev 0\Figure 13_Proposed Project layout_GTRE_OGZ



- Field-verified Regional Ecosystems**
- 3.1.2a
 - 3.12.39a
 - 3.12.47a
 - 3.12.47b
 - 3.12.7
 - 3.2.10a
 - 3.2.12a (TEC)
 - 3.2.14
 - 3.2.18
 - 3.2.21
 - 3.2.27

- Legend**
- MLA100284
 - Study area
 - Boundary access track
 - MLA protection buffer
 - Disturbance area footprint

Data Source:
 © The State of Queensland (Department of Resources) 2021
 © Google Satellite Imagery ©2021 CNES / Airbus, Landsat / Copernicus, Maxar Technologies
 © Aerometrex Imagery (dated 28 July 2021)



0 200 400 600 800 1,000 m
 Scale: 1: 20,000@ A4
 Datum: GDA2020 Projection: MGA zone 55

Metallica Minerals Ltd
Cape Flattery Silica Sands Project
Terrestrial Ecology Assessment
 Figure 13
 Proposed Project Layout on
 Field-verified Vegetation Mapping

Table 12. Predicted vegetation clearing within disturbance footprint of Project area

RE field-verified	Biodiversity (EP Act) status	Potential threatened species habitat	Proposed impact area (ha)
3.2.10a	No Concern	Known habitat of <i>Acacia solenota</i> . Possible habitat for <i>Dendrobium johannis</i> .	68.06
3.2.14	Of Concern	Known habitat of <i>Acacia solenota</i> . Known habitat for <i>Myrmecodia beccarii</i> . Habitat for Cape Heath Ctenotus. Possible habitat for <i>Dendrobium johannis</i> .	0.13
3.2.18	No Concern	Known habitat of <i>Acacia solenota</i> . Habitat for Cape Heath Ctenotus.	9.33
3.2.21	No Concern	Known habitat of <i>Acacia solenota</i> . Habitat for Cape Heath Ctenotus.	220.58
3.12.39a	Of Concern	Possible habitat for <i>Dendrobium johannis</i> and <i>Myrmecodia beccarii</i> .	0.21
3.12.47a	No Concern	Known habitat of <i>Acacia solenota</i> .	10.73
Total area			309.03 ha

5.2 Habitat Fragmentation and Connectivity

Highly fragmented habitats support fewer species than connected blocks of habitat of the same size. This is because fragmentation restricts dispersal of fauna and plant seeds between available native habitat. Impacts of habitat fragmentation depend on the degree to which dispersal is inhibited by habitat gaps, size of the remaining habitat fragments, nature of the modified areas and ecological attributes of the species.

The Project will not isolate the rocky headland to the east and north-east of the MLA. An access corridor (approximately 30 m wide at its widest point) will be established (**Figure 2**) which may create a barrier for certain fossorial species, such as Mclvor River Slider. However, based on known habitat use, the species is unlikely to occur to the east of the proposed corridor. Proposed mining activities will not create any barrier to the south of the headland. There is an existing track. Any barrier created by this track has already isolated the headland given that the track extends west and then north to Connies Beach. Progressive rehabilitation will lessen the impacts of habitat loss on connectivity. The area to be disturbed does not extend to the existing mine to the west and southwest of the Study area.

The potential impact of the Project layout has been assessed using the DES' 'Landscape Fragmentation and Connectivity' tool. Results of the assessment indicate that any impact on connectivity areas is not significant. A copy of the output is provided in **Appendix G**.

5.3 Direct mortality

Clearing of vegetation for the Project presents a risk of direct mortality or injury to fauna. Ground fauna of low mobility, such as Cape Heath Ctenotus, are at risk of injury or death from heavy machinery and vehicular movements during the construction and ongoing clearing during the Project operations.

5.4 Dust

Earthworks and vehicular traffic associated with Project construction and operation can generate substantial amounts of dust during dry weather (Field et al. 2010). Dust can have both a physical and chemical impact on plants, either through the smothering of leaves, whereupon the rate of deposition is important, or through chemical changes to the soil or directly to the plant surface. Changes in soil properties, such as pH, can ultimately impact plant species assemblages. Dust can form a hard crust on the leaf surface, increasing leaf temperature and

increasing susceptibility to drought. Dust can also have adverse impacts on plant photosynthesis, respiration, transpiration and productivity (Farmer 1993; Chaston & Doley 2006). Evidence of potential impacts on entire vegetation communities is scarce. Many studies focus on specific impacts to single species.

Dust has also been known to provide adsorption surfaces for volatile contaminants that are subsequently deposited either by dry or wet deposition, causing respiratory ailments in animals, including humans. Microclimatic changes such as these can affect areas great distances from roads, changing the vegetation composition (Coffin 2007). Dust deposition may ultimately reduce plants' primary production and indirectly affect wildlife food plants and habitat quality (Lovich & Ennen 2011). The effects of dust on wildlife appear to be little known.

The silica sand within the Project area is considered less dispersive than soils comprising finer particles (e.g. clay soils), thereby reducing the likely extent of any potential impact from dust entrainment in the air column. In addition, sandy soils and regular wet weather associated with the Project area may make vegetation in these areas less susceptible to the impacts of dust. This is because most or all annual growth occurs during a period of the year when rainfall is highest. This coincides with the time of year when dust is least problematic, as rain inhibits the dispersal of dust in the air, and washes dust from leaves.

The potential impact of dust settlement on local ecological values is considered is considered a minor issue at worst.

5.5 Noise

Noise may affect animal behaviour and, when at chronic levels or frequency, can have deleterious effects on reproductive success. Noise is typically accompanied by other changes in environment, and it is difficult to identify the contribution noise has in population declines compared with other factors such as dust, pollution, fragmentation, weed invasion and road mortality (Blickley & Patricelli 2010). However, noise pollution exacerbates the effects of habitat fragmentation and the presence of humans on fauna (Barber et al. 2009).

Determining the effect of noise on wildlife in a particular location is difficult as responses vary between species, between different populations of the same species and between individuals of the same species. The characteristics of the noise and its duration, the life history of a species, season, habitat, sex, age, level of previous exposure, activity at the time of the noise and whether other physical stresses are occurring at the time all affect the consequences of artificial noise on wildlife (Busnel 1978; Radle 2007). Not all effects are deleterious, for example some bird species have higher reproductive success in noisy areas due to disrupted predator-prey interactions (Francis et al. 2009). Many species may interpret a new noise as a potential danger at first, but rapidly learn the noise is not associated with any threat (Radle 2007).

There are some studies on the effects of noise on Australian birds (e.g. Parris & Schneider 2009), but little available on mammals (Biedenweg et al. 2011). Anthropogenic noise is known to disrupt the breeding communications of Australian frogs (Parris et al. 2009) and has been shown to reduce the foraging efficiency of microbats (Bunkley & Barber 2015; Allen et al. 2021).

5.6 Light

Artificial lighting may impact fauna within the Project area. Lighting may have a range of impacts across different groups of taxa and between species within these groups, affecting behaviour of both nocturnal and diurnal fauna, vertebrate and invertebrate. Impacts include interfering with birds that migrate at night, altering singing behaviour in birds, altering reproductive and foraging behaviour of frogs, disrupting communication between individuals, disrupting emergence time, altering reproduction cycles, focusing the foraging activities of insectivores, increasing inter-specific competition and increasing the likelihood of predation for some species (Longcore & Rich 2004; Miller 2006; Robert et al. 2015; Rowse et al. 2016; Longcore & Rich 2017).

There has been little study of the effects of artificial light on free-ranging wild Australian mammals (Robert et al. 2015), as opposed to captive bred and held individuals.

Land-based light sources may affect coastal and marine species. Lights are known to affect the predator-prey dynamics of fish and marine mammals (Longcore & Rich 2017). Seabirds that are active at night at breeding sites may reduce activity levels in the presence of artificial light, with increased light intensity and duration increasing

the effect. Red light has a reduced effect compared to white and green light (Syposz et al. 2021), though the use of green light rather than white light has been shown to reduce attraction of seabirds to offshore platforms (Longcore & Rich 2017). At least 56 species of seabird are known to be affected by artificial light. Birds can become disorientated and are forced to land, which can result in mass mortality events. Grounded birds may be unable to take off again and are vulnerable to predation. Birds also collide with infrastructure such as buildings, pylons and wires (Rodríguez et al. 2017).

Connies Beach is not suitable as a nesting site for marine turtles, based on the tidal extent and encroaching woody vegetation at the top of the frontal dune. Marine turtles are known to be present in waters near the proposed jetty, with one seen during the dry season fauna survey. Marine turtle hatchlings may be attracted to coastal artificial lights while close to shore, increasing predation risk (Thums et al. 2016). Coastal lights may also affect the fitness of hatchlings and reduce the likelihood of them reaching the favourable currents that facilitate reaching nursery habitats (Scott et al. 2017). It is not known if breeding occurs on the mainland in the Cape Flattery area.

Not all effects of artificial lights are negative. Ambient light has been shown to increase foraging opportunities for sandpipers and plovers that feed in the intertidal zone, with timing of foraging based on tidal regime. Those species that use both visual and tactile foraging methods also increase their use of visual foraging, which is the more efficient method (Santos et al. 2010; Dwyer et al. 2013). However, artificial light may increase the likelihood of predation at night (Longcore & Rich 2017).

5.7 Altered fire regimes

The Study area is extensively covered by remnant native vegetation, a majority of which is very dense heathland (average height of 2.5 m) dominated by Yellow Teatree with a range of other species including the threatened *Acacia solenota*. There is very little evidence of recent fire throughout the Study area. The North Australia & Rangelands Fire Information (NAFI 2021) indicates only one fire in the last 20 years, in 2013, and which burnt only a small portion of the area. Therefore, most of the vegetation has been unburnt for at least 20 years, with a small area of heath and eucalypt woodland unburnt for eight years. The Queensland Herbarium (2021) recommends heath is burnt every five to ten years and eucalypt woodlands every one to five or two to five years. The lack of recent fire limits post fire species recruitment and species diversity, particularly in the heath dominated vegetation communities. It may also leave the flora and fauna susceptible to the damaging effects of a single, high intensity wildfire that burns most of the vegetation.

One vegetation community identified in the Study area contains floristic elements analogous to the Threatened Ecological Community (TEC) *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia*. Fire and weed invasion are considered key threats to this TEC (TSSC 2008). A suitable fire management strategy for the ecological community will be developed and implemented. This will include hazard reduction zones in the vicinity of remnants of the community and fire suppression, which includes keeping stand margins in as weed-free a condition as possible (TSSC 2008).

5.8 Water and contaminants

5.8.1 Surface water flows

The Project is expected to source water for construction and operations from bores and to a lesser extent from collection of rainfall runoff. Project water will be primarily used in mineral processing, where recycling will play a key part in minimising water consumption. Mine process water will be retained onsite. The remaining water will be used to satisfy other operational requirements, such as dust suppression for material transfer and stockpiles, as well as water and wastewater services for Project personnel use. Rainfall runoff will be collected and stored in the MIA sediment basin. It is expected the Project water sediment basin would experience a component of water loss via evaporation and seepage from natural processes and therefore, will need supplementing over time. The MIA sediment basin is currently designed for a maximum capacity of 36 ML and has a relatively small catchment of 12.3 ha. Modelling of flood events predicted no overtopping at the sediment basin during any of the scenarios modelled (WRM 2022). Water quality in the MIA sediment dam will be subject to monitoring within the Project Receiving Environment Management Plan (REMP) to ensure water quality remains within the required water quality parameters described in the Project's EA conditions. Controlled releases of water from the MIA (such as

stormwater) will drain into an existing drainage line. Any releases will meet the water quality requirements under the EA and is not expected to impact any terrestrial ecological values.

The watercourses within the Project area are limited to a series of small, unnamed, non-perennial first order watercourses that discharge into the adjacent marine area. These flow only very intermittently following heavy rainfall periods. Two mapped watercourses located within the ML drain to the south into two connected palustrine wetlands (on the southern boundary of the Study area) which are mapped as high ecological significance (HES) and are part of the 'Cape Flattery Dune Lakes' system (listed under the Directory of Important Wetlands of Australia). The latter years of mining (year 14 onwards) will impact these drainage lines. Nevertheless, rainfall will largely infiltrate into the sandy soils comprising the mining area, except during extreme events. Water levels in the wetlands are considered to be maintained by localised rainfall and minimal impact is expected from mining in the upstream watercourses (WRM 2022). Detailed information on potential impacts to these wetlands and other aquatic habitat values is provided in the Project Aquatic Ecology Technical Report (Hydrobiology 2022a).

5.8.2 Groundwater

Existing Groundwater information associated with the Project indicates groundwater levels varying between 14.5 mbgl (in the south of the Study area), 30.6 mbgl in the north-west and 45.6 mbgl in the east (at the base of the rocky hill adjacent to the Project). Given the vegetation in much of the Project area is heathland on sand it is considered very unlikely this vegetation would be accessing groundwater on a permanent or intermittent basis. The connection between groundwater and the dune lakes intersected by the southern boundary of the Study area appears unlikely (based on groundwater studies for the Project) although remains somewhat uncertain at this stage. A discussion on potential impacts to these wetlands is provided in the Project Aquatic Ecology Technical Report (Hydrobiology 2022a).

5.8.3 Aquatic pollutant release

The accidental release of pollutants from Project activities has the potential to degrade the surrounding environment and downstream freshwater and marine environments. The greatest risk of release may arise from accidental discharge of diesel and other fuels to the environment during transfer of fuel to onshore storage tanks, or via the pump-out of sewerage systems from barges, tugs and service vessels. For activities on land the extent of impact will of course be dependent on the size of the spill and the volume of water in the waterway (including whether there is flow). Nevertheless, spills and accidents resulting in the release of chemicals or fuels to the terrestrial environment are not considered a substantial risk from the Project. Despite the potential impacts broadly described above, it is noted the drainage lines in the Project area are highly ephemeral. The application of standard operational controls is considered to substantially limit the likelihood of such impacts.

5.9 Invasive species

Introduced weeds have potential to impact on terrestrial and aquatic ecological values as native flora can become displaced through competition with weed species, and adversely affected by browsing and soil trampling caused by feral herbivores. Weeds may also reduce habitat suitability for native fauna, by changing the physical structure and/or replacing food species. Native fauna populations, particularly small to medium sized species, may be impacted by predation from introduced carnivores and omnivores such as feral Cats and Pigs. These are indirect impacts which may not manifest themselves in the short-term and may be exacerbated by existing activities on adjacent lands. In this instance, adjacent land use is unlikely to introduce invasive species to the Study area or increase the abundance of those already present.

Introduced weed species are already present within the Project area, though to a very limited extent. Pest plant species were mainly confined to unofficial camp sites along the foreshore of Connies Beach to the north of the Study area. None of the eight exotic plant species identified by field survey is a listed pest species under the *Biosecurity Act 2014* or a WoNS.

Five species of introduced animal were recorded during the field survey (**Appendix B**), although only Cane Toad appeared to be common. Of these species, three are pest species listed under Schedule 2 of the *Biosecurity Act 2014* as 'Restricted Matters', Dingo, feral Cat and feral Pig. There was no evidence that the Study area was being significantly impacted by the presence of the recorded introduced animal species.

The following activities associated with the Project have the potential to promote proliferation of weeds and pests within the Study area, or introduce new weeds and pests from surrounding areas:

- The use of construction machinery and plant sourced from outside the region may introduce new weeds and spread existing species
- Vegetation clearance favours the establishment of weeds due to increased light and soil disturbance
- Inappropriate disposal and storage of putrescible wastes may attract feral animals

The weeds and pest animals currently occurring within the Project area are not expected to significantly proliferate in response to the Project activities. The major threat is the introduction of new weeds via contaminated vehicles or soils.

5.10 Cumulative impacts

Cumulative impacts are the incremental impacts of an action when combined with other past, present and reasonably foreseeable future actions. Impacts may be positive or negative, direct and indirect, long-term and short-term, and each individual effect may not be significant if taken in isolation. To the extent of the information available, an assessment endeavours to predict the cumulative impacts of the Project on environmental values over time and in combination with impacts created by the activities of other adjacent, upstream and downstream developments.

The only land-based commercial enterprise close to the Study area is CFSM, though cattle are grazed in suitable areas some distance to the west and south. Land-based cumulative impacts considered relevant to the Project are the operating CFSM and the proposed and yet to be approved Galalar Silica Sand Project (GSSP), which is west of Cape Bedford and close to Nob Point, east of Hope Vale (approximately 35 km south of the Project).

CFSM has operated since 1967 and is the world's largest silica sand mining operation. It includes ML2806 (4,915 ha), ML2965 (712 ha), ML40048 (131.6 ha) and ML7069 (584.6 ha). MLs 2806 and 2965 are immediately adjacent to the Study area. ML40048 is a narrow corridor linking ML2806 to ML7069, which lies 12.5 km west of the Study area. CFSM also held ML2807 (2,673 ha) at Point Lookout, north of Cape Flattery. The silica mine there was surrendered on 7 January 1994. The southern boundary of ML2807 lies 14 km north-west of the Study area. It is currently mapped by the Queensland Government as remnant vegetation, including RE 3.2.21, which is the most extensive RE in the Study area. The current EA for the CFSM indicates up to 1,548 ha may be subject to mining over the life of the Project. Details of what areas have already been mined and subject to rehabilitation activities are not available. Aerial imagery shows the area to be well vegetated. It is noted under the current EA the majority of all disturbed areas associated with the mine will be subject to rehabilitation and turned back to 'conservation purposes'.

There is little publicly available information for the currently operating CFSM. In addition to the mine, known features includes an airstrip and associated fuel storage, sewage treatment plant, mining tracks, borrow pits, accommodation area and associated marine port/barge area. The CFSM marine offloading facility is situated on the southern point of the Cape Flattery headland and runs out to sea for some 500 m, with 250 m of trestle approach and 250 m of operation deck. This port has a single berth serviced by a travelling ship loader for the export of sand and was established solely for the export of silica sand.

The Study area shares several REs with CFSM, based on Queensland Government mapping. CFSM also shares several threatened flora and fauna species, though only limited information is publicly available. There is a record of Estuarine Crocodile from a waterbody in ML2806. There are numerous records of Cape Heath Ctenotus from both ML2806 and ML2965. There is no known *Acacia solenota* record from within the four MLs but WildNet records submitted under a Scientific Purposes Permit or Research Permit are not publicly available. Three of the REs mapped as present in ML2806 and/or ML2965 are known habitat for *Acacia solenota* in the Study area. There is a record of *Myrmecodia beccarii* in ALA from 1984 whose co-ordinates place it within ML2806. However, the record has a spatial error of 10 km and it may not have been from within CFSM. Information regarding CFSM was derived from publicly available databases, Queensland Globe and GeoResGlobe, maintained by the Queensland Government, and the Environmental Authority EPML00550113.

Diatreme Resources Limited holds two exploration licences (EPM17795 and EPM27450) covering dune fields known to contain silica sand and mineral sands as well as the recently lodged MLA100308 and MLA100309 to the east and south, respectively of the CFSM operation. The GSSP is at the permit application stage for MLA100235, which will be an open cut mining operation designed to extract and process silica sand. It will involve dry mining silica sand above the water table, on-site processing involving washing and gravity separation, stockpiling processed product, and export via ship to overseas markets. MLA100235 is 35 km south of the Study area.

The GSSP resource is approximately 38 million tonnes for a project life of 15 to 23 years. Associated infrastructure at the site will include a workshop and office, a stockpile site, a mobile processing plant, slurry holding and treatment ponds and roads. The proposed ML is approximately 530 ha. The proposed mine footprint occupies approximately 242 ha, with the majority of that (190 ha) comprising heathland on sand dunes. The mining operation will include sequential rehabilitation and the area of disturbance for mining at any one time will average 6 ha per year. Though due to the lag between mining and rehabilitation it is possible that up to 16 ha may be exposed at any one time.

Surveys for GSSP have shown that it shares several threatened ecosystems and species with the Study area including the *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia* TEC, Lesser and Greater Sand Plovers, *Acacia solenota*, *Myrmecodia beccarii*, Estuarine Crocodile and Whimbrel. This information was sourced from *Diatreme Resources Galalar Silica Sand Project EPBC Act Referral Supporting Information Project Number 559B February 2020* prepared by Environment North, Biotropica Australia and BMT.

Species such as Lesser Sand Plover and Estuarine Crocodile are widespread and cumulative impacts on these species should be negligible given the nature of the projects. The species with restricted distributions and habitat requirements that make them most susceptible to cumulative impacts from the Project, CFSM and GSSP are Cape Heath Ctenotus and *Acacia solenota*, and Mclvor River Slider (should it be present in the areas of impact). *The Action plan for Australian Lizards and Snakes 2017* (Chapple et al. 2019) lists Cape Heath Ctenotus as Least Concern and Mclvor River Slider as Data Deficient. Chapple et al. (2019) considered the existing localised sand mining exercise within its range not to be a significant threat for Cape Heath Ctenotus. Current impacts of sand mining for Mclvor River Slider are unknown. The action plan does consider that expansion of sand mining may threaten both species. *Acacia solenota* is locally common and sand mining is considered a potential threat (TSSC 2013). However, it may be very suitable for rehabilitation. Available records of Cape Heath Ctenotus from within CFSM are from 1995, almost 20 years after mining commenced. But it is not known if these records are from areas prior to mining or from rehabilitated areas.

Should it proceed, GSSP is sufficiently distant that, assuming appropriate mitigation measures are implemented, impacts such as dust, noise, light pollution and invasive species should have no accumulated impact with regard to the Project.

Given the lack of available information regarding the extent of habitats/REs that may be impacted by the existing CFSM it is challenging to describe the overall cumulative impact to ecological values resulting from all projects. It is noted the overall allowable mining area of the CFSM (as identified in the Project EA) is substantially larger than either the GSSP or the proposed CFS Project. Regardless, the nature of the sand mining process is sequential and allows for progressive rehabilitation of mined lands. As such, only a relatively minor percentage of the overall mine footprint is subject to mining at any one time, and this is applicable to all the projects identified here.

The proximity of the CFSM to the Project may increase the likelihood of accumulated impacts to ecological values in the local Cape Flattery area. This potential will be addressed through monitoring measures outlined in **Section 6.2**. It is considered that the sequential rehabilitation and scale of mining for the CFSM, as also proposed for the Project, will limit the likelihood of cumulative impacts over the longer term.

6 MITIGATION AND MANAGEMENT RECOMMENDATIONS

6.1 Avoidance

CFS commits to a range of measures to minimise impacts to MNES, MSES and ecological values associated with the Study area. In the first instance, the final design process for the Project will reduce the area of impact to areas representing habitat for threatened species as much as is feasible for the construction of infrastructure. Where avoidance is not possible, a range of mitigation strategies will be implemented under an overarching Project Construction Environmental Management Plan (CEMP) and Operation Environmental Management Plan (OEMP). The CEMP and OEMP will comprise a number of sub-plans relevant to ecological impacts including (but not limited to):

- Threatened Species Management Plan
- Weed and Pest Management Plan
- Air Quality Management Plan
- Noise and Vibration Management Plan
- Erosion and Sediment Control Management Plan
- Surface Water and Groundwater Management Plans
- Waste and Contamination Management Plan

The CEMP, OEMP and various sub-plans will comprise a range of measures that will mitigate potential impacts to ecological values as outlined in **Table 13**. A Progressive Rehabilitation and Closure Plan (PRCP) will also be implemented.

Avoidance and minimisation of impacts to national and state significant environmental values were major considerations during the Project design phase and in discussion with the indigenous landowners. Project design measures have included the following elements reducing impacts to ecological values associated with the Project:

- Avoidance of the TEC identified as occurring within the Study area including placing a 50 m non-disturbance buffer around each occurrence
- Placing a 50 m non-disturbance buffer around the wetlands on the southern boundary of the Study area
- Avoidance of impacts to Connies Beach which provides intermittent habitat for several wader/shorebird species listed under State and Commonwealth legislation
- Mining will avoid intersecting the shallow groundwater aquifer avoiding any follow on impacts to potential GDEs in the area

The mine footprint has been positioned to limit disturbance, as much as practicable. With the application of the impact avoidance measures detailed in the following section, it is considered the majority of protected matters known from the area will not be significantly impacted by the Project.

6.2 Mitigation

Recommended mitigation strategies to reduce impacts to ecological values is presented in **Table 13**.

Table 13. Mitigation measures proposed for general impacts of the Project

Management Measure	Timing
Clearing of vegetation	
1	Where possible the overall Project footprint will be refined and minimised further during the final design process
2	The Project will develop a CEMP prior to the commencement of construction. Vegetation clearing protocols will be established within both plans and will include the following mitigations measures at a minimum.
3	Project employees and contractors will be made aware of environmental obligations and compliance requirements through the site induction program.

Management Measure		Timing
4	As part of the PRCP suitable vegetation reference sites will be nominated and surveyed within the Project area for each RE to be disturbed by the Project.	Prior to clearing
5	Vegetation clearing extents will be clearly demarcated with flagging or bunting prior to clearing to limit the area safely and reasonably required for permanent and temporary works	Prior to clearing
6	Targeted pre-clearance surveys will be carried out prior to vegetation clearing and will incorporate searches for threatened plants and threatened. Pre-clearance surveys will be carried out by suitable qualified ecologists prior to vegetation clearing.	Prior to clearing
7	Fauna spotter-catchers (licensed) will be present during clearing and monitor vegetation clearing extents to ensure clearing does not extend beyond demarcated area and complies with CEMP.	During clearing
8	Topsoil, where present, will be removed in preparation for construction and during mining and stockpiled. Stockpiling will be carried out such that natural seed banks are retained.	Ongoing
9	Disturbed areas that are no longer required will be progressively reinstated to a non-polluting and stable landform as per the Project PRCP.	Ongoing
10	Ongoing rehabilitation throughout the life of the mine, to reduce environmental impacts by reinstating natural vegetation will be carried out in accordance with an approved PRCP.	Ongoing
Direct mortality		
1	Fauna spotter-catchers will inspect sites prior to vegetation clearing and will be present to rescue fauna during vegetation clearing.	Prior to and during clearing
2	A fauna register will record all fauna encountered during clearing works (as per fauna spotter-catchers) including fauna incidents (injuries and mortality).	Pre-construction
3	Onsite speed limits will be established throughout the Project area to limit the potential for fauna mortality.	Ongoing
Species of National / State Significance		
1	Threatened Species Management Plan will be in place prior to construction works being carried out. Plan will establish species-specific management procedures for threatened species considered by this report to be likely or known to be present. The plan will have specific relocation measures in place for threatened epiphytic flora: orchid species and ant plants.	Pre-construction
2	Where the project requires vegetation clearing in areas mapped as 'high risk' under the DES 'protected plants flora survey trigger map' surveys will be carried out as per the <i>Flora Survey Guidelines - Protected Plants</i> (DES 2020) i.e. within 12 months of lodging application to DES prior to clearing.	Pre-construction and pre-mining
3	Searches for threatened plant species will be carried out by a suitably qualified ecologist as part of pre-clearance surveys. Where threatened flora are found they will be subject to a Project-specific relocation program.	Pre-construction and pre-mining
4	Project inductions will outline species of significance that may occur on the Project area for personnel, contractors and fauna spotter/catchers.	Project induction
5	Fauna spotter-catchers will inspect sites prior to vegetation clearing (for the potential presence of threatened flora and fauna species) and will be present to rescue fauna during vegetation clearing.	Prior to and during clearing
6	Fauna spotter-catchers will inspect felled vegetation following clearing for epiphytic threatened plant species – specifically orchid species and ant plants.	During clearing

Management Measure		Timing
	These flora species will be subject to relocation as per the Threatened Species Management Plan.	
7	Project employees will be required to notify fauna spotter/catchers when a potential species of significance is observed in the Project area. All encounters with a threatened species will be recorded in the project fauna register.	Ongoing
Noise and lighting		
1	The final Project design process will incorporate components (mechanical) and design elements to reduce ongoing operational noise from permanent Project infrastructure that has potential to impact adjacent fauna habitat (such as the processing facility).	Final design
2	The final Project design process will incorporate the use of low light spill lighting components and directional lighting (away from adjacent fauna habitat and coastal areas) where night lighting is considered necessary.	Final design
3	The final Project design process will limit night lighting on the jetty, JIF and MOF as much as is practicable excepting when ship-loading operations are occurring	Final design
4	All Project-associated construction/operational machinery will be maintained as per manufacturer design specifications to ensure project noise is minimised.	Ongoing
5	Onsite speed limits will be established throughout Project area to limit noise levels as a result of vehicle movements.	Ongoing
Dust		
1	The final Project design will incorporate design elements to reduce dust generating activities. This will include covered conveyors wherever they are used for the Project.	Final design
2	Monitoring of air/dust emissions will be carried out in accordance with regulatory requirements.	Pre-construction and ongoing
3	Dust from areas likely to be a source of airborne dust (such as tracks and topsoil stockpiles) will be suppressed during construction and mining using water trucks/wetting to keep dust related impacts to a minimum. Water used for dust suppression will be obtained from Project-associated produced water where possible.	During construction and ongoing
4	Monitoring of weather conditions will be carried out to inform Project activities and planning during high-wind weather conditions.	Ongoing
5	Ensure employees are made aware of potential dust generating activities and appropriate mitigation and management measures.	Ongoing
6	Onsite speed limits will be established to minimise dust caused by vehicle movements.	Ongoing
7	Areas subject to vegetation clearing and no longer required for construction will be subject to vegetation reinstatement as soon as is practicable as per the PRCP.	Ongoing
Altered fire regimes		
1	Appropriate fire prevention regimes will require onsite staff to be vigilant of the potential for fire. Fire awareness training will be included during the site induction process.	Induction / ongoing
2	Monitoring of weather conditions will be carried out to inform Project activities and planning during high fire-risk weather conditions.	Ongoing

Management Measure		Timing
3	The Project will maintain communications with local representatives for the Queensland Fire and Emergency Services (QFES) regarding Project activities and bushfire hazard conditions.	Ongoing
4	Appropriate fire breaks will be maintained around Project infrastructure.	Ongoing
5	Site will include designated smoking areas.	Ongoing
6	Onsite fire-fighting equipment will be regularly maintained and staff training will be developed and implemented.	Ongoing
Waste		
1	Wastewater will be recycled and re-fed into the processing plant system.	Ongoing
2	General waste will be recycled where possible.	Ongoing
3	General waste will be disposed of appropriately. Waste tracking certificates should be kept and maintained as part of this process.	Ongoing
4	Sewage will be treated on an onsite sewage treatment plant.	Ongoing
Weeds and Pest Animals		
1	Weed and Pest Management Plan will be in place prior to construction works being carried out. Plan will detail all required management measures and monitoring procedures. Weed control strategies will be developed in line with the <i>Cape York Peninsula Regional Biosecurity Plan 2016 -2021</i> (CYNRM 2016).	Pre-construction
2	Areas subject to progressive rehabilitation will be regularly inspected for weed presence. Management controls will be developed and implemented where necessary.	Ongoing
3	Vehicle wash-downs will be required for all new vehicles (including earthmoving and other construction machinery) entering the Project area.	Ongoing
4	Disposal and storage of putrescible wastes must be undertaken appropriately to ensure feral animals aren't attracted to the Project area.	Ongoing
5	Storage of construction/operation materials to be carried out in a manner so as to not encourage the establishment of resident pest fauna.	Ongoing
6	Domestic animals, including pets, are not allowed onsite.	Ongoing
7	Regular monitoring of weed and pest occurrence in association with Project works areas.	Ongoing
Water Management		
1	A Water Management Plan will be developed and approved prior to construction occurring. The Plan will incorporate a surface and groundwater monitoring program that will encompass the wetland area downstream of the proposed mine panels (years 15 – 22).	Pre-construction
2	Mine and processing generated water and rainfall run off from the mine infrastructure area will be diverted to the Project sediment basin dam for storage. Flood modelling indicates the sediment basin dam will not overtop under any modelled scenario. No uncontrolled releases from Project activities are expected to occur.	Final design
3	A Water Management Plan will be developed and approved prior to construction occurring. The Plan will incorporate a surface and groundwater monitoring program which will encompass the wetland area downstream of the proposed mine panels (years 15 – 22).	Pre-construction
4	An Erosion and Sediment Control Plan (ESCP) will be developed and implemented prior to construction commencing. The ESCP will be developed by	Pre-construction

Management Measure		Timing
	a Certified Professional in Erosion and Sediment Control and be in accordance with the International Erosion Control Association Best Practice Erosion and Sediment Control (2008).	
5	Applicable Project materials/chemicals will be stored and handled in accordance with relevant legislative requirements and Australian Standards including: AS 3780:2008 – The storage and handling of corrosive substances AS 1940:2004 – The storage and handling of flammable and combustible liquids AS 3833:2007 – Storage and handling of mixed classes of dangerous goods in packaged and intermediate bulk containers.	Ongoing
6	All storage of chemicals and vehicle/machinery refuelling associated with Project works will be stored a minimum of 50 m from the nearest watercourse or wetland.	Ongoing
7	Spill response equipment (e.g. booms and absorbent materials) will be available at refuelling areas and other sites (where relevant). Staff will be trained in the appropriate use of spill response equipment.	Ongoing
8	Onsite washdown areas for Project vehicles/machinery will be located and clearly demarcated to prevent contaminated run-off from entering waterways and downstream marine waters.	Ongoing

7 PROJECT ASSESSMENT FOR SIGNIFICANT IMPACTS TO MNES AND MSES

7.1 Matters of National Environmental Significance (MNES)

This section only addresses those MNES considered relevant to terrestrial values. Impacts to marine MNES, the Great Barrier Reef Marine Park and the Great Barrier Reef World Heritage Area are assessed elsewhere. Therefore, the significant impact assessment only refers to the following MNES: terrestrial threatened species and threatened ecological communities.

Under the EPBC Act an action will require approval from the Minister if the action has, will have, or is likely to have, a significant impact on a MNES. To assess the relevant impacts on MNES from the Project, the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (2013)* (DE 2013) have been used to undertake a detailed analysis of the nature, extent and significance of the likely direct, indirect and consequential impacts relevant to MNES and/or their known and potential habitat, including likely short-term and long-term impacts.

7.1.1 Threatened Ecological Community

One vegetation community identified in the Study area, RE 3.2.12a, contains floristic elements analogous to the *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia*. This TEC is listed as Critically Endangered under the EPBC Act. Field survey identified the presence of two patches of RE 3.2.12a in the south and east of the Study area, totalling approximately 11.41 ha. These areas have been avoided by the final mine footprint with a 50 m protection buffer placed around them. There will be no impact to upstream water flows draining towards the patches of TEC. This community will not be disturbed due to Project activities and there will be no direct impact to the TEC. With the 50 m buffer in place no indirect impacts associated with Project are expected on the TEC.

7.1.2 Threatened species

The assessments in the following sections have been carried out on those species considered as known or likely to occur. There are an additional seven species listed as Vulnerable identified as possibly occurring in the Study area and surrounds (refer **Section 4.1.4.3, Table 8** and **Table 9**). The potential for significant impacts on these species from Project activities is considered unlikely based on the species habitat requirements and uncertain occurrence in or near the Project area. The reasoning for this assessment is addressed in detail in **Appendix H**.

Four species listed as threatened under the EPBC Act are known or likely to occur in the Project area and/or immediate surrounds:

- Known to occur:
 - Myrmecodia beccarii - Vulnerable
 - Lesser Sand Plover – Endangered and Migratory
 - Greater Sand Plover – Vulnerable and Migratory
- Likely to occur:
 - White-throated Needletail - Vulnerable and Migratory

Of these, White-throated Needletail is almost completely an aerial species when in Australia, possibly even sleeping on the wing. The species is sometimes found roosting in trees and may on rare occasions rest in trees and on the ground during the day. White-throated Needletails are found over a wide variety of habitat, including open areas, modified land and the ocean but are most often recorded over wooded areas (Higgins 1999). Given the extensive wooded habitat in the surrounding region, the Project is considered unlikely to have more than a very minor impact on this species (if any at all). As such, an assessment of the potential for significant impacts on this species is not considered warranted and it is not discussed further.

7.1.2.1 Species listed as Endangered under the EPBC Act

The endangered species assessment must evaluate the significance of impacts on a population, as defined within the significant impact criteria for critically endangered and endangered species. DE (2013) describes a 'population of a species' as an occurrence of the species in a particular area. This includes, but is not limited to:

- A geographically distinct regional population, or collection of local populations, or

- A population, or collection of local populations, that occurs within a particular bioregion.

The impact criteria include critical habitat. DE (2013) describes ‘habitat critical to the survival of a species or ecological community’ as areas that are necessary:

- For activities such as foraging, breeding, roosting, or dispersal
- For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- To maintain genetic diversity and long term evolutionary development, or
- For the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the minister under the EPBC Act (DE 2013).

Lesser Sand Plover (*Charadrius mongolus*)

Table 14 summarises data relevant to the Project area, known threats to the species and the relevant Commonwealth documents applicable to the species’ recovery.

Table 14. Key data for Lesser Sand Plover

Lesser Sand Plover (<i>Charadrius mongolus</i>)	
Baseline data results	Seventeen birds were observed at a high tide roost located to the west of Connies Beach in the wet season (refer Figure 12). No foraging was observed. The closest known database record is from Low Wooded Island, approximately 25 km to the southeast of the Study area (QG 2022). Lesser Sand Plover is widespread from the southeast Gulf of Carpentaria, north to the Torres Strait and along the entire east coast (Marchant & Higgins 1993). Nationally important habitat for a migratory shorebird has been defined as habitat supporting 0.1 percent of the flyway population of a single species of migratory shorebird (DE 2015). The most recent population estimate for the species is 180,000 (Hansen et al. 2016). Nationally important habitat for this species, or migratory shorebirds in general does not occur.
EPBC Act status	Endangered, Migratory (Bonn Convention, CAMBA, JAMBA, ROKAMBA), Marine.
Key threats	The key threat to Lesser Sand Plover is ongoing loss of habitat along its migration route (TSSC 2016a). In Australia, the species is threatened by human disturbance, habitat loss and degradation due to pollution and changes in the water regime (Garnett et al. 2011).
Recovery Plan	There is no Recovery Plan and one is not required. The approved conservation advice provides sufficient direction to implement priority actions and mitigate against key threats (CCEEW 2022d).
Threat Abatement Plans	One threat abatement plan is considered relevant, <i>Threat abatement plan for predation by European red fox</i> (DEWHA 2008i). The plan has five main objectives, including prevention of foxes occupying new areas, promoting the maintenance and recovery of native species and ecological communities that are affected by fox predation, improving the effectiveness, target specificity, integration and humaneness of control options for foxes. It is noted Red Fox does not occur on Cape York Peninsula.

Lesser Sand Plover is mostly confined to coastal habitats, rarely occurring on inland wetlands. The species forages for molluscs, worms, crustaceans and insects on intertidal mudflats and sandflats, usually in sheltered bays and estuaries but also on ocean beaches, coral reefs and rock platforms. It roosts on beaches, sandbars and estuarine lagoons and occasionally rocky islets and reefs (Marchant & Higgins 1993). Lesser Sand Plover breeds in central and north-eastern Asia during the northern summer and migrates through the East Asian-Australasian Flyway (Marchant & Higgins 1993; Bamford et al. 2008), arriving in Australia in August to October, with some birds moving southwards until December. Birds arrive in north Queensland mostly in September, with a second influx in mid-October. In Australia the species may occur around much of the mainland coast. Departure from north Queensland for breeding grounds mostly occurs in mid-April. When not breeding the species is widespread in coastal areas of Asia, the south-west Pacific, the Middle East and southern and eastern Africa (Marchant & Higgins 1993).

Lesser Sand Plover has undergone recent notable population decline. Pringle (1987) described it as the commonest migrant plover in Australia. *The Action Plan for Australian birds 2010* (Garnett et al. 2011) changed the status of the species from Near Threatened (its status in 2000) to Endangered due to a decline in its population and on-going loss of habitat along its migration route. This change in status was adopted under legislation in May 2016 (TSSC 2016b).

Table 15 shows the significant impact assessment under the *MNES Significant impact guidelines 1.1* (DE 2013) for Lesser Sand Plover within the proposed disturbance area.

Table 15. Assessment against significant impact criteria: Lesser Sand Plover

Criterion	Assessment against Significance Criteria (Endangered)
Lead to a long-term decrease in the size of a population	<p>There is a single population of Lesser Sand Plover which is distributed around coastal mainland Australia (Garnett et al. 2011; CCEEW 2022d). The population is spread sporadically around the entire coastline. Seventeen individuals were recorded at a roost site located outside of the Project area. The area would not be considered important habitat for the species, or migratory shorebirds in general.</p> <p>Potential coastal habitat suitable for the species, such as Connies Beach and adjacent tidal foraging habitat, will be buffered from Project activities. The nearest mining disturbance to Connies Beach will be approximately 170 m away (in year 14). Mining infrastructure (such as the port area and MIA) will be located over 300 m from the beach and at least 1.8 km from the observed roost site. The only possible disturbance from the Project may be localised and temporary impacts associated with the construction of the Port area. At worst this may cause individuals to avoid the area localised to the port during the construction period. There is abundant similar habitat that will remain undisturbed in the Cape Flattery area. It is considered very unlikely the project will lead to a long term decrease in the size of the population.</p>
Reduce the area of occupancy of the species	<p>The area of occupancy in Australia is estimated at 5,900 km² (Rogers et al. 2021b) which is distributed around much of the Australian mainland coast. It is not expected that the project will reduce the area of occupancy of the species.</p>
Fragment an existing population into two or more populations	<p>There is only one population of Lesser Sand Plover in Australia (Garnett et al. 2011; CCEEW 2022d) which is spread sporadically around the entire mainland coastline. It is not expected that the project will fragment the population into two or more populations.</p>
Adversely affect habitat critical to the survival of the species	<p>Critical habitat is not defined for the species. The area would not be considered important habitat for the species, or migratory shorebirds in general. The Lesser Sand Plover is mostly confined to coastal habitats, foraging on intertidal mudflats and sandflats, usually in sheltered bays and estuaries but also on ocean beaches, coral reefs and rock platforms. It roosts on beaches, sandbars and estuarine lagoons and occasionally rocky islets and reefs (Marchant & Higgins 1993). Potential habitat will not be impacted by the Project. The Project will not adversely affect habitat critical to the survival of the species.</p>
Disrupt the breeding cycle of a population	<p>Lesser Sand Plover does not breed in Australia. The project is not expected to disrupt the breeding cycle of any population.</p>
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p>Lesser Sand Plover is mostly confined to coastal habitats, foraging on intertidal mudflats and sandflats, usually in sheltered bays and estuaries but also on ocean beaches, coral reefs and rock platforms. It roosts on beaches, sandbars and estuarine lagoons and occasionally rocky islets and reefs (Marchant & Higgins 1993). The only possible disturbance from the Project may be localised and temporary impacts associated with the construction of the Port area. At worst this may cause individuals to avoid the area localised to the port during the construction period. There is abundant similar habitat that will remain undisturbed in the Cape Flattery area. It is not expected that the Project will affect habitat to the extent that the species is likely to decline.</p>
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat	<p>Weed and pest control measures will be incorporated into the Project Weed Management Strategy to control the introduction and spread of weed species across the Project Area. There is no proposed project activity in proximity to habitat for the species. The Project will not result in establishment of an invasive species harmful to Lesser Sand Plover.</p>

Introduce disease that may cause the species to decline	The Project weed management plan will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities. Any project equipment sourced from overseas will be quarantined as required under State and Commonwealth legislation. The Project is not expected to introduce disease that may cause Lesser Sand Plover to decline.
Interfere with the recovery of the species.	There is no recovery plan for Lesser Sand Plover. The key threat to Lesser Sand Plover is on-going loss of habitat along its migration route (TSSC 2016b). In Australia, the species is threatened by human disturbance, habitat loss and degradation due to pollution and changes in the water regime (Garnett et al. 2011). The Project will not interfere with the recovery of the species.

Based on the assessment outcomes in **Table 13**, it is not expected that the project will result in a significant residual impact to Lesser Sand Plover.

7.1.2.2 Species listed as Vulnerable under the EPBC Act

The vulnerable species assessment must include an evaluation of the likely importance of the population, as defined within the significant impact criteria for Vulnerable species. DE (2013) describes an ‘important population’ as a population that is necessary for a species’ long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- Key source populations either for breeding or dispersal
- Populations that are necessary for maintaining genetic diversity and/or
- Populations that are near the limit of the species range.

Greater Sand Plover (*Charadrius leschenaultii*)

Table 16 summarises data relevant to the Study area, known threats to the species and the relevant Commonwealth documents applicable to the species’ recovery.

Table 16. Key data for Greater Sand Plover

Greater Sand Plover (<i>Charadrius leschenaultii</i>)	
Baseline data results	Two birds were found at a high tide roost west of Connies Beach in the wet season (refer Appendix B). No foraging was observed. The closest known database record is from Low Wooded Island, approximately 25 km to the south-east of the Study area (QG 2022). Greater Sand Plover occurs along all Australian coasts, especially in the north (Garnett et al. 2011). Nationally important habitat for a migratory shorebird has been defined as habitat supporting 0.1 percent of the flyway population of a single species of migratory shorebird (DE 2015). The most recent population estimate for the species is 200,000-300,000 (Hansen et al. 2016). Nationally important habitat for this species, or migratory birds in general does not occur.
EPBC Act status	Vulnerable, Migratory (Bonn Convention, CAMBA, JAMBA, ROKAMBA)
Key threats	The key threat to Greater Sand Plover is on-going loss of habitat along its migration route (TSSC 2016a). In Australia, the species is threatened by human disturbance, habitat loss and degradation due to pollution and changes in the water regime (Garnett et al. 2011). In Australia, there is no major threat as most birds spend the non-breeding season along sparsely populated coasts (Garnett & Baker 2021).
Recovery Plan	There is no Recovery Plan and one is not required. The approved conservation advice provides sufficient direction to implement priority actions and mitigate against key threats (CCEEW 2022e).
Threat Abatement Plans	No Threat Abatement Plan is identified as relevant (CCEEW 2022e).

The habitat use and foraging behaviour of Greater Sand Plover are very similar to Lesser Sand Plover and the two species are often found together (Lane 1987; Marchant & Higgins 1993).

Table 17 shows the significant impact assessment under the *MNES Significant impact guidelines 1.1* (DE 2013) for Greater Sand Plover within the Project area.

Table 17. Assessment against significant impact criteria: Greater Sand Plover

Criterion	Assessment against Significance Criteria (Vulnerable)
Lead to a long-term decrease in the size of an important population of the species	<p>There is a single population of Lesser Sand Plover which is distributed around coastal mainland Australia (CCEEW 2022e). The population is spread sporadically around the entire coastline but with a preference for northern coasts. Only two individuals were recorded at a roost site located outside of the Project area. The area would not be considered important habitat for the species, or migratory shorebirds in general.</p> <p>Potential coastal habitat suitable for the species, such as Connies Beach and adjacent tidal foraging habitat, will be buffered from Project activities. The nearest mining disturbance to Connies Beach will be approximately 170 m away (in year 14). Mining infrastructure (such as the port area and MIA) will be located over 300 m from the beach and at least 1.8 km from the observed roost site. The only possible disturbance from the Project may be localised and temporary impacts associated with the construction of the Port area. At worst this may cause individuals to avoid the area localised to the port during the construction period. There is abundant similar habitat that will remain undisturbed in the Cape Flattery area. It is considered very unlikely the project will lead to a long term decrease in the size of the population.</p>
Reduce the area of occupancy of an important population	<p>The area of occupancy in Australia is estimated at 6,000 km² (Rogers et al. 2021a) which is distributed around much of the Australian mainland coast. It is considered very unlikely the Project will reduce the area of occupancy of the species.</p>
Fragment an existing important population into two or more populations	<p>There is only one population of Greater Sand Plover in Australia (CCEEW 2022e) which is sporadically spread around much of the coastline. It is not expected that the project will fragment the population into two or more populations.</p>
Adversely affect habitat critical to the survival of the species	<p>Critical habitat is not defined for the species. The area would not be considered important habitat for the species, or migratory shorebirds in general. Greater Sand Plover is mostly confined to coastal habitats, foraging on intertidal mudflats and sandflats, usually in sheltered bays and estuaries but also on ocean beaches, coral reefs and rock platforms. It roosts on beaches, sandbars and estuarine lagoons and occasionally rocky islets and reefs (Marchant & Higgins 1993). Potential habitat will not be impacted by the Project. The Project will not adversely affect habitat critical to the survival of the species.</p>
Disrupt the breeding cycle of an important population	<p>Greater Sand Plover does not breed in Australia. The project is not expected to disrupt the breeding cycle of the population.</p>
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p>Greater Sand Plover is mostly confined to coastal habitats, foraging on intertidal mudflats and sandflats, usually in sheltered bays and estuaries but also on ocean beaches, coral reefs and rock platforms. It roosts on beaches, sandbars and estuarine lagoons and occasionally rocky islets and reefs (Marchant & Higgins 1993). The only possible disturbance from the Project may be localised and temporary impacts associated with the construction of the Port area. At worst this may cause individuals to avoid the area localised to the port during the construction period. There is abundant similar habitat that will remain undisturbed in the Cape Flattery area. It is considered very unlikely the Project will affect habitat to the extent that the species is likely to decline.</p>
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	<p>Weed and pest control measures will be incorporated into the Project Weed Management Strategy to control the introduction and spread of weed species across the Project site. The weed management plan will be in place for the life of the Project and will minimise the potential for weed invasion and may in the long-term improve habitat condition within vegetation communities located adjacent to Project infrastructure. The Project will not result in establishment of an invasive species harmful to Greater Sand Plover.</p>
Introduce disease that may cause the species to decline	<p>The Project weed management plan will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities. Project equipment sourced from overseas will be</p>

Criterion	Assessment against Significance Criteria (Vulnerable)
	quarantined as required under State and Commonwealth legislation. The Project is not expected to introduce disease that may cause Greater Sand Plover to decline.
Interfere substantially with the recovery of the species.	There is no recovery plan for Greater Sand Plover. The key threat to Greater Sand Plover is on-going loss of habitat along its migration route (TSSC 2016a). In Australia, the species is threatened by human disturbance, habitat loss and degradation due to pollution and changes in the water regime (Garnett et al. 2011). The Project will not interfere with the recovery of the species.

Based on the assessment outcomes in **Table 17**, it is not expected that the project will result in a significant residual impact on Greater Sand Plover.

***Myrmecodia beccarii* (an ant plant)**

Table 18 summarises data relevant to the Study area, known threats to the species and the relevant Commonwealth documents applicable to the species' recovery.

Table 18. Key data for *Myrmecodia beccarii*

<i>Myrmecodia beccarii</i>	
Baseline data results	There are 2 ALA records from search area including a 1984 record 5 km south-west and a 2020 record 25 km south of the Study area (the coordinates provided for the latter place it in marine waters). A single plant was observed growing on <i>Melaleuca arcana</i> in a small patch of RE 3.2.14. It may occur elsewhere in the Study area, mainly in the canopy layer of sheltered pockets of woodlands with taller Broad-leaved Paperbark (<i>M. viridiflora</i>). Within the Project area taller Broad-leaved Paperbark occurs in RE 3.12.39a, although the suitability of this habitat will depend on the availability of sheltered sites.
EPBC Act status	Vulnerable
Key threats	<i>Myrmecodia beccarii</i> is threatened by habitat loss, weed invasion and the removal of plants by plant and butterfly collectors (CCEEW 2022f).
Recovery Plan	There is no recovery plan and one is not required (CCEEW 2022f).
Threat Abatement Plans	No Threat Abatement Plan is identified as relevant (CCEEW 2022f).

Myrmecodia beccarii is an epiphytic plant that grows in lowland woodland dominated by melaleucas, mostly Broad-leaved Paperbark. It also occurs in mangroves (CCEEW 2022f). It is the sole habitat for the larval life stage of the Apollo Jewell Butterfly (*Hypochrysops apollo apollo*), a threatened species (Braby 2000).

Table 19 shows the significant impact assessment under the *MNES Significant impact guidelines 1.1* (DEE 2013) for *Myrmecodia beccarii* within the proposed disturbance area.

Table 19. Assessment against significant impact criteria: *Myrmecodia beccarii*

Criterion	Assessment against Significance Criteria (Vulnerable)
Lead to a long-term decrease in the size of an important population of the species	<p>The importance of the population in the Project area is unknown, however only one plant was found on site and there are only two ALA records within a 25 km search radius. This suggests the habitat on much of the site is unsuitable and the local population occurs sparsely and is therefore not important. Less than 0.13 ha of known habitat, RE 3.2.14, would be cleared as part of the Project. Only 0.07 ha of other potential habitat (RE 3.12.39a) is proposed to be cleared.</p> <p>Pre-clearance surveys will be carried out by personnel trained in the identification of the species prior to clearing activities. Inspection of felled trees will be carried out following clearing to search for epiphytic plant species. Where the species is found it will be subject to a translocation program which will be detailed in the Project Environmental Management Plan.</p>
Reduce the area of occupancy of an important population	<p><i>Myrmecodia beccarii</i> has a minimum area of occupancy of 7,000 km² (DEWHA 2008g). Less than 0.2 ha of suitable/potential habitat would be cleared as part of the Project. The area of occupancy will not be reduced, regardless of the importance or otherwise of the population.</p>
Fragment an existing important population into two or more populations	<p>Less than 0.2 ha of possibly suitable habitat would be cleared as part of the Project. The position of the Study area in the landscape indicates that that no population will be fragmented into two or more populations regardless of the importance, or otherwise, of the population.</p>
Adversely affect habitat critical to the survival of the species	<p>Critical habitat for the species is not defined. <i>Myrmecodia beccarii</i> grows in lowland woodland dominated by melaleucas, mostly Broad-leaved Paperbark. It also occurs in mangroves. Lowland paperbark woodland within the known distribution of the species may be considered critical habitat. If so, the Project would adversely affect 0.2 ha of critical habitat. However, the presence of one individual plant suggests the habitat on site is not critical to the survival of the species. The Project will not adversely affect habitat critical to the survival of the species.</p>
Disrupt the breeding cycle of an important population	<p>The importance or otherwise of the population is unknown. The project would involve the loss of 0.13 ha of potentially suitable habitat that supported one individual at the time of field survey. The loss of this area is not expected to disrupt a breeding cycle of any population.</p>
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p>The project would involve the loss of 0.13 ha of potentially suitable habitat that supported one individual at the time of field survey. The loss of this area is not expected to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.</p>
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	<p>No pests or diseases for the species are known, though they could potentially suffer from pest insects such as scale, mealy bugs, mites or aphids (ANH 2021). Weed and pest control measures will be incorporated into the Project Weed Management Strategy to control the introduction and spread of weed species across the Project site. The weed management plan will be in place for the life of the Project and will minimise the potential for weed invasion and may in the long-term improve habitat condition within vegetation communities located adjacent to Project infrastructure. The Project will not result in establishment of an invasive species harmful to <i>Myrmecodia beccarii</i>.</p>
Introduce disease that may cause the species to decline	<p>The Project weed management plan will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities. Project equipment sourced from overseas will be quarantined as required under State and Commonwealth legislation. The Project is not expected to introduce disease that may cause <i>Myrmecodia beccarii</i> to decline.</p>
Interfere substantially with the recovery of the species.	<p>There is no recovery plan. The loss of 0.13 ha of potentially suitable habitat will not interfere substantially with the recovery of the species.</p>

Based on the assessment outcomes in **Table 19**, it is considered unlikely the project will result in a significant residual impact on *Myrmecodia beccarii*.

7.1.3 Species listed as Migratory under the EPBC Act

Eight fauna species listed as Migratory under the EPBC Act are known or likely to occur in the Project area and/or immediate surrounds:

- Known to occur:
 - Whimbrel
 - Bridled Tern
 - Little Tern
 - Caspian Tern
 - Greater Crested Tern
 - Rufous Fantail
 - Estuarine Crocodile
- Likely to occur:
 - Fork-tailed Swift

The tern species and Whimbrel were all recorded (mostly as individuals) from the coastal habitat associated with Connies Beach. Bridled Tern is an offshore foraging species that nest on islands and is not relevant to the Project. CFS have entered into an agreement with Traditional Owners to avoid any impacts to Connies Beach and adjacent coastal habitat, with a buffer between Connies Beach and the proposed disturbance area. The nearest mining disturbance to Connies Beach will be approximately 170 m away (in year 14). Mining infrastructure (MIA) will be located over 300 m from the beach. Given Whimbrel, Little Tern and Greater Crested Tern may use this habitat (in low numbers) for foraging and roosting, the only possible impact from the Project is likely to be localised construction disturbance associated with the Project port infrastructure. The port area is located 350 m away from the eastern edge of Connies Beach. The construction disturbance will be temporary and no offsite impacts to local foraging habitat are likely. As such, an assessment of the potential for significant impacts on these species is not considered warranted and they are not discussed further.

Fork-tailed Swift is an aerial foraging species when in Australia with habits very similar to White-throated Needletail. As per that species, potential Project impacts to Fork-tailed Swift are considered negligible at worst and the species has not been subject to an assessment for significant impacts.

Only Caspian Tern, Rufous Fantail and Estuarine Crocodile have potential to occur within the Project mine area and are addressed hereunder.

Two of the three significant impact criteria for Migratory species (DE 2013) refer to 'important habitat'. An area of 'important habitat' for a migratory species is:

- Habitat utilised occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
- Habitat that is of critical importance to the species at particular life-cycle stages, and/or
- Habitat utilised which is at the limit of the species range, and/or
- Habitat within an area where the species is declining.

The third criterion refers to an 'ecologically significant proportion of the population'. This varies with species but included consideration of population status, genetic distinctiveness and behaviours such as site fidelity and dispersal rates.

Caspian Tern (*Hydroprogne caspia*)

Table 20 summarises the observations made during ecological surveys in the Project area, known threats to Caspian Tern, and the relevant Commonwealth documents applicable to the species' conservation.

Table 20. Key data for Caspian Tern

Caspian Tern (<i>Hydroprogne caspia</i>)	
Baseline Data Results	Caspian Tern was seen repeatedly along Connies Beach in the dry season. It was likely that only a single individual was present. The species could occur over the freshwater waterbody in the Study area though such occurrence would most likely be infrequent and brief. The waterbody is not within the disturbance area.
EPBC Status	Migratory – JAMBA
Key Threats	The current global population trend for Caspian Tern is ‘increasing’. Nonetheless the species is threatened by human disturbance, especially during the early courtship and incubation stages, during which human visitation results in the flushing of the whole colony, potentially leading to nest or colony abandonment. Much of the loss of reproductive success occurs through gull predation of chicks during the panic flight in which the eggs and chicks are left exposed (Birdlife International 2018). Exposure to and bioaccumulation of contaminants in fish could be lowering reproductive success (Gochfeld & Burger 1996). In Australia, predation of chicks by Silver Gulls (<i>Chroicocephalus novaehollandiae</i>), feral Cats (<i>Felis catus</i>) and Dingoes (<i>Canis familiaris</i>) during the breeding period. Young birds may also be entangled in fishing line and nets (Minton & Deleyev 2001).
Recovery Plan	No recovery plan currently exists for the species.
Threat Abatement Plans	No threat abatement plan is considered relevant to the species.

Caspian Tern occurs mostly in sheltered coastal habitats, such as bays, estuaries, harbours and inlets, usually with sandy or muddy margins. They use fresh and saline waterbodies and occur on inland wetlands, especially lakes, and reservoirs and rivers. They also use smaller artificial waterbodies such as sewage ponds and saltworks (Higgins & Davies 1996).

Caspian Tern is partly resident and partly dispersive in Australia (Menkhorst et al. 2017). The species is widespread on the coast and occurs inland in eastern Australia. Breeding is widespread at coastal sites and occurs occasionally inland (Higgins & Davies 1996). Caspian Tern is not numerous but is widespread and conspicuous (Pringle 1987; Menkhorst et al. 2017), generally occurring alone or in small parties (Pringle 1987), though more than 200 have been reported when breeding (Pizzey 1980). **Table 21** shows the significant impact assessment under the *MNES Significant impact guidelines 1.1*.

Table 21. Assessment against significant impact criteria: Caspian Tern

Criterion	Assessment against Significance Criteria
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	The Project area is not at the limit of the range of Caspian Tern, nor is it within an area where the species is declining. The region is not known to support an ecologically significant proportion of the population. The Study area is not considered to contain habitat that is of importance to the 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	Weed and pest control measures will be implemented to control the introduction and spread of invasive species across the site. It is not expected that the infrastructure and proposed activities will result in harmful invasive species becoming established in this species’ habitat, whether or not the area is considered important habitat.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	There is no known breeding record for the Project area. The proposed activities will not disrupt the movements or resting of this species given the vast majority of its time would be spent along Connies Beach or over onshore waters. Connies Beach will be protected from any possible impacts. There is no expectation of any serious disruption to the lifecycle of any individuals using the area, regardless of whether or not such individuals are considered to be an ecologically significant proportion of the species.

Based on the assessment outcomes in **Table 21**, it is not expected that the Project will result in a significant residual impact on Caspian Tern.

Rufous Fantail (*Rhipidura rufifrons*)

Table 22 summarises the observations made during ecological surveys in the Project area, known threats to Rufous Fantail, and the relevant Commonwealth documents applicable to the species’ conservation.

Table 22. Key Data for Rufous Fantail

Rufous Fantail (<i>Rhipidura rufifrons</i>)	
Baseline Data Results	One was seen in coastal scrub during the dry season survey. Rufous Fantail could occur throughout the Study area but is most likely in treed areas which occupy 256 ha. The disturbance area contains 68 ha of potentially suitable habitat.
EPBC Status	Migratory – Bonn Convention
Key Threats	The species is threatened by loss and fragmentation of moist forest breeding habitat and remnant vegetation and corridors within its migration routes (Higgins et al. 2006).
Recovery Plan	No recovery plan currently exists for the species.
Threat Abatement Plans	No threat abatement plan is considered relevant to the species.

Rufous Fantail occurs in moist habitats, including closed forests, coastal scrubs, mangroves and along watercourses and gullies, and urban/rural areas during mid-year migration (Pizzey 1980; Higgins et al. 2006). They predominantly feed on small insects within the understorey (Higgins et al. 2006). The species migrates north in early autumn and returns to southern Australia in early spring to breed, wintering on Cape York Peninsula, the Torres Strait and New Guinea (Higgins et al. 2006; Menkhorst et al. 2017). Rufous Fantail is common in suitable habitat along the eastern seaboard (Menkhorst et al. 2017).

Table 23 shows the significant impact assessments under the *MNES Significant impact guidelines 1.1*.

Table 23. Assessment against significant impact criteria: Rufous Fantail

Criterion	Assessment against Significance Criteria
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	The Project area is not at the limit of the range of Rufous Fantail, nor is it within an area where the species is declining. The region is not known to support an ecologically significant proportion of the population. The Study area is not considered to contain habitat that is of importance to the 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	Weed and pest control measures will be implemented to control the introduction and spread of invasive species across the site. It is not expected that the infrastructure and proposed activities will result in harmful invasive species becoming established in this species’ habitat, whether or not the area is considered important habitat.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	Although Rufous Fantail may at times occur or move through the heath in the Project area it is more likely to occur in the coastal scrub behind Connies Beach. Any breeding would occur in the coastal scrub or other treed areas. The coastal scrub will be part of the buffer zone protecting Connies Beach from any impacts from the project. Although the disturbance area contains 52 ha of potentially suitable habitat, the proposed activities are not expected to disrupt the movements or resting of this species. There is no expectation of any serious disruption to the lifecycle of any individuals using the area, regardless of whether or not such individuals are considered to be an ecologically significant proportion of the species.

Based on the assessment outcomes in **Table 23**, it is not expected that the Project will result in a significant residual impact on Rufous Fantail.

Estuarine Crocodile (*Crocodylus porosus*)

Table 24 summarises the observations made during ecological surveys in the Project area, known threats to Estuarine Crocodile, and the relevant Commonwealth documents applicable to the species’ conservation.

Table 24. Key data for Estuarine Crocodile

Estuarine Crocodile (<i>Crocodylus porosus</i>)	
Baseline Data Results	A small individual was observed in coastal waters to the east of Connies Beach during the dry season survey. Tracks of a larger individual were also seen in the same area. An individual was observed in the same area during the December 2021 aquatic ecology survey for the Project. Evidence of presence was also observed at one of the wetlands on the southern boundary of the Project and at a creek site adjacent to mangroves in the east (Hydrobiology 2022a). There are two database records within 25 km, the closest known record is from approximately 1 km to the south of the Study area, in 1988 (QG 2022). Estuarine Crocodile is expected to occur, at least occasionally, in the small freshwater waterbody on the southern boundary of the Project area, as advised by Traditional Owners. This wetland is not within the disturbance footprint. The species is likely to be resident in onshore waters.
EPBC Status	Migratory – Bonn Convention
Key Threats	There is no known major threat to the species in Australia. Estuarine Crocodile is still threatened by drowning in fishing nets (Ehmann 1992; Read 2012) with juveniles more likely to become entangled (EPA 2007). A lack of suitable nesting habitat appears to be the most significant limiting factor for the recovery of the species in Queensland (Read et al. 2004; Read 2012). Recent urban development on the Queensland coast south of Cooktown, with clearing of riparian vegetation, reclamation of wetlands and removal of ‘problem’ crocodiles, is limiting recovery (Read 2012).
Recovery Plan	No recovery plan currently exists for the species.
Threat Abatement Plans	No threat abatement plan is considered relevant to the species.

Estuarine Crocodile is seen regularly in the open ocean but also occurs in tidal rivers, coastal floodplains and swamps, extending hundreds of kilometres inland along major drainage systems (Webb et al. 1983; Read et al. 2004). In Australia, the species is most common in large areas of productive wetlands and estuaries (Fukuda et al. 2007). In Queensland, Estuarine Crocodiles are mainly found in coastal areas north of the Fitzroy River, with only infrequent sightings to the south (QPWS 2007). The highest densities in Queensland are in north-west Cape York Peninsula (Read et al. 2004; EPA 2007). Crocodiles are essentially sedentary patrolling a well-defined home range. Large movements are generally restricted to dispersing males (Tucker et al. 1997).

Table 25 shows the significant impact assessments under the *MNES Significant impact guidelines 1.1*.

Table 25. Assessment against significant impact criteria: Estuarine Crocodile

Criterion	Assessment against Significance Criteria
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	<p>The Study area is not at the limit of the range of Estuarine Crocodile, nor is it within an area where the species is declining. The region is not known to support an ecologically significant proportion of the population. The Study area is not considered to contain habitat that is of importance to the species.</p> <p>Within the Project area Estuarine Crocodile is only likely to occur within the wetlands intersected by the southern boundary of the MLA. These habitats will not be disturbed by the Project. The port area is located in a rocky coastal area which is very unlikely to be used as a resting location. Temporary construction disturbance associated with the port area may cause a very minor reduction in foraging area but there is abundant identical habitat in the surrounding area. The Project will not destroy or isolate an area of habitat for Estuarine Crocodile, regardless of whether it may be considered as important or not.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	Weed and pest control measures will be implemented to control the introduction and spread of invasive species across the site. It is not expected that the infrastructure and proposed activities will result in harmful invasive species becoming established in this species' habitat, whether or not the area is considered important habitat.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	Although Estuarine Crocodile may at times occur in the waterbody to the south of the proposed mine area it is more likely to occur along Connies Beach and in adjacent coastal areas. Based on aerial images the waterbody does not look suitable for breeding given the surrounding vegetation. The proposed activities will not disrupt the movements or resting of this species. There is no expectation of any serious disruption to the lifecycle of any individuals using the area, regardless of whether or not such individuals are considered to be an ecologically significant proportion of the species.

Based on the assessment outcomes in **Table 25**, it is not expected that the Project will result in a significant residual impact on Estuarine Crocodile.

7.2 Matters of State Environmental Significance (MSES)

7.2.1 MSES vegetation

The following MSES associated with vegetation within the disturbance area are applicable to the Project. Where applicable the following matters are assessed under the criteria detailed in the *Queensland Environmental Offsets Policy - significant residual impact guideline* (Offsets Policy) (DEHP 2014).

7.2.1.1 Category B (remnant) areas of 'of concern' regional ecosystems (EP Act status)

Based on field-verified vegetation mapping there is 0.34 ha of remnant vegetation listed as Of Concern (under the EP Act) within the Disturbance area (refer **Table 12**). Under the assessment criteria in the Offsets Policy a significant impact is deemed to have occurred where clearing for non-linear infrastructure impacts:

- Area greater than 5 ha where in a grassland (structural category) RE or
- Area greater than 2 ha where in a sparse (structural category) RE or
- Area greater than 0.5 ha where in a dense to mid-dense (structural category) RE

Neither RE meets the Offsets Policy assessment criteria, therefore, there is no significant residual impact to a MSES.

7.2.1.2 Category B (remnant) vegetation located within a defined distance from the defining banks of a relevant watercourse

The defined distance for relevant watercourses in the Project area is 10 m from each bank of a mapped watercourse (stream order 1 and 2) with an overall area of 20 m width. The assessment criteria for this category of MSES vegetation are the same as that identified in the previous section for Of Concern REs. Based on field-verified vegetation mapping the current disturbance area will impact 8.68 ha of RE 3.2.21. The majority of the extent of both REs present is RE 3.2.21, which is listed as a mid-dense structural category (Queensland Herbarium 2021). As such, clearing of these RE 3.2.21 is considered a significant residual impact to a MSES.

7.2.1.3 Protected plants flora trigger survey mapping

The Project disturbance area overlaps 302.8 ha within the Protected plants flora trigger survey 'high risk' mapping layer over the whole life of mine. This mapping layer is associated with the individual records of *Acacia solenota* identified during the Epic 2021 flora surveys. As a result, protected plant surveys will be carried out in mapped areas prior to construction disturbance as per the *Flora survey guidelines - protected plants* (DES 2020).

A potential significant residual impact may be found to occur where protected plants (listed under the NC Act) are found to be present within the disturbance area and are unable to be avoided. However, the rehabilitation process provides an opportunity to use *Acacia solenota* seeds from plants onsite, grow saplings in a dedicated nursery to then revegetate the Project area post-mining (refer to the PRCP for further details).

7.2.1.4 Connectivity

Impact to landscape connectivity has been assessed using the DES 'landscape fragmentation and connectivity tool'. The analysis has determined there will be no significant impact to connectivity values associated with the Project (refer **Appendix G** for analysis output).

7.2.1.5 Regulated vegetation intersecting a watercourse

There is 4.29 km of regulated vegetation (Category B – remnant vegetation) intersecting watercourses within the disturbance footprint .

7.2.1.6 Waterway barrier works for fish passage

There are two watercourses mapped as either low or moderate impact waterways under the Queensland waterways for waterway barrier works mapping. The watercourses are mapped as occurring in the east of the Study area and are outside of any proposed disturbance works for the Project. There will be no impact on this MSES.

7.2.1.7 Threatened species known or expected to occur

Impacts to MNES from the Project will be assessed through an EPBC Act referral to CCEEW. Where a matter listed as an MSES substantially overlaps with an MNES (e.g. species listed under both the State and Commonwealth legislation) the assessment defers to the EPBC Act assessment process and does not require consideration under the State assessment process. Threatened fauna and flora species listed as both MNES and MSES and known, likely or possibly present have been assessed for potential significant residual impacts under the EPBC Act (refer **Section 7.1.2.2** and **Appendix H**) and are not discussed further as MSES.

Four species considered threatened only under the NC Act have been recorded in the Study area. Beach Stone-curlew, Estuarine Crocodile, Cape Heath Ctenotus and *Acacia solenota* are listed as Vulnerable.

Estuarine Crocodile is listed as Migratory under the EPBC Act and has been assessed under the MNES Guidelines in **Table 25**. Although it has not been assessed as a threatened species the conclusions as to the potential for significant residual impacts on the species remains valid as an MSES. The only available habitat for the species within the Project area are the wetlands on the southern boundary which will not be disturbed by the Project. Potential disturbance associated with the construction of the port infrastructure may cause a localised and temporary (during the construction period) avoidance of this area, but there is abundant identical habitat in the immediate surrounds and wider area.

Beach Stone-curlew occurs exclusively in coastal habitats, on beaches and mudflats, near mangroves, and occasionally on coastal lagoons (Lane 1987; Marchant & Higgins 1993). It will not occur in terrestrial habitats within the Project area and the port area comprises a rocky tidal habitat and is unlikely to be suitable for the species. CFS have entered into an agreement with Traditional Owners to avoid any impacts to Connies Beach and adjacent coastal habitat, with a buffer between Connies Beach and the proposed disturbance area. The nearest mining disturbance to Connies Beach will be approximately 270 m away (in year 26). Mining infrastructure (such as the port area and MIA) will be located over 300 m from the beach. Any possible disturbance on the species would be very minor and likely associated with construction activity at the port area and would be a temporary disturbance only.

As such, an assessment of the potential for significant residual impacts on either Estuarine Crocodile or Beach Stone-curlew is not considered warranted and they are not discussed further.

Although not recorded during field surveys, Mclvor River Slider (Ingram’s Lerista), listed as Vulnerable, is considered to possibly occur. Mclvor River Slider is addressed here for the sake of a thorough assessment.

Cape Heath Ctenotus – Vulnerable

Cape Heath Ctenotus is listed as Least Concern in *The Action plan for Australian Lizards and Snakes 2017* (Chapple et al. 2019). The species is confined to a small area of coastal dunefields of white sand in the vicinity of Cape Bedford and Cape Flattery on Cape York Peninsula (Ehmann 1992; Wilson 2015). The dunes are fixed by heath and the interdune spaces contain ephemeral and permanent paperbark swamps (Ehmann 1992). It is one of a number of reptile species endemic to Cape York Peninsula that are dependent on rock or heath habitats (Covacevich et al. 1982). It is a poorly known species. Ctenotus generally are diurnal, sun-loving and terrestrial species. They are opportunistic predators and actively forage (Greer 1989).

There are 37 records of Cape Heath Ctenotus in the *Atlas of Living Australia* (ALA 2022) and 24 records available through the Queensland Government’s species profile (QG 2022), with substantial overlap in records. There is only one available record post 1998, an isolated 2010 Queensland Museum specimen from approximately 23 km south-west of the Study area (OZCAM 2022). Ehmann (1992) considered the species to be common and its status to be secure. Chapple et al. (2019) considered the localised sand mining exercise within its range to not be a significant threat to the species, but that possible future expansion may threaten the species. Cape Heath Ctenotus is not found in any protected area. It has an estimated area of occupancy of 68 km² and an extent of occurrence of 524 km².

Cape Heath Ctenotus was recorded at five locations and appears to be common in areas of heath in the Study area. For example, three different individuals were captured at one trap site. The species was not recorded in other habitats, though trapping was only conducted in heath. Its known life history suggests it will be restricted to heath on sand and there is no expectation that it occurs in adjacent habitats.

Table 26 provides the significant impact assessments of the significant residual impact criteria.

Table 26. Assessment against significant residual impact criteria for Cape Heath Ctenotus

Criterion	Assessment against impact criteria
An action is likely to have a significant impact on vulnerable wildlife if the impact on the habitat is likely to:	
lead to a long-term decrease in the size of a local population	Although Cape Heath Ctenotus may be more common on edges or in gaps in the heath that provide access to direct sunlight, it is assumed that the species occurs throughout the proposed mine site. The overall extent of the proposed activities will result in the loss of 230.04 ha of potentially suitable habitat for the species, based on the field verified REs and habitat assessment. However, mining will be carried out sequentially over a 26 year period (refer Section 1.3). Rehabilitation of mined areas will occur as mining progresses over the life of the Project (as is practised in the adjacent CFSM). As such, the extent of habitat loss at any one time will be much less than the overall Disturbance area. As rehabilitated areas mature it is expected the species will recolonise these areas. The only areas of permanent habitat loss (i.e. not subject to vegetation rehabilitation) will be some of the mining infrastructure elements which will be retained post closure. These elements comprise a very small portion of the overall footprint.

Criterion	Assessment against impact criteria
An action is likely to have a significant impact on vulnerable wildlife if the impact on the habitat is likely to:	
	<p>Cape Heath Ctenotus is a highly mobile species. Vegetation clearing for the Project will be carried out in a sequential manner (in stages) in order to allow safe movement of fauna away from disturbed areas. Fauna spotters will also be present during vegetation clearing. These measures will minimise the potential for injury/mortality to individuals during operations.</p> <p>The limits of the local population are unknown, although it is very likely to extend well beyond the limits of the Study area given the extent of similar dunal vegetation REs to the west and south. Nevertheless, a conservative approach to this assessment has been taken and it is assumed that the project will lead to a long term decrease in a local population.</p>
reduce the extent of occurrence of the species	The extent of occurrence of Cape Heath Ctenotus is 524 km ² and the extent of occupancy is 64 km ² (Chapple et al. 2019). The overall extent of the proposed activities will result in the loss of 230.04 ha (3.6% of the extent of occupancy), although the extent of habitat loss at any one time will be much less than the overall Disturbance area. There will be a minor reduction in the extent of occurrence as a result of the project.
fragment an existing population	The proposed disturbance area abuts rocky coastal habitat to the north-east that is not suitable for the species. It is not expected that an existing population will be fragmented.
result in genetically distinct populations forming as a result of habitat isolation	The proposed disturbance area abuts rocky coastal habitat to the north-east that is not suitable for the species. It is not expected that a genetically distinct population will be formed.
result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat	Weed and pest control measures will be incorporated into the Project Weed Management Strategy to control the introduction and spread of weed species across the site. The weed management plan will be in place for the life of the Project and will minimise the potential for weed invasion and may in the long-term improve habitat condition within vegetation communities located adjacent to Project infrastructure. The Project will not result in establishment of an invasive species harmful to Cape Heath Ctenotus.
introduce disease that may cause the population to decline	The Project weed management plan will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities. Project equipment sourced from overseas will be quarantined as required under State and Commonwealth legislation. The Project is not expected to introduce disease that may cause Cape Heath Ctenotus to decline.
interfere with the recovery of the species	There is no recovery plan for Cape Heath Ctenotus. The project is not expected to interfere with the recovery of the species.
cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	It is not known if the Study area is an ecologically significant location for the species. The project will disrupt breeding and feeding locally, regardless of the significance of the location.

The sequential rehabilitation and scale of mining allows for the maintenance of the Cape Heath Ctenotus population within the disturbance area, in areas yet to be mined, and colonisation of rehabilitated areas may occur quite quickly. It is noted the existing and adjacent mining operations in the CFSM carry out sequential mining and rehabilitation similar to the process described here. Unfortunately, there is no publicly available information regarding the success of the rehabilitation practises at the CFSM for the relevant vegetation communities or the associated fauna (through recolonisation of rehabilitated areas). As such, this assessment has taken a conservative approach and, based on the assessment in **Table 26**, it is considered the Project has potential to result in a significant residual impact on Cape Heath Ctenotus.

Mclvor River Slider – Vulnerable

This fossorial (burrowing) species is found only in the vicinity of the Mclvor River mouth on south-eastern Cape York Peninsula. It occurs on white coastal sand, including the first coastal dune, and shelters in loose soft sand under coconuts and other debris (Wilson 2015). The species may be restricted to sand dune areas behind the frontal (coastal) dune (Chapple et al. 2019). There are nine records in the *Atlas of Living Australia* (ALA 2022) which are more than 4.5 km from the coast but there is no spatial error provided for the records. Due to a lack of information regarding the species ecology it is unknown if the species is restricted to areas immediately behind the frontal dune.

Mclvor River Slider is little known but may be fairly common (Chapple et al. 2019). There are only four records available through the Queensland Government’s species profile, one of which is from Cape Flattery (QG 2022) and is possibly within the proposed disturbance area (the record has a spatial error which potentially takes it out of the area). There are 18 records in the *Atlas of Living Australia* (ALA 2022), the closest of which is 15 km south-west of the Study area. The species was not recorded during targeted active searches for the species (including leaf litter raking) conducted in the dry season survey for the Project.

The species is not known to occur in any protected area and has an estimated area of occupancy of 24 km² and an extent of occurrence of 59 km². *The action plan for Australian lizards and snakes 2017* (Chapple 2017) notes the species could be threatened by any expansion in sand mining in the area. The scope, severity and impact of future mining are unknown. **Table 27** provides a significant impact assessment against the significant residual impact criteria.

Table 27. Assessment against significant residual impact criteria for Mclvor River Slider

Criterion	Assessment against impact criteria
An action is likely to have a significant impact on vulnerable wildlife if the impact on the habitat is likely to:	
lead to a long-term decrease in the size of a local population	<p>The potential occurrence of the species in the Study area is unknown. No individual has been located during studies for the Project. The species habitat requirements (as they are currently known) may be restricted to the vicinity of frontal dunes, although this is uncertain. There are no frontal dunes in the southern and eastern portions of the Study area (the coast along the eastern boundary of the Project is rocky). On the northern boundary of the Project the Disturbance area is located more than 250 m from the frontal dune area (at its closest point).</p> <p>Project mining will be carried out sequentially over a 26 year period (refer Figure 13). Rehabilitation of mined areas will occur as mining progresses over the life of the Project (as is practised in the adjacent CFSM). As such, the extent of habitat loss at any one time will be much less than the overall Disturbance area. The only areas of permanent habitat loss (i.e. not subject to vegetation rehabilitation) will be some of the mining infrastructure elements which will be retained post closure. These elements comprise a very small portion of the overall footprint and are very unlikely to support the species given the vicinity to the adjacent rocky habitat associated with Cape Flattery itself.</p> <p>Fauna spotters will be present during vegetation clearing and will search the immediate area prior to clearing activity. These measures will reduce the potential for injury/mortality to individuals during operations.</p> <p>Although it is noted the breadth of habitat preferences for the species is uncertain, given the preferred habitat for the species is not impacted it is considered unlikely the Project will lead to a long-term decrease in the size of a local population.</p>
reduce the extent of occurrence of the species	<p>The potential occurrence of the species in the Study area is unknown. No individuals have been located during studies for the Project. The extent of occurrence of Cape Heath Ctenotus is 59 km² and the extent of occupancy is 24 km² (Chapple et al. 2019). The species may be restricted to the vicinity of frontal dunes and no frontal dunes occur within the Disturbance area.</p> <p>Although it is noted the breadth of habitat preferences for the species is uncertain, given the preferred habitat for the species is not impacted it is considered unlikely the Project will reduce the extent of occurrence of the species.</p>

Criterion	Assessment against impact criteria
An action is likely to have a significant impact on vulnerable wildlife if the impact on the habitat is likely to:	
fragment an existing population	The proposed disturbance area abuts rocky coastal habitat to the north-east that is not suitable for the species. It is not expected that an existing population will be fragmented.
result in genetically distinct populations forming as a result of habitat isolation	The proposed disturbance area abuts rocky coastal habitat to the north-east that is not suitable for the species. It is not expected that a genetically distinct population will be formed.
result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat	Weed and pest control measures will be incorporated into the Project Weed Management Strategy to control the introduction and spread of weed species across the site. The weed management plan will be in place for the life of the Project and will minimise the potential for weed invasion and may in the long-term improve habitat condition within vegetation communities located adjacent to Project infrastructure. The Project will not result in establishment of an invasive species harmful to Mclvor River Slider.
introduce disease that may cause the population to decline	The Project weed management plan will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities. Project equipment sourced from overseas will be quarantined as required under State and Commonwealth legislation. The Project is not expected to introduce disease that may cause Mclvor River Slider to decline.
interfere with the recovery of the species	There is no recovery plan for Mclvor River Slider. The project is not expected to interfere with the recovery of the species.
cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	It is not known if the Study area is an ecologically significant location for the species. It is not known if the species occurs in the area. The proposed Disturbance area avoids the preferred habitat known for the species, although it is noted the breadth of habitat preferences for the species is uncertain. The Project is not considered likely to cause disruption to an ecologically significant location.

It is uncertain if Mclvor River Slider is present within the Study area. The Project avoids impacting the known habitat for the species (frontal dune area). Based on the assessment in **Table 27**, no significant residual impact is expected to occur on the Mclvor River Slider.

Acacia solenota – Vulnerable

Acacia solenota occurs in a narrow coastal band extending from Cooktown to Cape Flattery. The species grows in dense heathland communities (often in pure stands) on sand dunes. It is locally common and forms dense stands in the Mclvor River area (20 km south-east of the Study area) (TSSC 2013). There is no known threat to the species, though sand mining is considered a potential threat. *Acacia solenota* is thought to regenerate rapidly following disturbance (Landsberg & Clarkson 2004 in TSSC 2013) and is highly likely to be very suitable for rehabilitation activities. In the Study area it is abundant on track edges (i.e. after mechanical disturbances) and the germination of its hard seeds are likely to be promoted by fire, mechanical disturbance or hot water pre-sowing treatments (pers. comm. Dr Paul Williams Vegetation Management Science). It is noted the existing and adjacent mining operations in the CFSM carry out sequential mining and rehabilitation similar to the process to be used for the Project. Unfortunately, there is no publicly available information regarding the success of the rehabilitation practises at the CFSM for the relevant vegetation communities or the associated flora which would inform this assessment.

The extent of occurrence is estimated at 185 km² (TSSC 2013). Database records extend from Cooktown north to an area approximately 10 km south of the Project. The species appears to occur patchily within this area with dense stands occurring in the Mclvor River area (TSSC 2013). Over 2,000 individual plants were recorded during site surveys, largely along existing tracks (**Figure 11, Plate 2 and Plate 3**) to which surveys were generally restricted (due to the density of the undisturbed heathland dominating the Study area). It is likely the total number of plants in the Study area substantially exceeds the number observed. It was recorded commonly in the following vegetation communities in area: RE 3.2.10a, 3.2.18, 3.2.21. It is also recorded in RE 3.2.12a and 3.12.47a.

Table 28 provides an assessment of the potential impact of the Project on *Acacia solenota* using the significant residual impact criteria.

Table 28. Assessment against significant residual impact criteria for *Acacia solenota*

Criterion	Assessment against impact criteria
An action is likely to have a significant impact on vulnerable wildlife if the impact on the habitat is likely to:	
lead to a long-term decrease in the size of a local population	<p>The species occurs patchily (often in dense stands) from Cooktown north to Cape Flattery. The proposed activities will result in the loss of 308.82 ha (field verified) of potentially suitable habitat and the loss of at least 2,000 individuals. In the Study area the species was found to be common in disturbed areas (track edges).</p> <p>Mining will be carried out sequentially over a 26 year period (refer Figure 13). Rehabilitation of mined areas will occur as mining progresses over the life of the Project (as is practised in the adjacent CFM). As such, the extent of habitat loss at any one time will be much less than the overall Disturbance area. The species is thought to regenerate quickly in disturbed areas and is highly likely to be suitable for rehabilitation of the mined areas. The only areas of permanent habitat loss (i.e. not subject to vegetation rehabilitation) will be some of the mining infrastructure elements which will be retained post closure. These elements comprise a very small portion of the overall footprint.</p> <p>The mined area will be rehabilitated and successful rehabilitation of this species is expected. It is assumed at this stage that the project will not lead to a long term decrease in a local population.</p>
reduce the extent of occurrence of the species	<p>The extent of occurrence of <i>Acacia solenota</i> is 185 km² (TSSC 2013). The overall extent of the proposed activities will result in the loss of 308.82 ha field verified potentially suitable habitat (1.67% of the extent of occurrence), although the extent of habitat loss at any one time will be much less than the overall Disturbance area. Mined areas will be subject to rehabilitation for which the species is highly likely to be suitable. The only areas of permanent habitat loss (i.e. not subject to vegetation rehabilitation) will be some of the mining infrastructure elements which will be retained post closure. The Project will result in at least a short-term and minor reduction in the extent of occurrence of the species, although it is not considered to be a significant impact on the species.</p>
fragment an existing population	<p>The Study area is at the northern extent of the known distribution of the species. It is not expected that an existing population will be fragmented.</p>
result in genetically distinct populations forming as a result of habitat isolation	<p>The Study area is at the northern extent of the known distribution of the species. It is not expected that a genetically distinct population will be formed.</p>
result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat	<p>Weed and pest control measures will be incorporated into the Project Weed Management Strategy to control the introduction and spread of weed species across the site. The weed management plan will be in place for the life of the Project and will minimise the potential for weed invasion and may in the long-term improve habitat condition within vegetation communities located adjacent to Project infrastructure. The Project will not result in establishment of an invasive species harmful to <i>Acacia solenota</i>.</p>
introduce disease that may cause the population to decline	<p>The Project weed management plan will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities. Project equipment sourced from overseas</p>

Criterion	Assessment against impact criteria
An action is likely to have a significant impact on vulnerable wildlife if the impact on the habitat is likely to:	
	will be quarantined as required under State and Commonwealth legislation. The Project is not expected to introduce disease that may cause <i>Acacia solenota</i> to decline.
interfere with the recovery of the species	There is no recovery plan for <i>Acacia solenota</i> . The project is not expected to interfere with the recovery of the species.
cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	It is not known if the Study area is an ecologically significant location for the species. The Project occupies a relatively minor proportion of the species extent of occurrence and with the application of successful rehabilitation practises the proposed activities will cause a short-term reduction in the extent of the species occurrence at worst.

The sequential rehabilitation and scale of mining allows for the maintenance of the *Acacia solenota* population within the disturbance area, in areas yet to be mined, and successful propagation in rehabilitated areas is expected. Based on the assessment in **Table 28**, it is considered that the project is unlikely to result in a significant residual impact on *Acacia solenota*.

7.3 Environmental Offsets

Under the assessments in **Section 7.1** and **Appendix H** there is no expected significant impact to any flora or fauna species listed as a MNES or TEC (MNES) as a result of the proposed Project activities.

There are expected to be significant residual impacts to the following MSES vegetation categories which will be subject to State-required environmental offsets:

- 0.34 ha of vegetation listed as Of Concern under the EP Act
- 8.68 ha of Category B (remnant) vegetation located within 10 m of a mapped watercourse (stream order 1 and 2) on the VM Act mapping layer
- 230.04 ha of field verified potentially suitable habitat for Cape Heath Ctenotus (listed as Vulnerable under the NC Act)
- 4.29 km of regulated vegetation (Category B – remnant vegetation) intersecting watercourses

The application of sequential mining and rehabilitation of mined areas for the Project will potentially reduce the overall area of impact on the Cape Heath Ctenotus at any one time. The species is considered likely to recolonise rehabilitated areas. Nevertheless, the species has a restricted distribution and habitat disturbance associated with the Project and may require environmental offsets as per the Queensland Environmental Offsets Policy.

It is noted there is overlap between the MSES areas identified to potentially require an offset. It is uncertain whether the proponent would be required to offset the overlapping MSES area twice as separate matters. Discussions will need to be held with DES regarding this matter.

8 CONCLUSION

Cape Flattery Silica propose to develop and operate the Cape Flattery Silica Sands Project (the Project) at Cape Flattery, located approximately 42 km north-east of Hope Vale and 56 km north north-east of Cooktown on Cape York Peninsula. The overall area of the Project Mine Lease (MLA) is approximately 616 ha which encompasses the known geological resource for the silica sands deposit. The proposed Project footprint for mining and associated mine infrastructure encompasses 309.03 ha.

The Project area has historically experienced minimal disturbance, and existing vegetation clearing appears to be limited to the vehicle tracks, and small-scale tree removal around campsites along the Connies Beach foreshore (which lies outside the MLA). Several minor and ephemeral first order watercourses traverse the Project area. The southern boundary of the Project intersects two wetlands considered as of HES under State wetland mapping.

Remnant vegetation dominates the entire Project area with dense low heathland on sand dunes being the dominant vegetation community present. Seasonal field surveys identified nine REs within the Study area including 55.36 ha of vegetation listed as Of Concern under the EP Act. A single vegetation community present in the Study area (RE 3.2.12a) is considered analogous to the *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia* TEC (Critically Endangered under the EPBC Act). Two threatened plant species were recorded within the Study area - *Acacia solenota* (Vulnerable under the NC Act) (very common) and *Myrmecodia beccarii* (Vulnerable under the NC Act and EPBC Act). There is a minor potential for a further three threatened plant species to occur.

Fauna surveys for the Project recorded five threatened fauna species listed as threatened under the NC Act and/or EPBC Act). However, only one of these species was recorded within the Project area and is considered likely to be impacted by the Project – Cape Heath Ctenotus (Vulnerable under the NC Act). Estuarine Crocodile (Vulnerable under the NC Act and Migratory under the EPBC act) may use the mapped wetland areas and coastal habitat in the surrounding area. The remaining species are migratory shorebirds and were identified in the vicinity of Connies Beach. The Project area does not comprise habitat for these species. Seven bird species listed as Migratory under the EPBC Act recorded outside but near the Project area. Only two of these are considered to have potential habitat within the Project area: Caspian Tern and Rufous Fantail.

The overall disturbance area for the Project (i.e. the area to be mined and areas to be modified for infrastructure) encompasses 309.03 ha. The main impact from the Project is expected to be from vegetation clearing. The Project footprint will avoid impacts to the TEC areas and the mapped wetlands on the southern boundary. The Project will disturb 0.34 ha of remnant vegetation listed as Of Concern.

Mining will be carried out sequentially over a 26 year period. Rehabilitation of mined areas will occur as mining progresses over the life of the Project. As such, the extent of habitat loss at any one time will be much less than the overall Disturbance area and no loss of connectivity at the local or landscape scale is anticipated. Most other potential impacts of the Project are considered to be manageable with the application of Project-specific mitigation measures.

The Project will impact potentially suitable habitat for Cape Heath Ctenotus. The potential for Cape Heath Ctenotus to use rehabilitated areas is uncertain but its life history is promising in that regard. Nevertheless, an assessment under the State impact guidelines indicates there is potential for the Project to have a significant residual impact on this species. *Acacia solenota* is considered to have a high likelihood of successful rehabilitation based upon its life history. As such, given the progressive nature of the Project mining, significant residual impacts have been assessed as unlikely to occur on the species. No significant residual impacts are predicted to occur on any other fauna or flora species listed as a MNES or MSES.

The Project may require offsets as per the Queensland Environmental Offsets Policy for the following terrestrial MSES:

- 0.34 ha of vegetation listed as Of Concern under the EP Act
- 8.68 ha of Category B (remnant) vegetation located within 10 m of a mapped watercourse (stream order 1 and 2) on the VM Act mapping layer
- 230.04 ha of field verified potentially suitable habitat for Cape Heath Ctenotus (listed as Vulnerable under the NC Act)
- 4.29 km of regulated vegetation (Category B – remnant vegetation) intersecting watercourses

The application of sequential mining and rehabilitation of mined areas for the Project will potentially reduce the overall area of impact on the Cape Heath Ctenotus at any one time. The species is considered likely to recolonise rehabilitated areas. Nevertheless, the species has a restricted distribution and habitat disturbance associated with the Project and may require environmental offsets as per the Queensland Environmental Offsets Policy.

It is noted there is overlap between the MSES areas identified to potentially require an offset. It is uncertain whether the proponent would be required to offset the overlapping MSES area twice as separate matters. Discussions will need to be held with DES regarding this matter.

9 REFERENCES

- ABRS 2020, *Australian faunal directory*. Australian Biological Resources Study, Canberra.
- ALA 2022, *Atlas of living Australia*, <https://www.ala.org.au/>.
- Algar, DA, Burbidge, AA & Angus, GJ 2002, 'Cat eradication on Hermite Island, Montebello Islands, Western Australia', in CR Veitch & MN Clout (eds), *Turning the tide: the eradication of invasive species, Proceedings of the International Conference On Eradication of Island Invasives*, Occasional Paper of the IUCN Species Survival Commission No. 27, IUCN SSC Invasive Species Specialist Group. IUCN, Gland, Switzerland and Cambridge, U.K., pp. 14-18.
- Allen, LC, Hristov, NI, Rubin, JJ, Lightsey, JT & Barber, JR 2021, 'Noise distracts foraging bats', *Proceedings of the Royal Society B*, vol. 288, 20202689. <https://doi.org/10.1098/rspb.2020.2689>.
- ANH 2021, *Myrmecodia beccarii an ant plant*, Information about Australia's flora: growing native plants, Australian National Herbarium, <https://www.anbg.gov.au/gnp/interns-2004/myrmecodia-beccarii.html>.
- Anstis, M 2013, *Tadpoles and frogs of Australia*, New Holland, Sydney.
- Armstrong, KN & Anstee, SD 2000, 'The ghost bat in the Pilbara: 100 years on', *Australian Mammalogy*, vol. 22, pp. 93-101.
- Aumann, T 2001, 'Habitat use, temporal activity patterns and foraging behaviour of raptors in the south-west of the Northern Territory, Australia', *Wildlife Research*, vol. 28, pp. 365-378.
- Baker, A & Dickman, C 2018, *Secret lives of carnivorous marsupials*, CSIRO Publishing, Clayton South.
- Bamford, M, Watkins, D, Bancroft, W, Tischler, G & Wahl, J 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, <http://www.environment.gov.au/biodiversity/migratory/publications/shorebirds-east-asia.html>.
- Barber, JR, Crooks, KR & Fristrup, KM 2009, 'The costs of chronic noise exposure for terrestrial organisms', *Trends in Ecology and Evolution*, vol. 25, pp. 180-189.
- Barker, M 1997, *Dendrobium bigibbum/D. phalaenopsis*, in *Species Management Manual*, Department of Natural Resources, Brisbane.
- Barratt, DG 1997, 'Predation by house cats, *Felis catus* (L.), in Canberra, Australia. I. Prey composition and preference', *Wildlife Research*, vol. 24, pp. 263-277.
- Barrett, G, Silcocks, A, Barry, S, Cunningham, R & Poulter, R 2003, *The new atlas of Australian birds*, Birds Australia, Melbourne.
- Biedenweg, TA, Parsons, MH, Fleming, PA & Blumstein, DT 2011, 'Sounds scary? Lack of habituation following the presentation of novel sounds', *PLoS One*, vol. 6, e14549, doi: 10.1371/journal.pone.0014549.
- BirdLife International 2018, *Hydroprogne caspia*, *IUCN Red List of Threatened Species*, e.T22694524A132557807, <http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22694524A132557807.en>.
- BirdLife International 2019, *Apus pacificus* (amended version of 2016 assessment), *The IUCN Red List of Threatened Species 2019*: e.T22686845A155438660, <https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22686845A155438660.en>.
- Black, R, Houston, W & Jaensch, R 2010, 'Evidence of regular seasonal migration by Australian painted snipe *Rostratula australis* to the Queensland tropics in autumn and winter', *Stilt*, vol. 58, pp. 1-9.
- Blakers, M, Davies, SJJF. & Reilly, PN 1984, *The atlas of Australian birds*, Melbourne University Press, Melbourne.
- Blickley, JL & Patricelli, GL 2010, 'Impacts of anthropogenic noise on wildlife: research priorities for the development of standards and mitigation', *Journal of International Wildlife Law & Policy*, vol. 13, pp. 274-292.
- Bloomer, JP & Bester, MN 1992, 'Control of feral cats on sub-Antarctic Marion Island, Indian Ocean', *Biological Conservation*, vol. 60, pp. 221-219.

- BoM 2021, *Cooktown daily weather observations*, Bureau of Meteorology, <http://www.bom.gov.au/climate/dwo/202006/html/IDCJDW4035.202006.shtml>.
- Braby, MF 2000, *The butterflies of Australia: their identification, biology and distribution*, CSIRO Publishing, Collingwood.
- Buchanan, BW 1993, 'Effects of enhanced lighting on the behaviour of nocturnal frogs', *Animal Behaviour*, vol. 45, pp. 893-899.
- Bunkley, JP & Barber, JR 2015, 'Noise reduces foraging efficiency in pallid bats (*Antrozous pallidus*)', *Ethology*, vol. 121, pp. 1-6.
- Burnett, S 1997, 'Colonizing cane toads cause population declines in native predators: reliable anecdotal information and management implications', *Pacific Conservation Biology*, vol. 3, pp. 65-72.
- Burnett, S 2012, 'Northern quoll *Dasyurus hallucatus* Gould, 1842', in LK Curtis, AJ Dennis, KR McDonald, PM Kyne & SJS Debus (eds), *Queensland's threatened animals*, CSIRO Publishing, Collingwood, pp. 340-341.
- Busnel, RG & Fletcher, J (eds) 1978, *Effects of noise on wildlife*, Academic Press, New York.
- Butler, D & Laidlaw, M 2012, *Species profile—Tyto novaehollandiae kimberli (masked owl (northern subspecies))*, Queensland Government, <https://apps.des.qld.gov.au/species-search/details/?id=1097#>.
- Case, TJ, Bolger, DT & Petren, K 1994, 'Invasions and competitive displacement among house geckos in the tropical Pacific', *Ecology*, vol. 75, pp. 464-477.
- CCEEW 2022a, *Species Profile and Threats Database*, Department of Agriculture, Water and the Environment, Canberra, <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>.
- CCEEW 2022b, *Protected Matters Search Tool*, Department of Agriculture, Water and the Environment, Canberra,
- CCEEW 2022c, *Dendrobium bigibbum — Cooktown orchid*, in *Species Profile and Threats Database*, Department of Agriculture, Water and the Environment, Canberra, http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=10306.
- CCEEW 2022d, *Charadrius mongolus – lesser sand plover, Mongolian plover*, in *Species Profile and Threats Database*, Department of Agriculture, Water and the Environment, Canberra, http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=879.
- CCEEW 2022e, *Charadrius leschenaultii – greater sand plover, large sand plover*, in *Species Profile and Threats Database*, Department of Agriculture, Water and the Environment, Canberra, http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=877.
- CCEEW 2022f, *Myrmecodia beccarii – ant plant*, in *Species Profile and Threats Database*, Department of Agriculture, Water and the Environment, Canberra, https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=11852.
- CCEEW 2022g, *Acriopsis emarginata – pale chandelier orchid*, in *Species Profile and Threats Database*, Department of Agriculture, Water and the Environment, Canberra, http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=83928.
- CCEEW 2022h, *Bruguiera x hainesii – Haines's orange mangrove*, in *Species Profile and Threats Database*, Department of Agriculture, Water and the Environment, Canberra, http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=91351.
- CCEEW 2022i, *Cyclophyllum costatum – a shrub*, in *Species Profile and Threats Database*, Department of Agriculture, Water and the Environment, Canberra, http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=82770.
- CCEEW 2022j, *Phaius pictus*, in *Species Profile and Threats Database*, Department of Agriculture, Water and the Environment, Canberra, http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=22564.
- Chapple, DG, Tingley, R, Mitchell, NJ, Macdonald, SL, Keogh, JS, Shea, GM, Bowles, P, Cox, NA & Woinarski, JCZ 2019, *The action plan for Australian lizards and snakes 2019*, CSIRO Publishing, Clayton South.

- Chaston, K & Doley, D 2006, 'Mineral particulates and vegetation: effects of coal dust, overburden and flyash on light interception and leaf temperature', *Clean Air and Environmental Quality*, vol. 40, pp. 40-44.
- Choquenot, D, McIlroy, J & Korn, T 1996, *Managing vertebrate pests: feral pigs*, Australian Government Publishing Service, Canberra.
- Churchill, S 2008, *Australian bats*, Second edition, Allen & Unwin, Crows Nest.
- Coffin, AW 2007, 'From roadkill to road ecology: a review of the ecological effects of roads', *Journal of Transport Geography*, vol. 15: pp. 396-406.
- Cogger, HG 2014, *Reptiles and amphibians of Australia*, Seventh edition, Reed Books, Sydney.
- Coles, R, Richards, G, Hall, L & Clague, C 1999, 'Bare-rumped sheath-tail bat', in A Duncan, GB Baker & N Montgomery (eds), *The action plan for Australian bats*, Environment Australia, Canberra.
- Covacevich, J, Ingram, GJ & Czechura, GV 1982. 'Rare frogs and reptiles of Cape York Peninsula, Australia', *Biological Conservation*, vol. 22, pp. 283-294.
- Crossland, MR & Alford, RA 1998, 'Evaluation of the toxicity of eggs, hatchlings and tadpoles of the introduced toad *Bufo marinus* (Anura: Bufonidae) to native Australian aquatic predators', *Australian Journal of Ecology*, vol. 23, pp. 129-137.
- CYNRM 2016, *Cape York Peninsula regional biosecurity plan 2016 -2021*, Cape York Natural Resource Management (Cape York NRM).
- Czechura, GV, Hobson, RG & Stewart, DA 2010, 'Distribution, status and habitat of the red goshawk *Erythrotriorchis radiatus* in Queensland', *Corella*, vol. 35, pp. 3-10.
- DAF 2018, *Accepted development requirements for operational work that is constructing or raising waterway barrier works*, Department of Agriculture and Fisheries, https://www.daf.qld.gov.au/__data/assets/pdf_file/0006/1476888/adr-operational-waterway-barrier-works.pdf.
- DAWE 2013, *Draft survey guidelines for Australia's threatened orchids – guidelines for detecting orchids listed as 'threatened' under the EPBC Act 1999*. Department of Agriculture, Water and the Environment, Canberra, <https://www.awe.gov.au/resource/draft-survey-guidelines-australias-threatened-orchids>.
- DE 2013, *Matters of National Environmental Significance Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999*, Department of the Environment, Canberra.
- DE 2015, *Threat abatement plan for predation by feral cats*, Department of the Environment, Canberra.
- Debus, S 1998, *The birds of prey of Australia: a field guide*, Oxford University Press, Melbourne.
- Debus, SJS 2012, 'Masked owl (northern subspecies) *Tyto novaehollandiae kimberli* Mathews, 1912,' in LK Curtis, AJ Dennis, KR McDonald, PM Kyne & SJS Debus (eds), *Queensland's threatened animals*, CSIRO Publishing, Collingwood, pp. 306-307.
- DEHP 2012, *Biodiversity planning assessment using BAMM for Cape York Peninsula Heritage Area, summary report*, Department of Environment and Heritage Protection, Queensland Government.
- Dennis, AJ 2012a, 'Semon's leaf-nosed bat *Hipposideros semoni* Matschie, 1903', in LK Curtis, AJ Dennis, KR McDonald, PM Kyne & SJS Debus (eds), *Queensland's threatened animals*, CSIRO Publishing, Collingwood, pp. 378-379.
- Dennis, AJ 2012b, 'Spectacled flying-fox *Pteropus conspicillatus* Gould, 1850', in LK Curtis, AJ Dennis, KR McDonald, PM Kyne & SJS Debus (eds), *Queensland's threatened animals*, CSIRO Publishing, Collingwood, pp. 388-389.
- Denny, EA & Dickman, CR 2013, *Review of cat ecology and management strategies in Australia*, Invasive Animals Cooperative Research Centre, Canberra.
- Denys, C, Taylor, PJ & Aplin, KP 2017, 'Family Muridae (true mice and rats, gerbils and relatives)', in DE Wilson, TE Lacher Jr & RA Mittermeier (eds), *Handbook of the mammals of the world, Vol. 7: rodents II*, Lynx Edicions, Barcelona, pp. 536-884.

DERM 2009, *National recovery plan for the red goshawk Erythrotriorchis radiatus*, Report to the Department of the Environment, Water, Heritage and the Arts, Canberra, Queensland Department of Environment and Resource Management, Brisbane.

DES 2020, *Flora survey guidelines – Protected plants Nature Conservation Act 1992 (V2.01)*, Department of Environment and Science, Queensland Government, Brisbane, https://www.qld.gov.au/__data/assets/pdf_file/0028/99901/gl-wl-pp-flora-survey.pdf.

DEWHA 2008a, *Approved conservation advice for Acriopsis javanica*, Department of the Environment, Water, Heritage and the Arts, Canberra, <http://www.environment.gov.au/biodiversity/threatened/species/pubs/83928-conservation-advice.pdf>.

DEWHA 2008b, *Approved conservation advice for Canthium costatum*, Department of the Environment, Water, Heritage and the Arts, Canberra, <http://www.environment.gov.au/biodiversity/threatened/species/pubs/14680-conservation-advice.pdf>.

DEWHA 2008c, *Approved conservation advice for Dendrobium bigibbum*, Department of the Environment, Water, Heritage and the Arts, Canberra, <http://www.environment.gov.au/biodiversity/threatened/species/pubs/78705-conservation-advice.pdf>.

DEWHA 2008d, *Approved conservation advice for Dendrobium johannis*, Department of the Environment, Water, Heritage and the Arts, Canberra, <http://www.environment.gov.au/biodiversity/threatened/species/pubs/78701-conservation-advice.pdf>.

DEWHA 2008e, *Approved conservation advice for Eremochloa muricata*, Department of the Environment, Water, Heritage and the Arts, Canberra, <http://www.environment.gov.au/biodiversity/threatened/species/pubs/6469-conservation-advice.pdf>.

DEWHA 2008f, *Approved conservation advice for Huperzia dalhousieana (blue tassel-fern)*, Department of the Environment, Water, Heritage and the Arts, Canberra, <http://www.environment.gov.au/biodiversity/threatened/species/pubs/86550-conservation-advice.pdf>.

DEWHA 2008g, *Approved conservation advice for Myrmecodia beccarii*, Department of the Environment, Water, Heritage and the Arts, Canberra, <http://www.environment.gov.au/biodiversity/threatened/species/pubs/11852-conservation-advice.pdf>.

DEWHA 2008h, *Approved conservation advice for Phaius pictus*, Department of the Environment, Water, Heritage and the Arts, Canberra, <http://www.environment.gov.au/biodiversity/threatened/species/pubs/22564-conservation-advice.pdf>.

DEWHA 2008i, *Threat abatement plan for predation by the European red fox*, Department of the Environment, Water, Heritage and the Arts, Canberra.

Dickman, CR, Pressey, CL, Lim, L & Parnaby, HE 1993, 'Mammals of particular conservation concern in the Western Division of New South Wales', *Biological Conservation*, vol. 65, pp. 219-248.

Dwyer, RG, Bearhop, S, Campbell, HA & Bryant, DM 2013, 'Shedding light on light: benefits of anthropogenic illumination to a nocturnally foraging shorebird', *Journal of Animal Ecology*, vol. 82, pp. 478-485.

Eddie, C 2012, 'Yakka skink *Egernia rugosa* De Vis, 1888', in LK Curtis, AJ Dennis, KR McDonald, PM Kyne & SJS Debus (eds), *Queensland's threatened animals*, CSIRO Publishing, Collingwood, pp. 224-225.

Edwards, GP, De Preu, N, Shakeshaft, BJ & Crealy, IV 2000, 'An evaluation of two methods of assessing feral cat and dingo abundance in central Australia', *Wildlife Research*, vol. 27, pp. 143-149.

Ehmann, H 1992, *Encyclopedia of Australian animals: reptiles*, Angus & Robertson, Sydney.

EPA 2007, *Nature conservation (estuarine crocodile) plan 2007 and management program 2007-2017*, Environmental Protection Agency, Queensland.

Eyre, TJ, Ferguson, DL, Hourigan, CL, Smith, GC, Mathieson, MT, Kelly, AL, Venz MF, Hogan, LD & Rowland, J 2018, *Terrestrial vertebrate fauna survey assessment guidelines for Queensland, V 3.0*, Department of Environment and Science, Queensland Government, Brisbane.

- Eyre, TJ, Kelly, AL, Neldner, VJ, Wilson, BA, Ferguson, DJ, Laidlaw, MJ & Franks, AJ 2015, *BioCondition: a condition assessment framework for terrestrial biodiversity in Queensland, assessment manual, Version 2.2*, Queensland Herbarium, Department of Science, Information Technology, Innovation and Arts, Brisbane.
- Farmer, AM 1993, 'The effects of dust on vegetation – a review', *Environmental Pollution*, vol. 79, pp. 63-75.
- Field, JP, Belnap, J, Breshears, DD, Neff, JC, Okin, GS, Whicker, JJ, Painter, TH, Ravi, S, Reheis, MC & Reynolds, RL 2010, 'The ecology of dust', *Frontiers in Ecology and the Environment*, vol. 8, pp. 423-430.
- Finn, PG, Catterall, CP & Driscoll, PV 2008, 'Prey versus substrate as determinants of habitat choice in a feeding shorebird', *Estuarine, Coastal and Shelf Science*, vol. 80, pp. 381-390.
- Fox, S 2011, 'The spectacled flying-fox – a review of past and present knowledge', in B Law, P Eby, D Lunney & L Lumsden (eds), *The biology and conservation of Australasian bats*, Royal Zoological Society of NSW, Mosman, pp. 136-145.
- Francis, CD, Ortega, CP & Cruz, A 2009, 'Noise pollution changes avian communities and species interactions', *Current Biology*, vol. 19, pp. 1415-1419.
- Fukuda, Y, Whitehead, P & Boggs, G 2007, 'Broad-scale environmental influences on the abundance of saltwater crocodiles (*Crocodylus porosus*) in Australia', *Wildlife Research*, vol. 34, pp. 167-176.
- Garnett, ST, Szabo, JK & Dutton, G 2011, *The action plan for Australian birds 2010*, CSIRO Publishing, Collingwood.
- Geering, A, Agnew, L & Harding, S 2007, *Shorebirds of Australia*, CSIRO Publishing, Collingwood.
- Gochfeld, M & Burger, J 1996, 'Family Sternidae (terns)', in J del Hoyo, A Elliott & L Sargatal (eds), *Handbook of the birds of the world, Vol.3: hoatzin to auks*, Lynx Edicions, Barcelona, pp. 624-667.
- Greer, AE 1989, *The biology & evolution of Australian lizards*, Surrey Beatty & Sons, Chipping Norton.
- Hagman M, Phillips BL & Shine R 2009, 'Fatal attraction: adaptations to prey on native frogs imperil snakes after invasion of toxic toads', *Proceedings of the Royal Society of London, Series B: Biological Sciences*, vol. 276, pp. 2813-2818.
- Hall, L 2008, 'Semon's leaf-nosed bat *Hipposideros semoni*', in S Van Dyck & R Strahan (eds), *The mammals of Australia*, Third edition, Reed New Holland, Sydney, pp. 465-466.
- Hall, LS, Thomson, BG & Milne, DJ 2008, 'Bare-rumped sheath-tailed bat *Saccolaimus saccolaimus*', in S Van Dyck & R Strahan (eds), *The mammals of Australia*, Third edition, Reed New Holland, Sydney, pp. 475-476.
- Hansen, BD, Fuller, RA, Watkins, D, Rogers, DI, Clemens, RS, Newman, M, Woehler, EJ and Weller, DR 2016, *Revision of the East Asian-Australasian Flyway Population Estimates for 37 listed Migratory Shorebird Species*. Unpublished report for the Department of the Environment, BirdLife Australia, Melbourne.
- Heise-Pavlov, PM 2008, 'Pig *Sus scrofa*', in S Van Dyck & R Strahan (eds), *The mammals of Australia*, Third edition, Reed New Holland, Sydney, pp. 755-757.
- Higgins, PJ & Davies, SJJF (eds) 1996, *Handbook of Australian, New Zealand and Antarctic birds, Vol. 3: snipe to pigeons*, Oxford University Press, Melbourne.
- Higgins, PJ (ed) 1999, *Handbook of Australian, New Zealand and Antarctic birds, Vol 4: parrots to dollarbird*, Oxford University Press, Melbourne.
- Higgins, PJ, Peter, JM & Cowling, SJ (eds) 2006, *Handbook of Australian, New Zealand and Antarctic birds, Vol. 7: boatbill to starlings, Part A: boatbill to larks*, Oxford University Press, South Melbourne.
- Hoskin, CJ & Couper, PJ 2014, 'Two new skinks (Scincidae: *Glaphyromorphus*) from rainforest habitats in north-eastern Australia', *Zootaxa*, vol. 3869, pp. 001-016.
- Hoskin, CJ 2010, 'The invasion and potential impact of the Asian house gecko (*Hemidactylus frenatus*) in Australia', *Austral Ecology*, DOI: 10.1111/j.1442-9993.2010.02143.x.
- Hoskin, CJ, Grigg, GC, Stewart, DA & Macdonald, SL 2015, *Frogs of Australia (1.1 (4614))* [Mobile application software], <http://www.ugmedia.com.au>.

- HVASC 2014, *Hope Vale Aboriginal Shire Council planning scheme*, Hope Vale Aboriginal Shire Council, Hope Vale.
- Hydrobiology 2022a, *Project aquatic ecology technical report: Metallica Minerals Silica Sands Project*, Hydrobiology, Auchenflower.
- Hydrobiology 2022b, *Project marine ecology technical report: Metallica Minerals Silica Sands Project*, Hydrobiology, Auchenflower.
- Krockenberger, A, Gordon, G & Dennis, AJ 2012, 'Koala (south-east Qld bioregion) *Phascolarctos cinereus* (Goldfuss, 1817)', in LK Curtis, AJ Dennis, KR McDonald, PM Kyne & SJS Debus (eds), *Queensland's threatened animals*, CSIRO Publishing, Collingwood, pp. 350-351.
- Landsberg, J & Clarkson, J 2004, *Threatened plants of Cape York Peninsula*, a report to the Australian Government Department of the Environment and Heritage, Queensland Parks & Wildlife Service
- Lane, BA 1987, *Shorebirds in Australia*, Nelson Publishers, Melbourne.
- Lepczyk, CA, Mertig, AG & Liu, J 2003, 'Landowners and cat predation across rural-to-urban landscapes', *Biological Conservation*, vol. 115, pp. 191-201.
- Longcore, T & Rich, C 2004, 'Ecological light pollution', *Frontiers in Ecology and the Environment*, vol. 2, pp. 191-198.
- Longcore, T & Rich, C 2017, *Artificial night lighting and protected lands: ecological effects and management approaches*, Natural Resource Report NPS/NRSS/NSNS/NRR— 2017/1493, National Park Service, Fort Collins, Colorado.
- Lovich, JE & Ennen, JR 2011, 'Wildlife conservation and solar energy development in the desert southwest, United States', *Bioscience*, vol. 61, pp. 982-992.
- Marchant, S & Higgins, PJ (eds) 1993, *Handbook of Australian, New Zealand and Antarctic birds. Vol. 2: raptors to lapwings*, Oxford University Press, Melbourne.
- Martin, RW, Handasyde, KA & Krockenberger, A 2008, 'Koala *Phascolarctos cinereus*', in S Van Dyck & R Strahan (eds), *The mammals of Australia*, Third edition, Reed New Holland, Sydney, pp. 198-201.
- Mathieson, MT & Smith, GC 2009, *National recovery plan for the buff-breasted button-quail Turnix olivii*, Report to Department of the Environment, Water, Heritage and the Arts, Canberra, Department of Environment and Resource Management, Brisbane.
- Mathieson, MT & Smith, GC 2012, 'Buff-breasted Button-quail *Turnix olivii* Robinson, 1900', in LK Curtis, AJ Dennis, KR McDonald, PM Kyne & SJS Debus (eds), *Queensland's threatened animals*, CSIRO Publishing, Collingwood, pp. 278-279.
- Menkhorst, P, Rogers, D & Clarke, R 2017, *The Australian bird guide*, CSIRO Publishing, Clayton South.
- Miller, MW 2006, 'Apparent effects of light pollution on singing behavior of American robins', *The Condor*, vol. 108, pp. 130-140.
- Minton, C & Deleyev, J 2001, 'Analysis of recoveries of VWSG banded Caspian terns', *Victorian Wader Study Group Bulletin*, vol. 24, pp. 71-75.
- Murphy, S 2002, 'Observations of the 'critically endangered' bare-rumped sheath-tail bat *Saccolaimus saccolaimus* Temminck (Chiroptera: Emballonuridae) on Cape York Peninsula, Queensland', *Australian Mammalogy*, vol. 23, pp. 185-187.
- NAFI 2021, North Australia and Rangelands Fire Information, <https://knowledge.aidr.org.au/resources/ajem-oct-2017-north-australia-and-rangelands-fire-information/>.
- Neldner, VJ, Wilson, BA, Dillewaard, HA, Ryan, TS, Butler, DW, McDonald, WJF, Addicott, EP & Appelman, CN 2020, *Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland. Version 5.1*. Updated March 2020, Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.
- Northcote et al. 1960-68, *Australian Soil Resource Information System*, <https://www.asris.csiro.au/themes/Atlas.html>

- Oakwood, M 2008, 'Northern quoll *Dasyurus hallucatus*,' in S Van Dyck & R Strahan (eds), *The mammals of Australia*, Third edition, Reed New Holland, Sydney, pp. 57-59.
- Olsen, P 1995, *Australian birds of prey*, University of New South Wales Press, Sydney.
- OZCAM 2022, *Online Zoological Collections of Australian Museums*, <http://ozcam.org.au/>.
- Parris, KM & Schneider, A 2009, 'Impacts of traffic noise and traffic volume on birds of roadside habitats', *Ecology and Society*, vol. 14, pp. 29.
- Parris, KM, Velik-Lord, M & North, JMA 2009, 'Frogs call at a higher pitch in traffic noise', *Ecology and Society*, vol. 14, pp. 25.
- Pavey, CR & Kutt, AS 2008, 'Large-eared horseshoe bat *Rhinolophus philippinensis*', in S Van Dyck & R Strahan (eds), *The mammals of Australia*, Third edition, Reed New Holland, Sydney, pp. 454-456.
- Phillips, BL, Brown, GP & Shine, R 2003, 'Assessing the potential impact of cane toads on Australian snakes', *Conservation Biology*, vol. 17, pp. 1738-1747.
- Pizzey, G 1980, *A field guide to the birds of Australia*, Collins, Sydney.
- Pollock, AB 1999, 'Notes on status, distribution and diet of northern quoll *Dasyurus hallucatus* in the Mackay-Bowen area, mideastern Queensland', *Australian Zoologist*, vol. 31, pp. 388-395.
- Pringle, JD 1987, *The shorebirds of Australia: the national photographic index of Australian wildlife*, Angus & Robertson, North Ryde.
- QG 2022, *Species profile search*, Queensland Government, <https://apps.des.qld.gov.au/species-search/>.
- QPWS 2007, *Distribution and abundance of the estuarine crocodile (Crocodylus porosus Schneider, 1801) in waterways of Queensland's populated east coast*, Report to Hon. Lindy Nelson-Carr MP Minister for the Environment and Multiculturalism, Queensland Parks and Wildlife Service, Brisbane.
- Queensland Herbarium 2021, *Regional Ecosystem Description Database*, <https://apps.des.qld.gov.au/regional-ecosystems/>.
- Radle, AL 2007, *The effect of noise on wildlife: a literature review*, http://ecoear.proscenia.net/wfaelibrary/library/articles/radle_effect_noise_wildlife.pdf.
- Rankmore, BR & Friend, GR 2008, 'Black-footed tree-rat *Mesembriomys gouldii*', in S Van Dyck & R Strahan (eds), *The mammals of Australia*, Third edition, Reed New Holland, Sydney, pp. 591-592.
- Read, M 2012, 'Estuarine crocodile *Crocodylus porosus* (Schneider, 1801),' in LK Curtis, AJ Dennis, KR McDonald, PM Kyne & SJS Debus (eds), *Queensland's threatened animals*, CSIRO Publishing, Collingwood, pp. 185-186.
- Read, MA, Miller, JD, Bell, IP & Felton, A 2004, 'The distribution and abundance of the estuarine crocodile, *Crocodylus porosus*, in Queensland', *Wildlife Research*, vol. 31, pp. 527-534.
- Richards, G 1990, 'The spectacled flying-fox, *Pteropus conspicillatus*, (Chiroptera: Pteropodidae) in North Queensland. 1. Roost sites and distribution patterns', *Australian Mammalogy*, vol. 13, pp. 17-24.
- Richards, GC, Hand, S, Armstrong, KN & Hall, LS 2008a, 'Ghost bat *Macroderma gigas*,' in S Van Dyck & R Strahan (eds), *The mammals of Australia*, Third edition, Reed New Holland, Sydney, pp. 449-450.
- Richards, GC, Spencer, HJ & Fox, S 2008b, 'Spectacled flying-fox *Pteropus conspicillatus*,' in S Van Dyck & R Strahan (eds), *The mammals of Australia*, Third edition, Reed New Holland, Sydney, pp. 438-440.
- Richardson, R 2008, *Queensland Brigalow Belt reptile recovery plan 2008 – 2012*, Report to the Department of the Environment, Water, Heritage and the Arts, Canberra, WWF-Australia, Brisbane.
- Robert, KA, Lesku, JA, Partecke, J & Chambers, B 2015, 'Artificial light at night desynchronizes strictly seasonal reproduction in a wild mammal', *Proceedings of the Royal Society B: Biological Sciences*, vol. 282, <https://doi.org/10.1098/rspb.2015.1745>.
- Rodríguez, A, Holmes, ND, Ryan, PG, et al. 2017, 'Seabird mortality induced by land-based artificial lights', *Conservation Biology*, vol. 31, pp. 986-1001.

- Rogers, D, Clemens, R, Carey, M & Garnett, ST 2021a, 'Eastern greater sand plover *Charadrius leschenaultii leschenaultii*', in ST Garnett & GB Baker (eds), *The Action Plan for Australian Birds 2020*, CSIRO Publishing, Melbourne, pp. 247-250.
- Rogers, D, Clemens, R, Carey, M & Garnett, ST 2021b, 'Mongolian lesser sand plover *Charadrius mongolus mongolus* and Kamchatkan lesser sand plover *C. m. stegmanni*', in ST Garnett & GB Baker (eds), *The Action Plan for Australian Birds 2020*, CSIRO Publishing, Melbourne, pp. 244-247.
- Rogers, D, Hance, I, Paton, S, Tzaros, C, Griffioen, P, Herring, M, Jaensch, R, Oring, L, Silcocks, A & Weston, M 2005, 'The breeding bottleneck: breeding habitat and population decline in the Australian painted snipe', in P Straw, (ed), *Status and conservation of seabirds in the East Asian-Australasian Flyway: proceedings of the Australasian Shorebirds Conference*, 13-15 Dec 2003, Canberra, Wetlands International Global Series 18, International Wader Studies 17, Sydney, pp. 15-23.
- Rowse, EG, Lewanzik, D, Stone, EL, Harris, S & Jones, G 2016, 'Dark matters: the effects of artificial lighting on bats', in CC Voigt & T Kingston (eds), *Bats in the Anthropocene: conservation of bats in a changing world*, DOI 10.1007/978-3-319-25220-9_7.
- Sanders, MG 2021, *Photographic field guide to Australian frogs*, CSIRO Publishing, Clayton South.
- Santos, CD, Miranda, AC, Granadeiro, JP, Lourenço, PM, Saraiva, S & Palmeirim, JM 2010, 'Effects of artificial illumination on the nocturnal foraging of waders', *Acta Oecologica*, vol. 36, pp. 166-172.
- Schoenjahn, J 2018, *Adaptations of the rare endemic grey falcon Falco hypoleucos that enable its permanent residence in the arid zone of Australia*, PhD thesis, School of Biological Sciences, University of Queensland.
- Scott, R, Biastoch, A, Agamboue, PD, Bayer, T, Boussamba, FL, Formia, A, Godley, BJ, Mabert, BDK, Manfoumbi, JC, Schwarzkopf, FU, Sounguet, GP, Wagner, P & Witt, MJ 2017, 'Spatio-temporal variation in ocean current-driven hatchling dispersion: implications for the world's largest leatherback sea turtle nesting region', *Diversity and Distributions*, vol. 23, pp. 604-614.
- Shine, R 2010, 'The ecological impact of invasive cane toads (*Bufo marinus*) in Australia', *Quarterly Review of Biology*, vol. 85, pp. 253-291.
- Syposz, M, Padget, O, Willis, J, Van Doren, BM, Gillies, N, Fayet, AL, Wood, MJ, Alejo, A & Guilford, T 2021, 'Avoidance of different durations, colours and intensities of artificial light by adult seabirds', *Scientific Reports*, vol. 11, 18941.
- Thomson, B, Pavey, C & Reardon, T 2001, *Recovery plan for cave-dwelling bats, Rhinolophus philippinensis, Hipposideros semoni and Taphozous troughtoni 2001-2005*, Queensland Parks and Wildlife Service.
- Thums, M, Whiting, SD, Reisser, J, Pendoley, KL, Pattiaratchi, CB, Proietti, M, Hetzel, Y, Fisher, R & Meekan, MG 2016, 'Artificial light on water attracts turtle hatchlings during their near shore transit', *Royal Society open science*, vol. 3, 160142, <http://dx.doi.org/10.1098/rsos.160142>.
- TSSC 2008, *Commonwealth listing advice on Littoral Rainforest and Coastal Vine Thickets of Eastern Australia*, Threatened Species Scientific Committee, Department of the Environment, Water, Heritage and the Arts. <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/76-listing-advice.pdf>.
- TSSC 2013, *Commonwealth listing advice on Acacia solenota*, Threatened Species Scientific Committee, Department of Sustainability, Environment, Water, Population and Communities, Canberra, <http://www.environment.gov.au/biodiversity/threatened/species/pubs/66461-listing-advice.pdf>.
- TSSC 2016a, *Conservation advice Charadrius leschenaultii greater sand plover*, Threatened Species Scientific Committee, Department of the Environment, Canberra. <http://www.environment.gov.au/biodiversity/threatened/species/pubs/877-conservation-advice-05052016.pdf>.
- TSSC 2016b, *Approved conservation advice for Charadrius mongolus (lesser sand plover)*, Threatened Species Scientific Committee, Department of the Environment, Canberra. <http://www.environment.gov.au/biodiversity/threatened/species/pubs/879-conservation-advice-05052016.pdf>.
- TSSC 2019, *Bruguiera hainesii Haines's orange mangrove*, Threatened Species Scientific Committee, Department of the Environment and Energy, Canberra.

<http://www.environment.gov.au/biodiversity/threatened/species/pubs/88756-conservation-advice-22022019.pdf>.

Tucker, AD, Limpus, CJ, McCallum, HI & McDonald, KR 1997, 'Movements and home ranges of *Crocodylus johnstoni* in the Lynd River, Queensland', *Wildlife Research*, vol. 24, pp. 379-396.

Webb, GJW, Sack, GC, Buckworth, R & Manolis, SC 1983, 'An examination of *Crocodylus porosus* nests in two Northern Australian freshwater swamps, with an analysis of embryo mortality', *Australian Wildlife Research*, vol. 10, pp. 571-605.

Webster, P, Mathieson, MT, Smith, GC & Garnett, ST 2021, 'Buff-breasted button-quail *Turnix olivii*', in ST Garnett & GB Baker (eds), *The action plan for Australian birds 2020*, CSIRO Publishing, Melbourne, pp. 314-316.

Westcott, DA, Heerink, DK, McKeown, A & Caley, P 2015, *The status and trends of Australia's EPBC-listed flying-foxes*, CSIRO, Australia.

Wilson, PG 1993, '*Xanthostemon arenarius* (Myrtaceae), a new species from the Cooktown area', *Telopea*, vol. 5, pp. 305-307.

Wilson, S 2015, *A field guide to reptiles of Queensland*, Second edition, Reed New Holland, Sydney.

Woinarski, J 2007, 'Red goshawk *Erythrotriorchis radiatus*', in J Woinarski, C Pavey, R Kerrigan, I Cowie & S Ward (eds), *Lost from our landscape: threatened species of the Northern Territory*, Northern Territory Department of Natural Resources, Environment and The Arts, Palmerston, p. 183.

Woinarski, JCZ, Burbidge, AA & Harrison, PL 2014, *The action plan for Australian mammals 2012*, CSIRO Publishing, Collingwood.

Woinarski, JCZ, Milne, DJ & Wanganeen, G 2001, 'Changes in mammal populations in relatively intact landscapes of Kakadu National Park, Northern Territory', *Austral Ecology*, vol. 26, pp. 360-370.

Woinarski, JCZ, Murphy, BP, Palmer, R, Legge, SM, Dickman, CR, Doherty, TS, Edwards, G, Nankivell, A, Read, JL & Stokeld, D 2018, 'How many reptiles are killed by cats in Australia?', *Wildlife Research*, vol. 45, pp. 247-266.

Wood, GA 1988, 'Further field observations of the palm cockatoo *Probosciger aterrimus* in the Cape York Peninsula, Queensland', *Corella*, vol. 12, pp. 48-52.

Worthington Wilmer, J 2012, 'Ghost bat *Macroderma gigas* (Dobson, 1880)', in LK Curtis, AJ Dennis, KR McDonald, PM Kyne & SJS Debus (eds), *Queensland's threatened animals*, CSIRO Publishing, Collingwood, pp. 382-383.

10 LIMITATIONS AND DISCLAIMER

Epic Environmental Pty Ltd (Epic) has prepared the following report for the exclusive benefit of Cape Flattery Silica Pty Ltd (Client) and for the singular purpose of providing a description of the ecological values associated with the Study area proposed for the site of a silica sands mining operation located on EPM 25734, approximately 42 km north-east of Hope Vale and 56 km north-north-east of Cook town, North Queensland. All interpretations, findings or recommendations outlined in this report should be read and relied upon only in the context of the report as a whole.

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APPENDIX A DESKTOP REVIEW RESULTS – DATABASE SEARCHES AND ENVIRONMENTAL REPORTS



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 04/08/22 12:04:09

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

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Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	1
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	16
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	46
Listed Migratory Species:	54

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	111
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	19
Nationally Important Wetlands:	2
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

World Heritage Properties [\[Resource Information \]](#)

Name	State	Status
Great Barrier Reef	QLD	Declared property

National Heritage Properties [\[Resource Information \]](#)

Name	State	Status
Natural		
Great Barrier Reef	QLD	Listed place

Great Barrier Reef Marine Park [\[Resource Information \]](#)

Type	Zone	IUCN
Buffer	B-14-3006	IV
Conservation Park	CP-14-4114	IV
Conservation Park	CP-15-4020	IV
General Use	GU-11-6002	VI
Habitat Protection	HP-14-5109	VI
Habitat Protection	HP-15-5113	VI
Habitat Protection	HP-14-5112	VI
Habitat Protection	HP-14-5110	VI
Habitat Protection	HP-15-5115	VI
Habitat Protection	HP-13-5080	VI
Habitat Protection	HP-14-5111	VI
Habitat Protection	HP-15-5114	VI
Marine National Park	MNP-14-1025	II
Marine National Park	MNP-14-1032	II
Marine National Park	MNP-15-1033	II
Marine National Park	MNP-14-1029	II

Commonwealth Marine Area [\[Resource Information \]](#)

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name

EEZ and Territorial Sea

Listed Threatened Ecological Communities [\[Resource Information \]](#)

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area

Listed Threatened Species [\[Resource Information \]](#)

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur

Name	Status	Type of Presence within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat likely to occur within area
Neochmia phaeton evangelinae Crimson Finch (white-bellied), White-bellied Crimson Finch [64443]	Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Probosciger aterrimus macgillivrayi Palm Cockatoo (Australian) [67033]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Turnix olivii Buff-breasted Button-quail [59293]	Endangered	Species or species habitat may occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat may occur within area
Fish		
Stiphodon semoni Opal Cling Goby [83909]	Critically Endangered	Species or species habitat may occur within area
Frogs		
Litoria dayi Australian Lace-lid, Lace-eyed Tree Frog, Day's Big-eyed Treefrog [86707]	Vulnerable	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area
Hipposideros semoni Semon's Leaf-nosed Bat, Greater Wart-nosed Horseshoe-bat [180]	Vulnerable	Species or species habitat may occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Mesembriomys gouldii rattoides Black-footed Tree-rat (north Queensland), Shaggy Rabbit-rat [87620]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat may occur within area
Pteropus conspicillatus Spectacled Flying-fox [185]	Endangered	Species or species habitat may occur within area
Rhinolophus robertsi Large-eared Horseshoe Bat, Greater Large-eared Horseshoe Bat [87639]	Vulnerable	Species or species habitat likely to occur within area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat likely to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Acriopsis emarginata Pale Chandelier Orchid [83928]	Vulnerable	Species or species habitat likely to occur within area
Bruguiera x hainesii Haines's Orange Mangrove [91351]	Critically Endangered	Species or species habitat likely to occur within area
Cyclophyllum costatum a shrub [82770]	Vulnerable	Species or species habitat likely to occur within area
Dendrobium johannis Chocolate Tea Tree Orchid [13585]	Vulnerable	Species or species habitat known to occur within area
Eremochloa muricata [6469]	Endangered	Species or species habitat known to occur within area
Myrmecodia beccarii Ant Plant [11852]	Vulnerable	Species or species habitat likely to occur within area
Phaius pictus [22564]	Vulnerable	Species or species habitat may occur within area
Phlegmariurus dalhousieanus BlueTassel-fern [86550]	Endangered	Species or species habitat likely to occur within area
Vappodes phalaenopsis Cooktown Orchid [78894]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area

Name	Status	Type of Presence
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sharks		
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Breeding known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sterna sumatrana Black-naped Tern [800]		Breeding known to occur within area

Name	Threatened	Type of Presence
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Breeding may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding likely to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat likely to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Foraging, feeding or related behaviour known to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Monarcha frater Black-winged Monarch [607]		Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur

Name	Threatened	Type of Presence within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Breeding known to occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species

Name	Threatened	Type of Presence
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	habitat may occur within area Species or species habitat known to occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha frater Black-winged Monarch [607]		Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area
Puffinus pacificus Wedge-tailed Shearwater [1027]		Breeding known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Sterna anaethetus Bridled Tern [814]		Breeding known to occur within area
Sterna bengalensis Lesser Crested Tern [815]		Breeding known to occur within area
Sterna bergii Crested Tern [816]		Breeding known to occur within area
Sterna caspia Caspian Tern [59467]		Breeding known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sterna sumatrana Black-naped Tern [800]		Breeding known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Bulbonaricus davaoensis Davao Pughead Pipefish [66190]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys cinctus Barred Short-bodied Pipefish, Girdled Pipefish [66195]		Species or species habitat may occur within area
Choeroichthys sculptus Sculptured Pipefish [66197]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys ocellatus Orange-spotted Pipefish, Ocellated Pipefish [66203]		Species or species habitat may occur within area
Corythoichthys paxtoni Paxton's Pipefish [66204]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area
Cosmocampus maxweberi Maxweber's Pipefish [66209]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Festucalex gibbsi Gibbs' Pipefish [66215]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus macrorhynchus Whiskered Pipefish, Ornate Pipefish [66222]		Species or species habitat may occur within area
Halicampus mataafae Samoan Pipefish [66223]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish [66229]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippichthys spicifer Belly-barred Pipefish, Banded Freshwater Pipefish [66232]		Species or species habitat may occur within area
Hippocampus bargibanti Pygmy Seahorse [66721]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Hippocampus zebra Zebra Seahorse [66241]		Species or species habitat may occur within area
Micrognathus andersonii Anderson's Pipefish, Shortnose Pipefish [66253]		Species or species habitat may occur within area
Micrognathus brevirostris thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area
Micrognathus natans Offshore Pipefish [66256]		Species or species habitat may occur within area
Microphis brachyurus Short-tail Pipefish, Short-tailed River Pipefish [66257]		Species or species habitat may occur within area
Nannocampus pictus Painted Pipefish, Reef Pipefish [66263]		Species or species habitat may occur within area
Phoxocampus diacanthus Pale-blotched Pipefish, Spined Pipefish [66266]		Species or species habitat may occur within area
Siokunichthys breviceps Softcoral Pipefish, Soft-coral Pipefish [66270]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Enhydrina schistosa Beaked Seasnake [1126]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis mcdowellii null [25926]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Lapemis hardwickii Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
Laticauda colubrina a sea krait [1092]		Species or species habitat may occur within area
Laticauda laticaudata a sea krait [1093]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species

Name	Status	Type of Presence
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		habitat may occur within area Foraging, feeding or related behaviour known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Daarrba (Cape York Peninsula Aboriginal Land)	QLD
Three Islands Group	QLD

Invasive Species	[Resource Information]
Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.	

Name	Status	Type of Presence
Birds		
<i>Columba livia</i> Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
<i>Lonchura punctulata</i> Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
<i>Passer domesticus</i> House Sparrow [405]		Species or species habitat likely to occur within area
<i>Streptopelia chinensis</i> Spotted Turtle-Dove, Spotted Dove [780]		Species or species habitat likely to occur within area
<i>Sturnus vulgaris</i> Common Starling [389]		Species or species habitat likely to occur within area
Frogs		
<i>Rhinella marina</i> Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
<i>Bos taurus</i> Domestic Cattle [16]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area

Plants

Andropogon gayanus Gamba Grass [66895]		Species or species habitat likely to occur within area
Annona glabra Pond Apple, Pond-apple Tree, Alligator Apple, Bullock's Heart, Cherimoya, Monkey Apple, Bobwood, Corkwood [6311]		Species or species habitat likely to occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area

Reptiles

Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area
Lepidodactylus lugubris Mourning Gecko [1712]		Species or species habitat likely to occur within area
Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat may occur within area

Nationally Important Wetlands

[Resource Information]

Name	State
Cape Flattery Dune Lakes	QLD
Great Barrier Reef Marine Park	QLD

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-14.9687 145.3343

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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Queensland Government

Department of Environment and Science

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest
ml: 100284

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "central coordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Please direct queries about these reports to: Planning.Support@des.qld.gov.au

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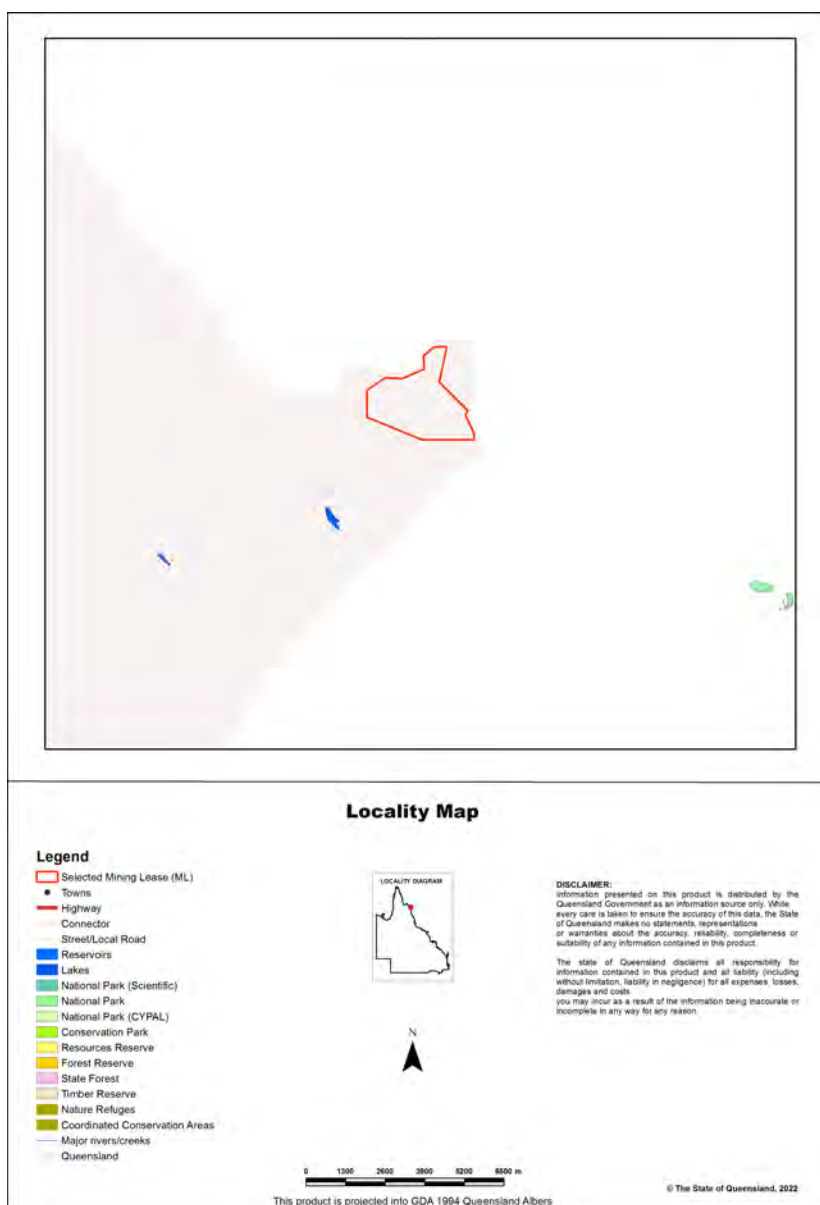
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Assessment Area Details

The following table provides an overview of the area of interest (AOI) with respect to selected topographic and environmental values.

Table 1: Summary table, details for AOI ml: 100284

Size (ha)	613.67
Local Government(s)	Hope Vale Aboriginal Shire
Bioregion(s)	Cape York Peninsula
Subregion(s)	Starke Coastal Lowlands
Catchment(s)	Jeannie



Matters of State Environmental Significance (MSES)

MSES Categories

Queensland's State Planning Policy (SPP) includes a biodiversity State interest that states:

'The sustainable, long-term conservation of biodiversity is supported. Significant impacts on matters of national or state environmental significance are avoided, or where this cannot be reasonably achieved; impacts are minimised and residual impacts offset.'

The MSES mapping product is a guide to assist planning and development assessment decision-making. Its primary purpose is to support implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts or regulations.

The SPP defines matters of state environmental significance as:

- Protected areas (including all classes of protected area except coordinated conservation areas) under the *Nature Conservation Act 1992* ;
- Marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the *Marine Parks Act 2004* ;
- Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008;
- Threatened wildlife under the *Nature Conservation Act 1992* and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006;
- Regulated vegetation under the *Vegetation Management Act 1999* that is:
 - Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;
 - Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;
 - Category R areas on the regulated vegetation management map;
 - Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;
 - Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;
- Strategic Environmental Areas under the *Regional Planning Interests Act 2014* ;
- Wetlands in a wetland protection area of wetlands of high ecological significance shown on the Map of Queensland Wetland Environmental Values under the Environment Protection Regulation 2019;
- Wetlands and watercourses in high ecological value waters defined in the Environmental Protection (Water) Policy 2009, schedule 2;
- Legally secured offset areas.

MSES Values Present

The MSES values that are present in the area of interest are summarised in the table below:

Table 2: Summary of MSES present within the AOI

1a Protected Areas- estates	0.0 ha	0.0 %
1b Protected Areas- nature refuges	0.0 ha	0.0 %
1c Protected Areas- special wildlife reserves	0.0 ha	0.0 %
2 State Marine Parks- highly protected zones	0.0 ha	0.0 %
3 Fish habitat areas (A and B areas)	0.0 ha	0.0 %
4 Strategic Environmental Areas (SEA)	0.0 ha	0.0 %
5 High Ecological Significance wetlands on the map of Referable Wetlands	1.09 ha	0.2%
6a High Ecological Value (HEV) wetlands	0.0 ha	0.0 %
6b High Ecological Value (HEV) waterways	0.0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	552.95 ha	90.1%
7b Special least concern animals	161.82 ha	26.4%
7c i Koala habitat area - core (SEQ)	0.0 ha	0.0 %
7c ii Koala habitat area - locally refined (SEQ)	0.0 ha	0.0 %
7d Sea turtle nesting areas	0.0 km	Not applicable
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	55.36 ha	9.0%
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	0.0 ha	0.0 %
8c Regulated Vegetation - Category R (GBR riverine regrowth)	0.0 ha	0.0 %
8d Regulated Vegetation - Essential habitat	457.02 ha	74.5%
8e Regulated Vegetation - intersecting a watercourse	11.3 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	8.1 ha	1.3%
9a Legally secured offset areas- offset register areas	0.0 ha	0.0 %
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0.0 ha	0.0 %

Additional Information with Respect to MSES Values Present

MSES - State Conservation Areas

1a. Protected Areas - estates

(no results)

1b. Protected Areas - nature refuges

(no results)

1c. Protected Areas - special wildlife reserves

(no results)

2. State Marine Parks - highly protected zones

(no results)

3. Fish habitat areas (A and B areas)

(no results)

Refer to **Map 1 - MSES - State Conservation Areas** for an overview of the relevant MSES.

MSES - Wetlands and Waterways

4. Strategic Environmental Areas (SEA)

(no results)

5. High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values

Natural wetlands that are 'High Ecological Significance' (HES) on the Map of Queensland Wetland Environmental Values are present.

6a. Wetlands in High Ecological Value (HEV) waters

(no results)

6b. Waterways in High Ecological Value (HEV) waters

(no results)

Refer to **Map 2 - MSES - Wetlands and Waterways** for an overview of the relevant MSES.

MSES - Species

7a. Threatened (endangered or vulnerable) wildlife

Values are present

7b. Special least concern animals

Values are present

7c i. Koala habitat area - core (SEQ)

Not applicable

7c ii. Koala habitat area - locally refined (SEQ)

Not applicable

7d. Wildlife habitat (sea turtle nesting areas)

Not applicable

Threatened (endangered or vulnerable) wildlife habitat suitability models

Species	Common name	NCA status	Presence
<i>Boronia keysii</i>		V	None
<i>Calyptorhynchus lathami</i>	Glossy black cockatoo	V	None
<i>Casuarium casuarium johnsonii</i>	Sthn population cassowary	E	None
<i>Crinia tinnula</i>	Wallum froglet	V	None
<i>Denisonia maculata</i>	Ornamental snake	V	None
<i>Litoria freycineti</i>	Wallum rocketfrog	V	None
<i>Litoria olongburensis</i>	Wallum sedgefrog	V	None
<i>Macadamia integrifolia</i>		V	None
<i>Macadamia ternifolia</i>		V	None
<i>Macadamia tetraphylla</i>		V	None
<i>Melaleuca irbyana</i>		E	None
<i>Petaurus gracilis</i>	Mahogany Glider	E	None
<i>Petrogale persephone</i>	Proserpine rock-wallaby	E	None
<i>Pezoporus wallicus wallicus</i>	Eastern ground parrot	V	None
<i>Phascolarctos cinereus</i>	Koala - outside SEQ*	V	None
<i>Taudactylus pleione</i>	Kroombit tinkerfrog	E	None
<i>Xeromys myoides</i>	Water Mouse	V	None

*For koala model, this includes areas outside SEQ. Check 7c SEQ koala habitat for presence/absence.

Threatened (endangered or vulnerable) wildlife species records

Scientific name	Common name	NCA status	EPBC status	Migratory status
<i>Ctenopus rawlinsoni</i>	Cape heath ctenopus	V		
<i>Acacia solenota</i>		V		
<i>Crocodylus porosus</i>	estuarine crocodile	V		Y

Special least concern animal species records

Scientific name	Common name	Migratory status
<i>Numenius phaeopus</i>	whimbrel	None

Shorebird habitat (critically endangered/endangered/vulnerable)

Not applicable

Shorebird habitat (special least concern)

Not applicable

**Nature Conservation Act 1992 (NCA) Status- Endangered (E), Vulnerable (V) or Special Least Concern Animal (SL). Environment Protection and Biodiversity Conservation Act 1999 (EPBC) status: Critically Endangered (CE) Endangered (E), Vulnerable (V)*

Migratory status (M) - China and Australia Migratory Bird Agreement (C), Japan and Australia Migratory Bird Agreement (J), Republic of Korea and Australia Migratory Bird Agreement (R), Bonn Migratory Convention (B), Eastern Flyway (E)

To request a species list for an area, or search for a species profile, access Wildlife Online at:

<https://www.qld.gov.au/environment/plants-animals/species-list/>

Refer to **Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals**, **Map 3b - MSES - Species - Koala habitat area (SEQ)** and **Map 3c - MSES - Wildlife habitat (sea turtle nesting areas)** for an overview of the relevant MSES.

MSES - Regulated Vegetation

For further information relating to regional ecosystems in general, go to:

<https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/>

For a more detailed description of a particular regional ecosystem, access the regional ecosystem search page at:

<https://environment.ehp.qld.gov.au/regional-ecosystems/>

8a. Regulated Vegetation - Endangered/Of concern in Category B (remnant)

Regional ecosystem	Vegetation management polygon	Vegetation management status
3.11.21/3.11.19b/3.11.19a	O-dom	rem_oc
3.2.21a/3.2.26/3.2.22	O-subdom	rem_oc

8b. Regulated Vegetation - Endangered/Of concern in Category C (regrowth)

Not applicable

8c. Regulated Vegetation - Category R (GBR riverine regrowth)

Not applicable

8d. Regulated Vegetation - Essential habitat

Values are present

8e. Regulated Vegetation - intersecting a watercourse**

A vegetation management watercourse is mapped as present

8f. Regulated Vegetation - within 100m of a Vegetation Management wetland

Regulated vegetation map category	Map number
B	7968

Refer to **Map 4 - MSES - Regulated Vegetation** for an overview of the relevant MSES.

MSES - Offsets

9a. Legally secured offset areas - offset register areas

(no results)

9b. Legally secured offset areas - vegetation offsets through a Property Map of Assessable Vegetation

(no results)

Refer to **Map 5 - MSES - Offset Areas** for an overview of the relevant MSES.

Map 1 - MSES - State Conservation Areas



MSES - State Conservation Areas

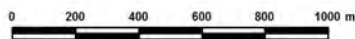
Area of Interest

-  Selected Mining Lease (ML)
-  Towns
-  Freeways/Highways
-  Secondary roads
-  Major rivers/creeks
-  Protected area (estates, nature refuges, special wildlife reserves)
-  Declared fish habitat area (A and B areas)
-  Marine park (highly protected)



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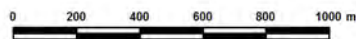
Map 2 - MSES - Wetlands and Waterways



MSES - Wetlands and Waterways

Area of Interest

- Selected Mining Lease (ML)
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Declared high ecological value waters (watercourse)
- Strategic environmental area (designated precinct)
- Declared high ecological value waters (wetland)
- High ecological significance wetlands



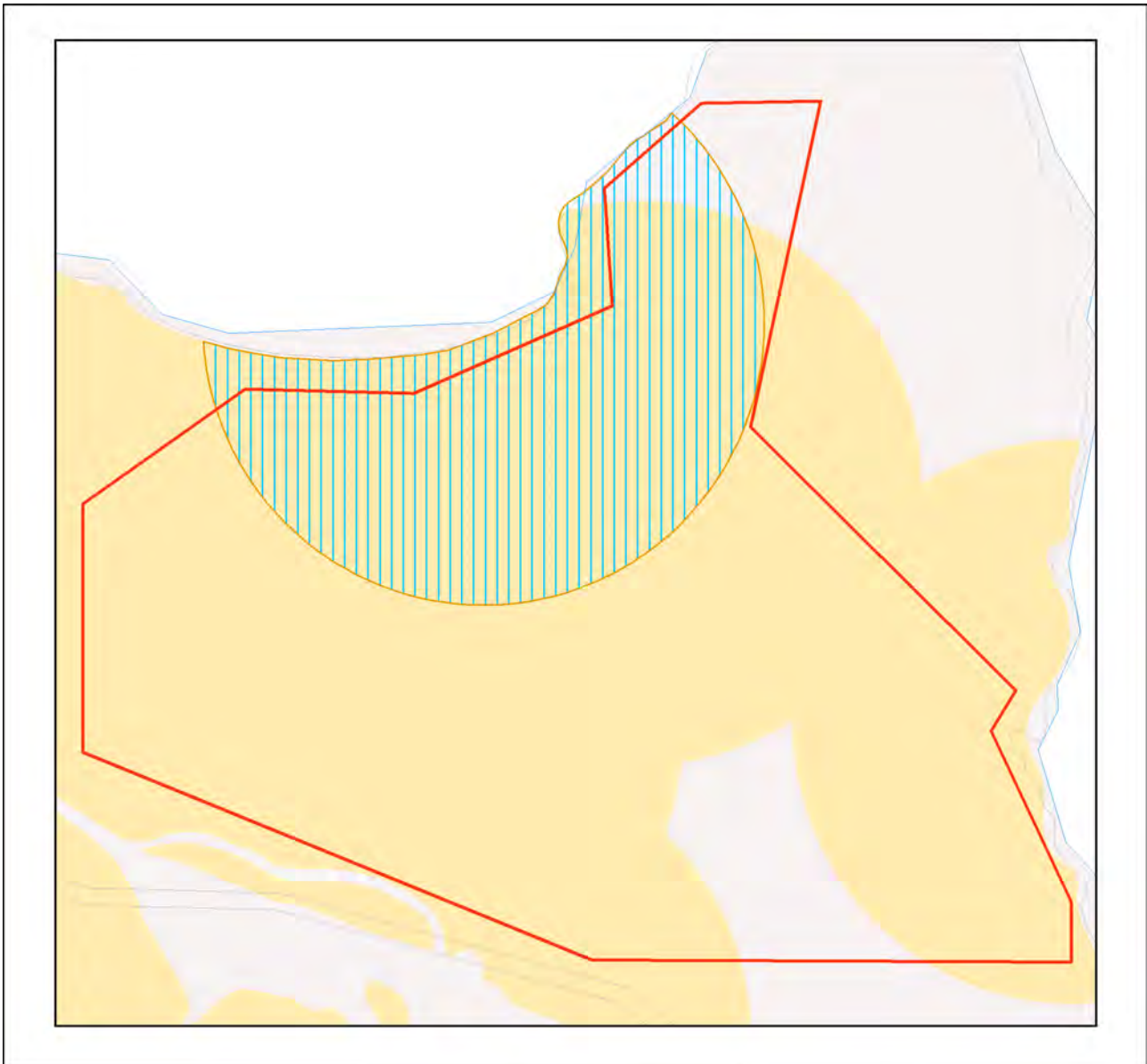
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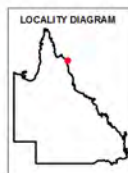
Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals



MSES - Species Threatened (endangered or vulnerable) wildlife and special least concern animals

Area of Interest

- Selected Mining Lease (ML)
- ▲ Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (special least concern)
- Wildlife habitat (endangered or vulnerable)



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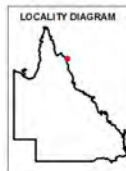
Map 3b - MSES - Species - Koala habitat area (SEQ)



MSES - Species Koala habitat area (SEQ)

Area of Interest

- Selected Mining Lease (ML)
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Koala habitat area (core)
- Koala habitat area (locally refined)



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The represented layers for SEQ 'koala habitat area-core' and 'koala habitat area- locally refined' in MSES are sourced directly from the regulatory mapping under the Nature Conservation (Koala) Conservation Plan 2017. Whilst every effort is made to ensure the information remains current, there may be delays between updating versions. Please refer to the original mapping for the most recent version. See <https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping>

The koala habitat mapping within South East Queensland uses regional ecosystem linework compiled at a scale varying from 1:25,000 to 1:100,000. Linework should be used as a guide only. The positional accuracy of regional ecosystem data mapped at a scale of 1:100,000 is +/- 100 metres.



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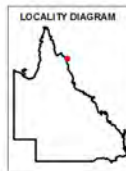
Map 3c - MSES - Wildlife habitat (sea turtle nesting areas)



MSES - Wildlife habitat (sea turtle nesting areas)

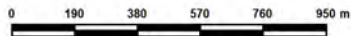
Area of Interest

- Selected Mining Lease (ML)
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (sea turtle nesting areas)

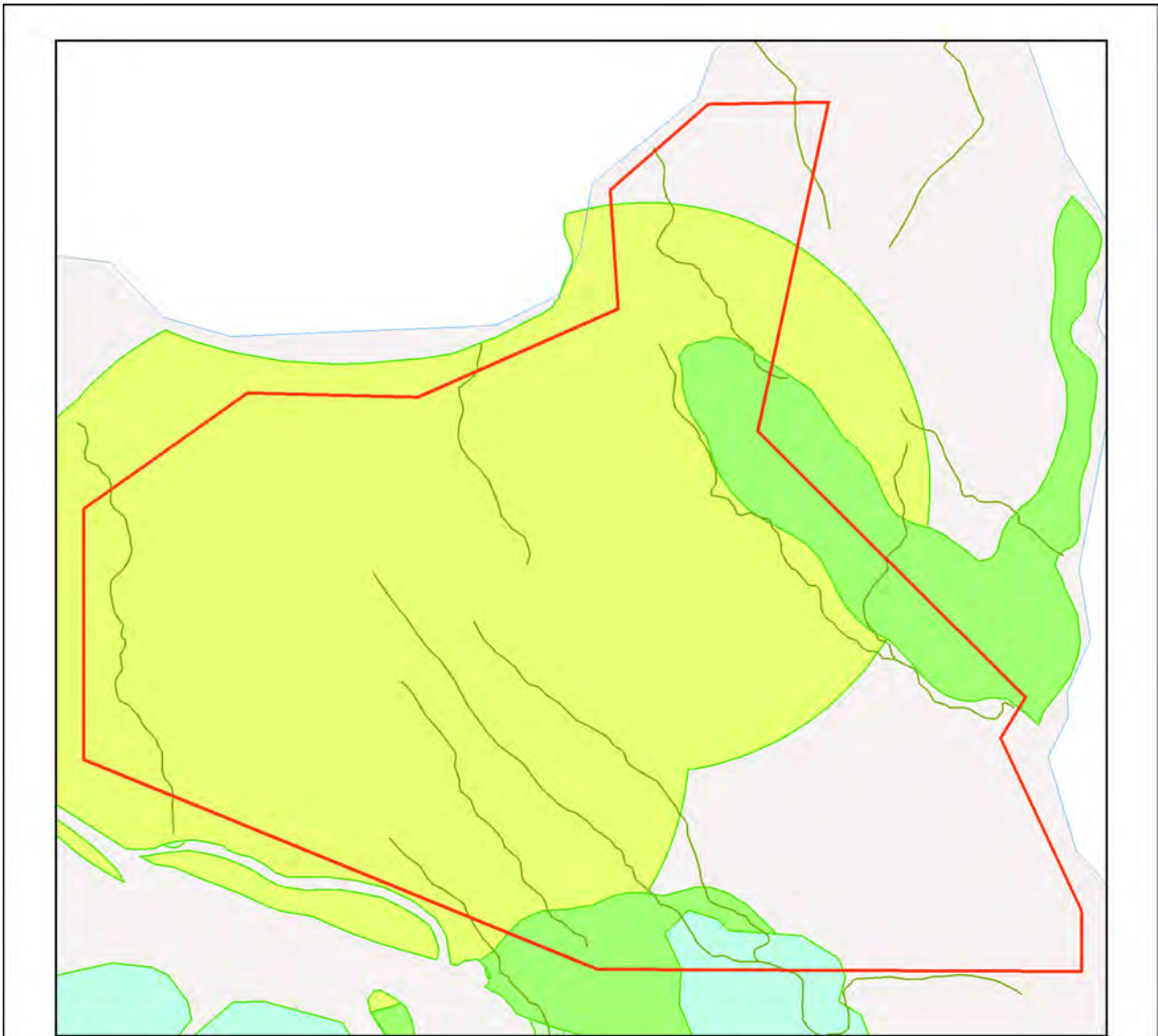


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MSES mapping of sea turtle nesting areas identifies beaches where the recorded number of turtle nests are over 1% of the turtle species or genetic stock. The linework is also deliberately extended along nearby rocky coastlines and headlands to recognise that significant numbers of nesting adults and hatchlings can become disoriented by light pollution from development on rocky coastlines and headlands while navigating offshore from nesting beaches.



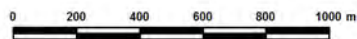
Map 4 - MSES - Regulated Vegetation



MSES - Regulated Vegetation

Area of Interest

- Selected Mining Lease (ML)
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Regulated vegetation (intersecting a watercourse)
- Regulated vegetation (100m from wetland)
- Regulated vegetation (category B - endangered or of concern)
- Regulated vegetation (category C - endangered or of concern)
- Regulated vegetation (category R - GBR riverine)
- Regulated vegetation (essential habitat)



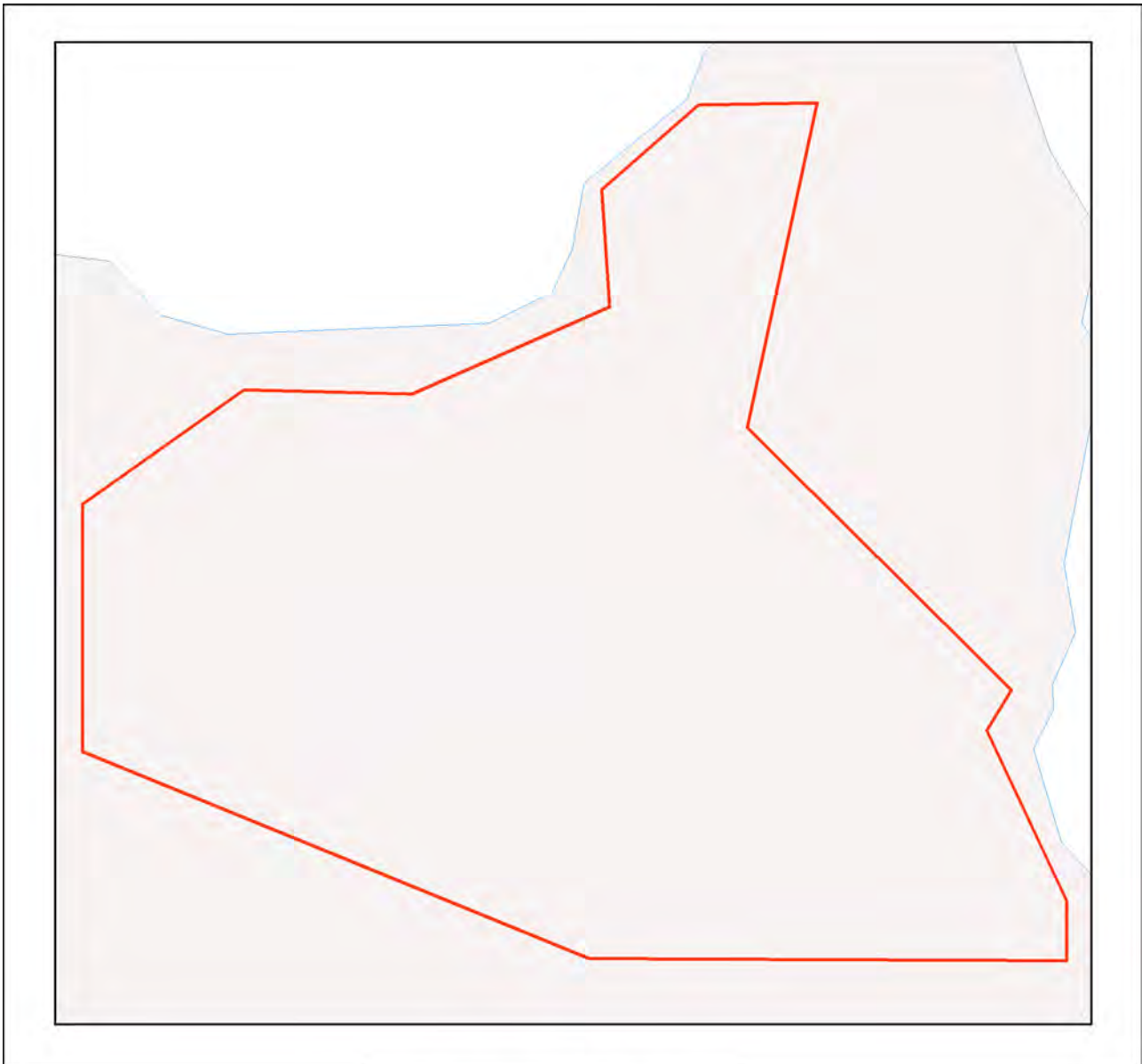
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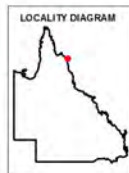
Map 5 - MSES - Offset Areas



MSES - Offsets

Area of Interest

- Selected Mining Lease (ML)
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Legally secured offset area (offset register)
- Legally secured offset area (vegetation offsets)



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Appendices

Appendix 1 - Matters of State Environmental Significance (MSES) methodology

MSES mapping is a regional-scale representation of the definition for MSES under the State Planning Policy (SPP). The compiled MSES mapping product is a guide to assist planning and development assessment decision-making. Its primary purpose is to support implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts or regulations.

The Queensland Government's "Method for mapping - matters of state environmental significance for use in land use planning and development assessment" can be downloaded from:

<http://www.ehp.qld.gov.au/land/natural-resource/method-mapping-mses.html> .

Appendix 2 - Source Data

The datasets listed below are available on request from:

<http://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

- Matters of State environmental significance

Note: MSES mapping is not based on new or unique data. The primary mapping product draws data from a number of underlying environment databases and geo-referenced information sources. MSES mapping is a versioned product that is updated generally on a twice-yearly basis to incorporate the changes to underlying data sources. Several components of MSES mapping made for the current version may differ from the current underlying data sources. To ensure accuracy, or proper representation of MSES values, it is strongly recommended that users refer to the underlying data sources and review the current definition of MSES in the State Planning Policy, before applying the MSES mapping.

Individual MSES layers can be attributed to the following source data available at QSpatial:

MSES layers	current QSpatial data (http://qspatial.information.qld.gov.au)
Protected Areas-Estates, Nature Refuges, Special Wildlife Reserves	- Protected areas of Queensland - Nature Refuges - Queensland - Special Wildlife Reserves- Queensland
Marine Park-Highly Protected Zones	Moreton Bay marine park zoning 2008
Fish Habitat Areas	Queensland fish habitat areas
Strategic Environmental Areas-designated	Regional Planning Interests Act - Strategic Environmental Areas
HES wetlands	Map of Queensland Wetland Environmental Values
Wetlands in HEV waters	HEV waters: - EPP Water intent for waters Source Wetlands: - Queensland Wetland Mapping (Current version 5) Source Watercourses: - Vegetation management watercourse and drainage feature map (1:100000 and 1:250000)
Wildlife habitat (threatened and special least concern)	- WildNet database species records - habitat suitability models (various) - SEQ koala habitat areas under the Koala Conservation Plan 2019 - Sea Turtle Nesting Areas records
VMA regulated regional ecosystems	Vegetation management regional ecosystem and remnant map
VMA Essential Habitat	Vegetation management - essential habitat map
VMA Wetlands	Vegetation management wetlands map
Legally secured offsets	Vegetation Management Act property maps of assessable vegetation. For offset register data-contact DES
Regulated Vegetation Map	Vegetation management - regulated vegetation management map



Queensland Government

WildNet species list

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Queensland status: All
Records: All
Date: All
Latitude: -14.9618
Longitude: 145.3334
Distance: 25
Email: mmahon@epicenvironmental.com.au
Date submitted: Friday 23 Sep 2022 09:01:49
Date extracted: Friday 23 Sep 2022 09:10:02

The number of records retrieved = 906

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Information about your Species lists request is logged for quality assurance, user support and product enhancement purposes only.

The information provided should be appropriately acknowledged as being derived from WildNet database when it is used. As the WildNet Program is still in a process of collating and vetting data, it is possible the information given is not complete. Go to the WildNet database webpage (<https://www.qld.gov.au/environment/plants-animals/species-information/wildnet>) to find out more about WildNet and where to access other WildNet information products approved for publication. Feedback about WildNet species lists should be emailed to wildlife.online@des.qld.gov.au.

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufo	<i>Rhinella marina</i>	cane toad	Y			22
animals	amphibians	Hylidae	<i>Cyclorana novaehollandiae</i>	eastern snapping frog		C		3/2
animals	amphibians	Hylidae	<i>Litoria bicolor</i>	northern sedgefrog		C		14
animals	amphibians	Hylidae	<i>Litoria caerulea</i>	common green treefrog		C		2
animals	amphibians	Hylidae	<i>Litoria infrafrenata</i>	white lipped treefrog		C		5
animals	amphibians	Hylidae	<i>Litoria nasuta</i>	striped rocketfrog		C		9
animals	amphibians	Hylidae	<i>Litoria nigrofrenata</i>	tawny rocketfrog		C		17
animals	amphibians	Hylidae	<i>Litoria pallida</i>	pallid rocketfrog		C		2
animals	amphibians	Hylidae	<i>Litoria rothii</i>	northern laughing treefrog		C		9
animals	amphibians	Hylidae	<i>Litoria rubella</i>	ruddy treefrog		C		4
animals	amphibians	Limnodynastidae	<i>Limnodynastes convexiusculus</i>	marbled frog		C		4
animals	amphibians	Limnodynastidae	<i>Limnodynastes terraereginae</i>	scarlet sided pobblebonk		C		37
animals	amphibians	Limnodynastidae	<i>Platyplectrum ornatum</i>	ornate burrowing frog		C		9
animals	amphibians	Myobatrachidae	<i>Crinia remota</i>	northern froglet		C		21
animals	amphibians	Myobatrachidae	<i>Uperoleia lithomoda</i>	stonemason gungan		C		14
animals	amphibians	Myobatrachidae	<i>Uperoleia mimula</i>	mimicking gungan		C		1
animals	amphibians	Myobatrachidae	<i>Uperoleia sp.</i>			C		6
animals	amphibians	Ranidae	<i>Papurana daemeli</i>	Australian woodfrog		C		3
animals	birds	Acanthizidae	<i>Gerygone magnirostris</i>	large-billed gerygone		C		1
animals	birds	Acanthizidae	<i>Gerygone palpebrosa</i>	fairy gerygone		C		5
animals	birds	Acanthizidae	<i>Sericornis beccarii</i>	tropical scrubwren		C		2
animals	birds	Accipitridae	<i>Accipiter novaehollandiae</i>	grey goshawk		C		1
animals	birds	Accipitridae	<i>Circus approximans</i>	swamp harrier		C		3
animals	birds	Accipitridae	<i>Circus assimilis</i>	spotted harrier		C		1
animals	birds	Accipitridae	<i>Elanus axillaris</i>	black-shouldered kite		C		1
animals	birds	Accipitridae	<i>Haliaeetus leucogaster</i>	white-bellied sea-eagle		C		42
animals	birds	Accipitridae	<i>Haliastur indus</i>	brahminy kite		C		4
animals	birds	Accipitridae	<i>Haliastur sphenurus</i>	whistling kite		C		1
animals	birds	Accipitridae	<i>Pandion cristatus</i>	eastern osprey		SL		68
animals	birds	Alcedinidae	<i>Ceyx azureus</i>	azure kingfisher		C		1
animals	birds	Anhingidae	<i>Anhinga novaehollandiae</i>	Australasian darter		C		1
animals	birds	Apodidae	<i>Apus pacificus</i>	fork-tailed swift		SL		1
animals	birds	Apodidae	<i>Hirundapus caudacutus</i>	white-throated needletail		V	V	2
animals	birds	Ardeidae	<i>Ardea alba modesta</i>	eastern great egret		C		3
animals	birds	Ardeidae	<i>Ardea intermedia</i>	intermediate egret		C		1
animals	birds	Ardeidae	<i>Ardea pacifica</i>	white-necked heron		C		2
animals	birds	Ardeidae	<i>Butorides striata</i>	striated heron		C		5
animals	birds	Ardeidae	<i>Egretta garzetta</i>	little egret		C		1
animals	birds	Ardeidae	<i>Egretta novaehollandiae</i>	white-faced heron		C		1
animals	birds	Ardeidae	<i>Egretta sacra</i>	eastern reef egret		C		59
animals	birds	Artamidae	<i>Artamus leucorhynchus</i>	white-breasted woodswallow		C		81
animals	birds	Artamidae	<i>Artamus personatus</i>	masked woodswallow		C		1
animals	birds	Artamidae	<i>Melloria quoyi</i>	black butcherbird		C		6
animals	birds	Artamidae	<i>Strepera graculina</i>	pieb currawong		C		1
animals	birds	Burhinidae	<i>Burhinus grallarius</i>	bush stone-curlew		C		3
animals	birds	Burhinidae	<i>Esacus magnirostris</i>	beach stone-curlew		V		40

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animals	birds	Cacatuidae	<i>Cacatua galerita</i>	sulphur-crested cockatoo		C		5
animals	birds	Campephagidae	<i>Coracina novaehollandiae</i>	black-faced cuckoo-shrike		C		9
animals	birds	Campephagidae	<i>Coracina papuensis</i>	white-bellied cuckoo-shrike		C		4
animals	birds	Campephagidae	<i>Edolisoma tenuirostre</i>	common cicadabird		C		1
animals	birds	Campephagidae	<i>Lalage leucomela</i>	varied triller		C		14
animals	birds	Caprimulgidae	<i>Caprimulgus macrurus</i>	large-tailed nightjar		C		9
animals	birds	Charadriidae	<i>Charadrius bicinctus</i>	double-banded plover		SL		1
animals	birds	Charadriidae	<i>Charadrius leschenaultii</i>	greater sand plover		V	V	6
animals	birds	Charadriidae	<i>Charadrius mongolus</i>	lesser sand plover		E		12
animals	birds	Charadriidae	<i>Charadrius ruficapillus</i>	red-capped plover		C		8
animals	birds	Charadriidae	<i>Charadrius veredus</i>	oriental plover		SL		1
animals	birds	Charadriidae	<i>Elseyornis melanops</i>	black-fronted dotterel		C		3
animals	birds	Charadriidae	<i>Pluvialis fulva</i>	Pacific golden plover		SL		15
animals	birds	Charadriidae	<i>Pluvialis squatarola</i>	grey plover		SL		3
animals	birds	Charadriidae	<i>Vanellus miles</i>	masked lapwing		C		1
animals	birds	Charadriidae	<i>Vanellus miles miles</i>	masked lapwing (northern subspecies)		C		1
animals	birds	Cisticolidae	<i>Cisticola exilis</i>	golden-headed cisticola		C		2
animals	birds	Columbidae	<i>Chalcophaps longirostris</i>	Pacific emerald dove		C		2
animals	birds	Columbidae	<i>Ducula bicolor</i>	pie imperial-pigeon		C		47
animals	birds	Columbidae	<i>Geopelia cuneata</i>	diamond dove		C		2
animals	birds	Columbidae	<i>Geopelia humeralis</i>	bar-shouldered dove		C		64
animals	birds	Columbidae	<i>Geopelia placida</i>	peaceful dove		C		1
animals	birds	Columbidae	<i>Macropygia amboinensis</i>	brown cuckoo-dove		C		2
animals	birds	Columbidae	<i>Ptilinopus magnificus</i>	wompoo fruit-dove		C		5
animals	birds	Columbidae	<i>Ptilinopus regina</i>	rose-crowned fruit-dove		C		21
animals	birds	Columbidae	<i>Ptilinopus superbus</i>	superb fruit-dove		C		6
animals	birds	Coraciidae	<i>Eurystomus orientalis</i>	dollarbird		C		3
animals	birds	Cuculidae	<i>Cacomantis castaneiventris</i>	chestnut-breasted cuckoo		C		1
animals	birds	Cuculidae	<i>Cacomantis flabelliformis</i>	fan-tailed cuckoo		C		1
animals	birds	Cuculidae	<i>Cacomantis variolosus</i>	brush cuckoo		C		3
animals	birds	Cuculidae	<i>Centropus phasianinus</i>	pheasant coucal		C		10
animals	birds	Cuculidae	<i>Chalcites basalus</i>	Horsfield's bronze-cuckoo		C		1
animals	birds	Cuculidae	<i>Chalcites minutillus</i>	little bronze-cuckoo		C		1
animals	birds	Cuculidae	<i>Chalcites minutillus russatus</i>	Gould's bronze-cuckoo		C		1
animals	birds	Cuculidae	<i>Cuculus optatus</i>	oriental cuckoo		SL		1
animals	birds	Cuculidae	<i>Scythrops novaehollandiae</i>	channel-billed cuckoo		C		2
animals	birds	Dicruridae	<i>Dicrurus bracteatus</i>	spangled drongo		C		11
animals	birds	Estrildidae	<i>Lonchura castaneothorax</i>	chestnut-breasted mannikin		C		2
animals	birds	Estrildidae	<i>Neochmia temporalis</i>	red-browed finch		C		3
animals	birds	Eurostopodidae	<i>Eurostopodus argus</i>	spotted nightjar		C		1
animals	birds	Falconidae	<i>Falco cenchroides</i>	nankeen kestrel		C		2
animals	birds	Fregatidae	<i>Fregata ariel</i>	lesser frigatebird		SL		5
animals	birds	Fregatidae	<i>Fregata minor</i>	great frigatebird		SL		3
animals	birds	Gruidae	<i>Antigone rubicunda</i>	broilga		C		1
animals	birds	Haematopodidae	<i>Haematopus fuliginosus</i>	sooty oystercatcher		C		41
animals	birds	Haematopodidae	<i>Haematopus longirostris</i>	Australian pied oystercatcher		C		39

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animals	birds	Halcyonidae	<i>Dacelo leachii</i>	blue-winged kookaburra		C		2
animals	birds	Halcyonidae	<i>Dacelo novaeguineae</i>	laughing kookaburra		C		1
animals	birds	Halcyonidae	<i>Todiramphus macleayii</i>	forest kingfisher		C		10
animals	birds	Halcyonidae	<i>Todiramphus sanctus</i>	sacred kingfisher		C		22
animals	birds	Halcyonidae	<i>Todiramphus sordidus</i>	Torresian kingfisher		C		16
animals	birds	Halcyonidae	<i>Todiramphus sp.</i>			C		1
animals	birds	Hirundinidae	<i>Hirundo neoxena</i>	welcome swallow		C		5
animals	birds	Laridae	<i>Anous minutus</i>	black noddy		C		26
animals	birds	Laridae	<i>Anous stolidus</i>	brown noddy		SL		13
animals	birds	Laridae	<i>Chroicocephalus novaehollandiae</i>	silver gull		C		130
animals	birds	Laridae	<i>Gelocheidon nilotica</i>	gull-billed tern		SL		3
animals	birds	Laridae	<i>Hydroprogne caspia</i>	Caspian tern		SL		19
animals	birds	Laridae	<i>Onychoprion anaethetus</i>	bridled tern		SL		79/5
animals	birds	Laridae	<i>Onychoprion fuscatus</i>	sooty tern		C		17
animals	birds	Laridae	<i>Sterna dougallii</i>	roseate tern		SL		29/1
animals	birds	Laridae	<i>Sterna hirundo</i>	common tern		SL		1
animals	birds	Laridae	<i>Sterna sumatrana</i>	black-naped tern		SL		86
animals	birds	Laridae	<i>Sternula albifrons</i>	little tern		SL		14
animals	birds	Laridae	<i>Thalasseus bengalensis</i>	lesser crested tern		C		31/3
animals	birds	Laridae	<i>Thalasseus bergii</i>	crested tern		SL		94
animals	birds	Maluridae	<i>Malurus amabilis</i>	lovely fairy-wren		C		3
animals	birds	Maluridae	<i>Malurus melanocephalus</i>	red-backed fairy-wren		C		1
animals	birds	Megapodiidae	<i>Alectura lathami</i>	Australian brush-turkey		C		1
animals	birds	Megapodiidae	<i>Megapodius reinwardt</i>	orange-footed scrubfowl		C		8
animals	birds	Meliphagidae	<i>Conopophila rufogularis</i>	rufous-throated honeyeater		C		1
animals	birds	Meliphagidae	<i>Gavicalis versicolor</i>	varied honeyeater		C		64
animals	birds	Meliphagidae	<i>Lichmera indistincta</i>	brown honeyeater		C		2
animals	birds	Meliphagidae	<i>Meliphaga lewinii</i>	Lewin's honeyeater		C		1
animals	birds	Meliphagidae	<i>Meliphaga notata</i>	yellow-spotted honeyeater		C		22
animals	birds	Meliphagidae	<i>Melithreptus albogularis</i>	white-throated honeyeater		C		1
animals	birds	Meliphagidae	<i>Microptilotis gracilis</i>	graceful honeyeater		C		4
animals	birds	Meliphagidae	<i>Myzomela obscura</i>	dusky honeyeater		C		15
animals	birds	Meliphagidae	<i>Philemon argenticeps</i>	silver-crowned friarbird		C		3
animals	birds	Meliphagidae	<i>Philemon buceroides</i>	helmeted friarbird		C		3
animals	birds	Meliphagidae	<i>Philemon corniculatus</i>	noisy friarbird		C		1
animals	birds	Meliphagidae	<i>Ramsayornis modestus</i>	brown-backed honeyeater		C		6
animals	birds	Meliphagidae	<i>Stomiopera flava</i>	yellow honeyeater		C		5
animals	birds	Meliphagidae	<i>Trichodere cockerelli</i>	white-streaked honeyeater		C		14
animals	birds	Meliphagidae	<i>Xanthotis macleayanus</i>	Macleay's honeyeater		C		7
animals	birds	Meropidae	<i>Merops ornatus</i>	rainbow bee-eater		C		20
animals	birds	Monarchidae	<i>Carterornis leucotis</i>	white-eared monarch		C		1
animals	birds	Monarchidae	<i>Grallina cyanoleuca</i>	magpie-lark		C		5
animals	birds	Monarchidae	<i>Monarcha frater</i>	black-winged monarch		SL		1
animals	birds	Monarchidae	<i>Monarcha melanopsis</i>	black-faced monarch		SL		1
animals	birds	Monarchidae	<i>Myiagra alecto</i>	shining flycatcher		C		2
animals	birds	Monarchidae	<i>Myiagra cyanoleuca</i>	satin flycatcher		SL		2

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animals	birds	Monarchidae	<i>Myiagra rubecula</i>	leaden flycatcher		C		9
animals	birds	Monarchidae	<i>Myiagra ruficollis</i>	broad-billed flycatcher		C		1
animals	birds	Monarchidae	<i>Symposiachrus trivirgatus</i>	spectacled monarch		SL		23
animals	birds	Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian pipit		C		1
animals	birds	Nectariniidae	<i>Cinnyris jugularis</i>	olive-backed sunbird		C		28
animals	birds	Nectariniidae	<i>Dicaeum hirundinaceum</i>	mistletoebird		C		15
animals	birds	Neosittidae	<i>Daphoenositta chrysoptera</i>	varied sittella		C		1
animals	birds	Oceanitidae	<i>Oceanites oceanicus</i>	Wilson's storm-petrel		SL		1
animals	birds	Oriolidae	<i>Oriolus flavocinctus</i>	green oriole		C		11
animals	birds	Oriolidae	<i>Oriolus sagittatus</i>	olive-backed oriole		C		2
animals	birds	Oriolidae	<i>Sphecotheres vieilloti</i>	Australasian figbird		C		6
animals	birds	Otididae	<i>Ardeotis australis</i>	Australian bustard		C		4
animals	birds	Pachycephalidae	<i>Colluricincla megarhyncha</i>	little shrike-thrush		C		11
animals	birds	Pachycephalidae	<i>Pachycephala melanura</i>	mangrove golden whistler		C		1
animals	birds	Pachycephalidae	<i>Pachycephala rufiventris</i>	rufous whistler		C		1
animals	birds	Pachycephalidae	<i>Pachycephala simplex peninsulae</i>	grey whistler		C		2
animals	birds	Pelecanidae	<i>Pelecanus conspicillatus</i>	Australian pelican		C		68
animals	birds	Petroicidae	<i>Microeca flavigaster</i>	lemon-bellied flycatcher		C		1
animals	birds	Petroicidae	<i>Poecilodryas superciliosa</i>	white-browed robin		C		2
animals	birds	Phalacrocoracidae	<i>Microcarbo melanoleucos</i>	little pied cormorant		C		5
animals	birds	Phalacrocoracidae	<i>Phalacrocorax carbo</i>	great cormorant		C		2
animals	birds	Phalacrocoracidae	<i>Phalacrocorax sulcirostris</i>	little black cormorant		C		8
animals	birds	Phalacrocoracidae	<i>Phalacrocorax varius</i>	pied cormorant		C		8
animals	birds	Phasianidae	<i>Synoicus ypsilophorus</i>	brown quail		C		5
animals	birds	Pittidae	<i>Pitta versicolor</i>	noisy pitta		C		3
animals	birds	Podargidae	<i>Podargus papuensis</i>	Papuan frogmouth		C		3/1
animals	birds	Podargidae	<i>Podargus strigoides</i>	tawny frogmouth		C		1
animals	birds	Procellariidae	<i>Ardenna pacifica</i>	wedge-tailed shearwater		V		19
animals	birds	Psittacidae	<i>Aprosmictus erythropterus</i>	red-winged parrot		C		1
animals	birds	Psittacidae	<i>Trichoglossus chlorolepidotus</i>	scaly-breasted lorikeet		C		1
animals	birds	Psittacidae	<i>Trichoglossus moluccanus</i>	rainbow lorikeet		C		16
animals	birds	Rallidae	<i>Gallirallus philippensis</i>	buff-banded rail		C		13
animals	birds	Rallidae	<i>Rallina tricolor</i>	red-necked crake		C		1
animals	birds	Rhipiduridae	<i>Rhipidura rufifrons</i>	rufous fantail		SL		12
animals	birds	Rhipiduridae	<i>Rhipidura rufiventris</i>	northern fantail		C		6
animals	birds	Scolopacidae	<i>Actitis hypoleucos</i>	common sandpiper		SL		2
animals	birds	Scolopacidae	<i>Arenaria interpres</i>	ruddy turnstone		SL		56
animals	birds	Scolopacidae	<i>Calidris acuminata</i>	sharp-tailed sandpiper		SL		3
animals	birds	Scolopacidae	<i>Calidris alba</i>	sanderling		SL		1
animals	birds	Scolopacidae	<i>Calidris canutus</i>	red knot		E	E	2
animals	birds	Scolopacidae	<i>Calidris falcinellus</i>	broad-billed sandpiper		SL		1
animals	birds	Scolopacidae	<i>Calidris ferruginea</i>	curlew sandpiper		CR	CE	2
animals	birds	Scolopacidae	<i>Calidris ruficollis</i>	red-necked stint		SL		1
animals	birds	Scolopacidae	<i>Calidris tenuirostris</i>	great knot		CR	CE	4
animals	birds	Scolopacidae	<i>Heteroscelus sp.</i>					6
animals	birds	Scolopacidae	<i>Limosa lapponica baueri</i>	Western Alaskan bar-tailed godwit		V	V	5

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animals	birds	Scolopacidae	<i>Numenius madagascariensis</i>	eastern curlew		E	CE	9
animals	birds	Scolopacidae	<i>Numenius minutus</i>	little curlew		SL		1
animals	birds	Scolopacidae	<i>Numenius phaeopus</i>	whimbrel		SL		18
animals	birds	Scolopacidae	<i>Tringa brevipes</i>	grey-tailed tattler		SL		21
animals	birds	Scolopacidae	<i>Tringa glareola</i>	wood sandpiper		SL		1
animals	birds	Scolopacidae	<i>Tringa incana</i>	wandering tattler		SL		3
animals	birds	Scolopacidae	<i>Xenus cinereus</i>	terek sandpiper		SL		1
animals	birds	Strigidae	<i>Ninox connivens</i>	barking owl		C		3
animals	birds	Sturnidae	<i>Aplonis metallica</i>	metallic starling		C		2
animals	birds	Sulidae	<i>Sula dactylatra</i>	masked booby		SL		3
animals	birds	Sulidae	<i>Sula leucogaster</i>	brown booby		SL		19
animals	birds	Sulidae	<i>Sula sula</i>	red-footed booby		SL		1
animals	birds	Threskiornithidae	<i>Threskiornis molucca</i>	Australian white ibis		C		1
animals	birds	Timaliidae	<i>Zosterops citrinella</i>	ashy-bellied white-eye		C		2
animals	birds	Timaliidae	<i>Zosterops lateralis</i>	silveryeye		C		15
animals	birds	Timaliidae	<i>Zosterops lateralis vegetus</i>	silveryeye (Cape York Peninsula)		C		2
animals	insects	Nymphalidae	<i>Junonia hedonia zelima</i>	chocolate argus				1
animals	insects	Nymphalidae	<i>Tirumala hamata hamata</i>	blue tiger				2
animals	mammals	Canidae	<i>Canis familiaris</i>	dog	Y			2
animals	mammals	Dasyuridae	<i>Phascogale tapoatafa tapoatafa</i>	brush-tailed phascogale		C		1
animals	mammals	Dasyuridae	<i>Sminthopsis virginiae</i>	red-cheeked dunnart		C		5
animals	mammals	Macropodidae	<i>Notamacropus agilis</i>	agile wallaby		C		3
animals	mammals	Muridae	<i>Leggadina lakedownensis</i>	Lakeland Downs mouse		C		2/1
animals	mammals	Muridae	<i>Melomys burtoni</i>	grassland melomys		C		20
animals	mammals	Muridae	<i>Melomys cervinipes</i>	fawn-footed melomys		C		15
animals	mammals	Muridae	<i>Melomys sp.</i>			C		36
animals	mammals	Muridae	<i>Rattus sp.</i>			C		9
animals	mammals	Muridae	<i>Rattus tunneyi</i>	pale field-rat		C		11
animals	mammals	Peramelidae	<i>Isoodon macrourus</i>	northern brown bandicoot		C		1
animals	mammals	Petauridae	<i>Petaurus notatus</i>	Kreff's glider		C		1
animals	mammals	Pteropodidae	<i>Pteropus alecto</i>	black flying-fox		C		1
animals	mammals	Pteropodidae	<i>Pteropus scapulatus</i>	little red flying-fox		C		1
animals	mammals	Pteropodidae	<i>Syconycteris australis</i>	eastern blossom bat		C		1
animals	mammals	Suidae	<i>Sus scrofa</i>	pig	Y			2
animals	ray-finned fishes	Eleotridae	<i>Mogurnda adspersa</i>	southern purplespotted gudgeon				1/1
animals	ray-finned fishes	Melanotaeniidae	<i>Melanotaenia maccullochi</i>	McCulloch's rainbowfish				4/4
animals	ray-finned fishes	Melanotaeniidae	<i>Melanotaenia splendida splendida</i>	eastern rainbowfish				1/1
animals	ray-finned fishes	Melanotaeniidae	<i>Melanotaenia trifasciata</i>	banded rainbowfish				3/2
animals	reptiles	Agamidae	<i>Diporiphora jugularis</i>	black-throated two-pored dragon		C		5
animals	reptiles	Agamidae	<i>Diporiphora sp.</i>			C		6/4
animals	reptiles	Boidae	<i>Aspidites melanocephalus</i>	black-headed python		C		1
animals	reptiles	Boidae	<i>Simalia kinghorni</i>	amethystine python (Australian form)		C		2
animals	reptiles	Chelidae	<i>Chelodina rugosa</i>	northern snake-necked turtle		C		1
animals	reptiles	Cheloniidae	<i>Caretta caretta</i>	loggerhead turtle		E	E	1
animals	reptiles	Cheloniidae	<i>Eretmochelys imbricata</i>	hawksbill turtle		E	V	1
animals	reptiles	Colubridae	<i>Boiga irregularis</i>	brown tree snake		C		3

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animals	reptiles	Colubridae	<i>Dendrelaphis calligastra</i>	northern tree snake		C		2
animals	reptiles	Colubridae	<i>Dendrelaphis punctulatus</i>	green tree snake		C		3
animals	reptiles	Colubridae	<i>Tropidonophis mairii</i>	freshwater snake		C		2
animals	reptiles	Crocodylidae	<i>Crocodylus porosus</i>	estuarine crocodile		V		2
animals	reptiles	Diplodactylidae	<i>Amalosia rhombifer</i>	zig-zag gecko		C		1
animals	reptiles	Elapidae	<i>Acanthophis praelongus</i>	northern death adder		C		1
animals	reptiles	Elapidae	<i>Cryptophis nigrescens</i>	eastern small-eyed snake		C		1
animals	reptiles	Elapidae	<i>Demansia psammophis</i>	yellow-faced whipsnake		C		2
animals	reptiles	Elapidae	<i>Demansia sp.</i>			C		1
animals	reptiles	Elapidae	<i>Demansia vestigiata</i>	lesser black whipsnake		C		1
animals	reptiles	Elapidae	<i>Furina ornata</i>	orange-naped snake		C		1
animals	reptiles	Elapidae	<i>Hydrophis elegans</i>	elegant sea snake		C		1/1
animals	reptiles	Elapidae	<i>Oxyuranus scutellatus</i>	coastal taipan		C		2
animals	reptiles	Elapidae	<i>Pseudonaja textilis</i>	eastern brown snake		C		1
animals	reptiles	Gekkonidae	<i>Cyrtodactylus tuberculatus</i>	tuberculated ring-tailed gecko		C		3
animals	reptiles	Gekkonidae	<i>Gehyra dubia</i>	dubious dtella		C		2
animals	reptiles	Gekkonidae	<i>Hemidactylus frenatus</i>	house gecko	Y			2
animals	reptiles	Gekkonidae	<i>Heteronotia binoei</i>	Bynoe's gecko		C		1
animals	reptiles	Gekkonidae	<i>Nactus cheverti</i>	Chevert gecko		C		10/1
animals	reptiles	Pygopodidae	<i>Lialis burtonis</i>	Burton's legless lizard		C		1
animals	reptiles	Scincidae	<i>Carlia dogare</i>	sandy rainbow-skink		C		27/5
animals	reptiles	Scincidae	<i>Carlia jarnoldae</i>	lined rainbow-skink		C		11/4
animals	reptiles	Scincidae	<i>Carlia longipes</i>	closed-litter rainbow-skink		C		22/2
animals	reptiles	Scincidae	<i>Carlia sp.</i>			C		6
animals	reptiles	Scincidae	<i>Carlia storri</i>	Storr's rainbow-skink		C		3
animals	reptiles	Scincidae	<i>Carlia vivax</i>	tussock rainbow-skink		C		1
animals	reptiles	Scincidae	<i>Cryptoblepharus litoralis litoralis</i>	coastal snake-eyed skink		C		1
animals	reptiles	Scincidae	<i>Cryptoblepharus virgatus</i>	striped snake-eyed skink		C		3
animals	reptiles	Scincidae	<i>Ctenotus inornatus</i>	bar-shouldered ctenotus		C		1
animals	reptiles	Scincidae	<i>Ctenotus nullum</i>	nullum ctenotus		C		1
animals	reptiles	Scincidae	<i>Ctenotus rawlinsoni</i>	Cape heath ctenotus		V		28/2
animals	reptiles	Scincidae	<i>Ctenotus spaldingi</i>	straight-browed ctenotus		C		12
animals	reptiles	Scincidae	<i>Eremiascincus pardalis</i>	lowlands bar-lipped skink		C		2/1
animals	reptiles	Scincidae	<i>Glaphyromorphus nigricaudis</i>	black-tailed bar-lipped skink		C		5/1
animals	reptiles	Scincidae	<i>Lerista ingrami</i>	Ingram's lerista		V		3/3
animals	reptiles	Scincidae	<i>Tiliqua scincoides</i>	eastern blue-tongued lizard		C		1
animals	reptiles	Varanidae	<i>Varanus gouldii</i>	sand monitor		C		1
animals	reptiles	Varanidae	<i>Varanus varius</i>	lace monitor		C		1
animals	uncertain	Indeterminate	<i>Indeterminate</i>	Unknown or Code Pending				1
fungi	Agaricomycetes	Corticaceae	<i>Corticium</i>			C		1/1
fungi	Agaricomycetes	Polyporaceae	<i>Microporus xanthopus</i>			C		1/1
fungi	lecanoromycetes	Caliciaceae	<i>Dirinaria</i>					1/1
fungi	lecanoromycetes	Caliciaceae	<i>Dirinaria applanata</i>			C		1/1
fungi	lecanoromycetes	Caliciaceae	<i>Dirinaria confluens</i>			C		1/1
fungi	lecanoromycetes	Caliciaceae	<i>Dirinaria picta</i>			C		2/2
fungi	lecanoromycetes	Caliciaceae	<i>Pyxine cocoes</i>			C		2/2

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fungi	lecanoromycetes	Cladoniaceae	<i>Cladonia macilenta</i>			C		1/1
fungi	lecanoromycetes	Collemataceae	<i>Collema rugosum</i>			C		2/2
fungi	lecanoromycetes	Collemataceae	<i>Leptogium</i>					1/1
fungi	lecanoromycetes	Collemataceae	<i>Leptogium cyanescens</i>			C		1/1
fungi	lecanoromycetes	Collemataceae	<i>Leptogium fallax</i>			C		2/2
fungi	lecanoromycetes	Collemataceae	<i>Leptogium propaguliferum</i>			C		1/1
fungi	lecanoromycetes	Graphidaceae	<i>Myriotrema subconforme</i>			C		1/1
fungi	lecanoromycetes	Letrouitiaceae	<i>Letrouitia muralis</i>			C		1/1
fungi	lecanoromycetes	Pannariaceae	<i>Pannaria dissecta</i>			C		4/4
fungi	lecanoromycetes	Pannariaceae	<i>Parmeliella mariana</i>			C		1/1
fungi	lecanoromycetes	Pannariaceae	<i>Physma ahtianum</i>			C		1/1
fungi	lecanoromycetes	Parmeliaceae	<i>Crespoa crozalsiana</i>			C		1/1
fungi	lecanoromycetes	Parmeliaceae	<i>Parmotrema judithae</i>			C		1/1
fungi	lecanoromycetes	Parmeliaceae	<i>Parmotrema robustum</i>			C		1/1
fungi	lecanoromycetes	Parmeliaceae	<i>Relicina sublanea</i>			C		1/1
fungi	lecanoromycetes	Pertusariaceae	<i>Pertusaria clarkeana</i>			C		1/1
fungi	lecanoromycetes	Porinaceae	<i>Porina mastoidea</i>			C		2/2
fungi	lecanoromycetes	Ramalinaceae	<i>Ramalina confirmata</i>			C		1/1
fungi	sordariomycetes	Xylariaceae	<i>Xylaria</i>					2/2
plants	land plants	Acanthaceae	<i>Avicennia marina subsp. australasica</i>			C		7/7
plants	land plants	Acanthaceae	<i>Avicennia marina subsp. eucalyptifolia</i>			C		1/1
plants	land plants	Acanthaceae	<i>Hygrophila angustifolia</i>			C		1/1
plants	land plants	Acanthaceae	<i>Nelsonia campestris</i>			C		1/1
plants	land plants	Acanthaceae	<i>Pseuderanthemum variabile</i>	pastel flower		C		1/1
plants	land plants	Acanthaceae	<i>Rostellularia</i>					1/1
plants	land plants	Acanthaceae	<i>Rostellularia adscendens var. hispida</i>			C		1/1
plants	land plants	Acanthaceae	<i>Rostellularia adscendens var. latifolia</i>			C		2/2
plants	land plants	Acanthaceae	<i>Staurogyne spatulata</i>			C		1/1
plants	land plants	Acrobolbaceae	<i>Goebelobryum unguiculatum</i>			C		1/1
plants	land plants	Aizoaceae	<i>Sesuvium portulacastrum</i>	sea purslane		C		1
plants	land plants	Aizoaceae	<i>Sesuvium portulacastrum subsp. portulacastrum</i>			C		7/7
plants	land plants	Amaranthaceae	<i>Achyranthes aspera</i>			C		5/4
plants	land plants	Amaranthaceae	<i>Amaranthus interruptus</i>			C		1/1
plants	land plants	Amaranthaceae	<i>Amaranthus viridis</i>	green amaranth	Y	C		1/1
plants	land plants	Amaranthaceae	<i>Deeringia arborescens</i>	climbing deeringia		C		1/1
plants	land plants	Amaranthaceae	<i>Gomphrena celosioides</i>	gomphrena weed	Y			1/1
plants	land plants	Amaryllidaceae	<i>Crinum pedunculatum</i>	river lily		SL		1/1
plants	land plants	Anacardiaceae	<i>Blepharocarya involucrigera</i>			C		1/1
plants	land plants	Anacardiaceae	<i>Buchanania arborescens</i>			C		1/1
plants	land plants	Annonaceae	<i>Melodorum leichhardtii</i>			C		1/1
plants	land plants	Annonaceae	<i>Miliusa horsfieldii</i>			C		3/3
plants	land plants	Annonaceae	<i>Monoon australe</i>			C		4/4
plants	land plants	Apiaceae	<i>Platysace valida</i>			C		1/1
plants	land plants	Apocynaceae	<i>Alstonia scholaris</i>	white cheesewood		C		1/1
plants	land plants	Apocynaceae	<i>Alyxia spicata</i>			C		4/4
plants	land plants	Apocynaceae	<i>Cynanchum viminale subsp. brunonianum</i>			C		3/3

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plants	land plants	Apocynaceae	<i>Hoya australis</i> subsp. <i>australis</i>			C		8/8
plants	land plants	Apocynaceae	<i>Leichhardtia viridiflora</i> subsp. <i>tropica</i>			C		3/3
plants	land plants	Apocynaceae	<i>Parsonsia longipetiolata</i>			C		1/1
plants	land plants	Apocynaceae	<i>Parsonsia velutina</i>	hairy silkpod		C		1/1
plants	land plants	Apocynaceae	<i>Tabernaemontana orientalis</i>			C		2/2
plants	land plants	Apocynaceae	<i>Vincetoxicum carnosum</i>			C		1/1
plants	land plants	Apocynaceae	<i>Wrightia laevis</i>			C		1/1
plants	land plants	Araceae	<i>Epipremnum pinnatum</i>			C		1/1
plants	land plants	Araliaceae	<i>Heptapleurum actinophyllum</i>			C		1/1
plants	land plants	Araliaceae	<i>Trachymene hookeri</i>			C		1/1
plants	land plants	Araucariaceae	<i>Araucaria cunninghamii</i> var. <i>cunninghamii</i>			C		1/1
plants	land plants	Arecaceae	<i>Archontophoenix alexandrae</i>	Alexandra palm		C		1/1
plants	land plants	Arecaceae	<i>Arenga australasica</i>			V		1/1
plants	land plants	Arecaceae	<i>Calamus vitiensis</i>			C		1/1
plants	land plants	Arecaceae	<i>Livistona muelleri</i>	dwarf fan palm			SL	1/1
plants	land plants	Arecaceae	<i>Nypa fruticans</i>			C		1/1
plants	land plants	Asteraceae	<i>Ageratum conyzoides</i>	billygoat weed	Y			7
plants	land plants	Asteraceae	<i>Asteraceae</i>					1/1
plants	land plants	Asteraceae	<i>Bidens bipinnata</i>	bipinnate beggar's ticks	Y			1/1
plants	land plants	Asteraceae	<i>Coronidium rupicola</i>				C	1/1
plants	land plants	Asteraceae	<i>Cosmos caudatus</i>		Y			1/1
plants	land plants	Asteraceae	<i>Cyanthillium cinereum</i>				C	2/2
plants	land plants	Asteraceae	<i>Eleutheranthera ruderalis</i>		Y			1/1
plants	land plants	Asteraceae	<i>Emilia sonchifolia</i>		Y			1/1
plants	land plants	Asteraceae	<i>Emilia sonchifolia</i> var. <i>sonchifolia</i>		Y			3/3
plants	land plants	Asteraceae	<i>Phacellothrix cladochaeta</i>				C	1/1
plants	land plants	Asteraceae	<i>Pterocaulon ciliosum</i>				C	2/2
plants	land plants	Asteraceae	<i>Sphaeromorphaea harrisii</i>				C	2/2
plants	land plants	Asteraceae	<i>Synedrella nodiflora</i>		Y			2
plants	land plants	Asteraceae	<i>Tridax procumbens</i>	tridax daisy	Y			2/2
plants	land plants	Asteraceae	<i>Wollastonia uniflora</i>				C	4/4
plants	land plants	Bataceae	<i>Batis argillicola</i>				C	1/1
plants	land plants	Blechnaceae	<i>Blechnum medium</i>				SL	1/1
plants	land plants	Boraginaceae	<i>Argusia argentea</i>	octopus bush		C		6/5
plants	land plants	Boraginaceae	<i>Cordia subcordata</i>			C		3/3
plants	land plants	Burseraceae	<i>Canarium australianum</i> var. <i>australianum</i>			C		1/1
plants	land plants	Burseraceae	<i>Canarium vitiense</i>			C		1/1
plants	land plants	Burseraceae	<i>Garuga floribunda</i> var. <i>floribunda</i>			C		2/2
plants	land plants	Byblidaceae	<i>Byblis liniflora</i>				SL	1/1
plants	land plants	Byttneriaceae	<i>Abroma molle</i>			C		1/1
plants	land plants	Cannabaceae	<i>Celtis paniculata</i>	native celtis		C		1/1
plants	land plants	Cannabaceae	<i>Trema tomentosa</i> var. <i>tomentosa</i>			C		1/1
plants	land plants	Capparaceae	<i>Capparis lucida</i>			C		6/6
plants	land plants	Capparaceae	<i>Capparis nummularia</i>			C		4/4
plants	land plants	Capparaceae	<i>Capparis sepiaria</i>			C		1/1
plants	land plants	Casuarinaceae	<i>Allocasuarina littoralis</i>			C		3/3

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plants	land plants	Casuarinaceae	<i>Allocasuarina sp. (Shaw Island G.N.Batianoff+ 3360)</i>			C		1/1
plants	land plants	Casuarinaceae	<i>Casuarina equisetifolia</i>			C		1/1
plants	land plants	Casuarinaceae	<i>Casuarina equisetifolia subsp. incana</i>			C		9/7
plants	land plants	Celastraceae	<i>Denhamia fasciculiflora</i>			C		1/1
plants	land plants	Celastraceae	<i>Elaeodendron melanocarpum</i>			C		5/5
plants	land plants	Celastraceae	<i>Euonymus australiana</i>			C		1/1
plants	land plants	Celastraceae	<i>Gymnosporia inermis</i>			C		1/1
plants	land plants	Celastraceae	<i>Pleurostylia opposita</i>			C		1/1
plants	land plants	Celastraceae	<i>Salacia disepala</i>			C		1/1
plants	land plants	Centrolepidaceae	<i>Centrolepis banksii</i>			C		1/1
plants	land plants	Chenopodiaceae	<i>Salicornia quinqueflora subsp. quinqueflora</i>			C		6/6
plants	land plants	Chenopodiaceae	<i>Salsola australis</i>			C		5/4
plants	land plants	Chenopodiaceae	<i>Suaeda australis</i>			C		6/6
plants	land plants	Chenopodiaceae	<i>Tecticornia indica subsp. leiostachya</i>			C		1/1
plants	land plants	Chrysobalanaceae	<i>Parinari nonda</i>			C		4/4
plants	land plants	Cleomaceae	<i>Arivela viscosa</i>			C		4/3
plants	land plants	Clusiaceae	<i>Calophyllum inophyllum</i>	beach calophyllum		C		1/1
plants	land plants	Clusiaceae	<i>Calophyllum sil</i>			C		1/1
plants	land plants	Combretaceae	<i>Lumnitzera racemosa</i>			C		2/2
plants	land plants	Combretaceae	<i>Terminalia</i>					1/1
plants	land plants	Combretaceae	<i>Terminalia muelleri</i>			C		9/9
plants	land plants	Combretaceae	<i>Terminalia sericocarpa</i>	damson		C		3/3
plants	land plants	Commelinaceae	<i>Aneilema siliculosum</i>			C		1/1
plants	land plants	Commelinaceae	<i>Commelina</i>					1/1
plants	land plants	Commelinaceae	<i>Commelina diffusa</i>	wandering jew		C		3/3
plants	land plants	Commelinaceae	<i>Commelina ensifolia</i>	scurvy grass		C		3/3
plants	land plants	Commelinaceae	<i>Commelina lanceolata</i>			C		1/1
plants	land plants	Commelinaceae	<i>Commelinaceae</i>					1/1
plants	land plants	Convolvulaceae	<i>Evolvulus alsinoides</i>				C	1/1
plants	land plants	Convolvulaceae	<i>Ipomoea hederifolia</i>		Y			7/1
plants	land plants	Convolvulaceae	<i>Ipomoea pes-caprae subsp. brasiliensis</i>	goatsfoot		C		9/7
plants	land plants	Convolvulaceae	<i>Ipomoea violacea</i>			C		4/2
plants	land plants	Convolvulaceae	<i>Xenostegia tridentata</i>			C		4/4
plants	land plants	Cornaceae	<i>Alangium solomonense</i>			C		2/2
plants	land plants	Cucurbitaceae	<i>Citrullus amarus</i>		Y			1/1
plants	land plants	Cucurbitaceae	<i>Cucumis althaeoides</i>			C		3/3
plants	land plants	Cucurbitaceae	<i>Diplocyclos palmatus</i>			C		2/2
plants	land plants	Cucurbitaceae	<i>Diplocyclos palmatus subsp. affinis</i>			C		3/3
plants	land plants	Cucurbitaceae	<i>Diplocyclos palmatus subsp. palmatus</i>			C		1/1
plants	land plants	Cycadaceae	<i>Cycas media subsp. banksii</i>			SL		1/1
plants	land plants	Cymodoceaceae	<i>Halodule uninervis</i>			SL		1/1
plants	land plants	Cyperaceae	<i>Abildgaardia schoenoides</i>			C		1/1
plants	land plants	Cyperaceae	<i>Anthelepis clarksonii</i>			C		3/3
plants	land plants	Cyperaceae	<i>Arthrostylis aphylla</i>			C		7/7
plants	land plants	Cyperaceae	<i>Bulbostylis barbata</i>			C		3/3
plants	land plants	Cyperaceae	<i>Cyperus decompositus</i>			C		1/1

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plants	land plants	Cyperaceae	<i>Cyperus orgadophilus</i>			C		1/1
plants	land plants	Cyperaceae	<i>Cyperus pedunculatus</i>			C		6/6
plants	land plants	Cyperaceae	<i>Cyperus scaber</i>			C		3/3
plants	land plants	Cyperaceae	<i>Cyperus stoloniferus</i>			C		1/1
plants	land plants	Cyperaceae	<i>Eleocharis dulcis</i>			C		1/1
plants	land plants	Cyperaceae	<i>Eleocharis geniculata</i>			C		1/1
plants	land plants	Cyperaceae	<i>Eleocharis ochrostachys</i>			C		1/1
plants	land plants	Cyperaceae	<i>Fimbristylis</i>					1/1
plants	land plants	Cyperaceae	<i>Fimbristylis pauciflora</i>			C		1/1
plants	land plants	Cyperaceae	<i>Fimbristylis recta</i>			C		3/3
plants	land plants	Cyperaceae	<i>Fimbristylis sericea</i>			C		1/1
plants	land plants	Cyperaceae	<i>Fuirena ciliaris</i>			C		3/3
plants	land plants	Cyperaceae	<i>Gahnia aspera</i>			C		1/1
plants	land plants	Cyperaceae	<i>Gahnia sieberiana</i>	sword grass		C		5/5
plants	land plants	Cyperaceae	<i>Lepironia articulata</i>			C		1/1
plants	land plants	Cyperaceae	<i>Machaerina</i>					1/1
plants	land plants	Cyperaceae	<i>Machaerina rubiginosa</i>			C		1/1
plants	land plants	Cyperaceae	<i>Machaerina teretifolia</i>			C		1/1
plants	land plants	Cyperaceae	<i>Rhynchospora heterochaeta</i>			C		1/1
plants	land plants	Cyperaceae	<i>Schoenus calostachyus</i>			C		5/5
plants	land plants	Cyperaceae	<i>Schoenus sparteus</i>			C		3/3
plants	land plants	Cyperaceae	<i>Scleria brownii</i>			C		1/1
plants	land plants	Cyperaceae	<i>Scleria polycarpa</i>			C		1/1
plants	land plants	Cyperaceae	<i>Scleria rugosa</i>			C		1/1
plants	land plants	Cyperaceae	<i>Trachystylis stradbrogensis</i>			C		5/5
plants	land plants	Dilleniaceae	<i>Dillenia alata</i>			C		2/2
plants	land plants	Dilleniaceae	<i>Hibbertia araneolifera</i>			C		1/1
plants	land plants	Dilleniaceae	<i>Hibbertia banksii forma banksii</i>			C		7/7
plants	land plants	Dilleniaceae	<i>Hibbertia eciliata</i>			C		2/2
plants	land plants	Droseraceae	<i>Drosera lanata</i>			SL		1/1
plants	land plants	Droseraceae	<i>Drosera petiolaris</i>			SL		2/2
plants	land plants	Droseraceae	<i>Drosera serpens</i>			SL		1/1
plants	land plants	Dryopteridaceae	<i>Lastreopsis poecilophlebia</i>			SL		1/1
plants	land plants	Ebenaceae	<i>Diospyros compacta</i>			C		6/6
plants	land plants	Ebenaceae	<i>Diospyros fasciculosa</i>	grey ebony		C		1/1
plants	land plants	Ebenaceae	<i>Diospyros geminata</i>	scaly ebony		C		1/1
plants	land plants	Ebenaceae	<i>Diospyros hebecarpa</i>			C		2/2
plants	land plants	Ebenaceae	<i>Diospyros maritima</i>			C		6/6
plants	land plants	Ebenaceae	<i>Diospyros peninsularis</i>			C		2/2
plants	land plants	Elaeocarpaceae	<i>Elaeocarpus arnhemicus</i>			C		1/1
plants	land plants	Elaeocarpaceae	<i>Elaeocarpus michaelii</i>			C		2/2
plants	land plants	Ericaceae	<i>Styphelia lavarackii</i>			C		5/5
plants	land plants	Ericaceae	<i>Styphelia leptospermoides</i>			C		1/1
plants	land plants	Ericaceae	<i>Styphelia ruscifolia</i>			C		7/7
plants	land plants	Ericaceae	<i>Styphelia yorkensis</i>			C		4/4
plants	land plants	Eriocaulaceae	<i>Eriocaulon depressum</i>			C		1/1

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plants	land plants	Eriocaulaceae	<i>Eriocaulon fistulosum</i>			C		1/1
plants	land plants	Euphorbiaceae	<i>Claoxylon hillii</i>			C		1/1
plants	land plants	Euphorbiaceae	<i>Cleidion javanicum</i>			C		1/1
plants	land plants	Euphorbiaceae	<i>Codiaeum membranaceum</i>			C		1/1
plants	land plants	Euphorbiaceae	<i>Euphorbia heterophylla</i>		Y			1/1
plants	land plants	Euphorbiaceae	<i>Euphorbia hirta</i>		Y			3/3
plants	land plants	Euphorbiaceae	<i>Euphorbia pallens</i>			C		3/3
plants	land plants	Euphorbiaceae	<i>Euphorbia tannensis subsp. tannensis</i>			C		5/5
plants	land plants	Euphorbiaceae	<i>Excoecaria agallocha</i>	milky mangrove		C		2/2
plants	land plants	Euphorbiaceae	<i>Macaranga involucrata var. mallotoides</i>			C		1/1
plants	land plants	Euphorbiaceae	<i>Macaranga tanarius</i>	macaranga		C		5/5
plants	land plants	Euphorbiaceae	<i>Mallotus mollissimus</i>			C		1/1
plants	land plants	Euphorbiaceae	<i>Mallotus philippensis</i>	red kamala		C		1/1
plants	land plants	Euphorbiaceae	<i>Mallotus resinusus</i>			C		6/6
plants	land plants	Euphorbiaceae	<i>Mallotus surculosus</i>			C		1/1
plants	land plants	Euphorbiaceae	<i>Microstachys chamaelea</i>			C		1/1
plants	land plants	Euphorbiaceae	<i>Shonia tristigma subsp. borealis</i>			C		8/8
plants	land plants	Euphorbiaceae	<i>Tritaxis australiensis</i>			C		2/2
plants	land plants	Flagellariaceae	<i>Flagellaria indica</i>	whip vine		C		2/2
plants	land plants	Goodeniaceae	<i>Scaevola taccada</i>	Cardwell cabbage		C		10/8
plants	land plants	Haloragaceae	<i>Myriophyllum dicoccum</i>			C		1/1
plants	land plants	Hemerocallidaceae	<i>Dianella longifolia var. longifolia</i>			C		1/1
plants	land plants	Hemerocallidaceae	<i>Dianella nervosa</i>			C		1/1
plants	land plants	Hemerocallidaceae	<i>Dianella pavopennacea var. pavopennacea</i>			C		5/5
plants	land plants	Hydrocharitaceae	<i>Halophila decipiens</i>			SL		2/2
plants	land plants	Hydrocharitaceae	<i>Halophila minor</i>			SL		2/2
plants	land plants	Hydrocharitaceae	<i>Halophila ovalis</i>			SL		4/4
plants	land plants	Hydrocharitaceae	<i>Halophila spinulosa</i>			SL		4/4
plants	land plants	Hydrocharitaceae	<i>Halophila tricostata</i>			SL		2/2
plants	land plants	Hydrocharitaceae	<i>Thalassia hemprichii</i>			SL		2/2
plants	land plants	Hydrocharitaceae	<i>Vallisneria caulescens</i>			SL		1/1
plants	land plants	Johnsoniaceae	<i>Tricoryne anceps subsp. anceps</i>			C		1/1
plants	land plants	Johnsoniaceae	<i>Tricoryne anceps subsp. pterocaulon</i>			C		2/2
plants	land plants	Lamiaceae	<i>Chloanthes parviflora</i>			C		3/3
plants	land plants	Lamiaceae	<i>Clerodendrum inerme</i>	coastal lolly bush		C		4/4
plants	land plants	Lamiaceae	<i>Mesosphaerum suaveolens</i>		Y			12
plants	land plants	Lamiaceae	<i>Platostoma longicorne</i>			C		1/1
plants	land plants	Lamiaceae	<i>Premna limbata</i>			C		1/1
plants	land plants	Lamiaceae	<i>Premna serratifolia</i>			C		7/7
plants	land plants	Lamiaceae	<i>Salvia misella</i>		Y			1/1
plants	land plants	Lamiaceae	<i>Vitex rotundifolia</i>			C		5/5
plants	land plants	Lamiaceae	<i>Vitex trifolia var. subtrisecta</i>			C		2/2
plants	land plants	Lauraceae	<i>Cassytha filiformis</i>	dodder laurel		C		4/4
plants	land plants	Lauraceae	<i>Cryptocarya brassii</i>			C		1/1
plants	land plants	Lauraceae	<i>Cryptocarya exfoliata</i>			C		2/2
plants	land plants	Lauraceae	<i>Cryptocarya hypospodia</i>	north Queensland purple laurel		C		1/1

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plants	land plants	Lauraceae	<i>Cryptocarya murrayi</i>	Murray's laurel		C		1/1
plants	land plants	Lauraceae	<i>Cryptocarya rhodosperma</i>			C		5/5
plants	land plants	Lauraceae	<i>Cryptocarya vulgaris</i>			C		1/1
plants	land plants	Lauraceae	<i>Endiandra glauca</i>			C		2/2
plants	land plants	Lauraceae	<i>Endiandra longipedicellata</i>			C		2/2
plants	land plants	Lauraceae	<i>Endiandra monothyra subsp. monothyra</i>			C		1/1
plants	land plants	Lauraceae	<i>Litsea glutinosa</i>			C		1/1
plants	land plants	Laxmanniaceae	<i>Cordyline cannifolia</i>			SL		1/1
plants	land plants	Laxmanniaceae	<i>Lomandra banksii</i>			C		4/4
plants	land plants	Laxmanniaceae	<i>Lomandra decomposita</i>			C		1/1
plants	land plants	Lecythidaceae	<i>Barringtonia calyptrata</i>			C		1/1
plants	land plants	Leguminosae	<i>Abrus precatorius subsp. precatorius</i>			C		3/3
plants	land plants	Leguminosae	<i>Acacia auriculiformis</i>	black wattle		C		1/1
plants	land plants	Leguminosae	<i>Acacia brassii</i>			C		5/5
plants	land plants	Leguminosae	<i>Acacia calyculata</i>			C		3/3
plants	land plants	Leguminosae	<i>Acacia crassicarpa</i>			C		4/4
plants	land plants	Leguminosae	<i>Acacia flavescens</i>	toothed wattle		C		1/1
plants	land plants	Leguminosae	<i>Acacia humifusa</i>			C		3/3
plants	land plants	Leguminosae	<i>Acacia legnota</i>			C		7/7
plants	land plants	Leguminosae	<i>Acacia leptocarpa</i>	north coast wattle		C		2/2
plants	land plants	Leguminosae	<i>Acacia leptoloba</i>			C		1/1
plants	land plants	Leguminosae	<i>Acacia oraria</i>			C		2/2
plants	land plants	Leguminosae	<i>Acacia pubirhachis</i>			C		10/10
plants	land plants	Leguminosae	<i>Acacia racospermoides</i>			C		9/9
plants	land plants	Leguminosae	<i>Acacia simsii</i>			C		1/1
plants	land plants	Leguminosae	<i>Acacia solenota</i>			V		10/10
plants	land plants	Leguminosae	<i>Aeschynomene indica</i>	budda pea		C		1
plants	land plants	Leguminosae	<i>Aphyllodium biarticulatum</i>			C		1/1
plants	land plants	Leguminosae	<i>Archidendron grandiflorum</i>	lace flower tree		C		1/1
plants	land plants	Leguminosae	<i>Archidendron hendersonii</i>	white lace flower		C		1/1
plants	land plants	Leguminosae	<i>Bossiaea arenicola</i>			C		5/5
plants	land plants	Leguminosae	<i>Calopogonium mucunoides</i>		Y			12/2
plants	land plants	Leguminosae	<i>Canavalia rosea</i>	coastal jack bean		C		4/4
plants	land plants	Leguminosae	<i>Castanospermum australe</i>	black bean		C		1/1
plants	land plants	Leguminosae	<i>Centrosema molle</i>		Y			1/1
plants	land plants	Leguminosae	<i>Chamaecrista rotundifolia</i>		Y			3
plants	land plants	Leguminosae	<i>Crotalaria brevis</i>			C		1/1
plants	land plants	Leguminosae	<i>Derris sp. (Claudie River L.J.Webb+ 8348)</i>			C		1/1
plants	land plants	Leguminosae	<i>Desmodium pullenii</i>			C		1/1
plants	land plants	Leguminosae	<i>Desmodium strigillosum</i>		Y			1/1
plants	land plants	Leguminosae	<i>Galactia tenuiflora var. tenuiflora</i>			C		1/1
plants	land plants	Leguminosae	<i>Glycine</i>					1/1
plants	land plants	Leguminosae	<i>Glycine sp. (Bolt Head P.I.Forster PIF8948)</i>			C		2/2
plants	land plants	Leguminosae	<i>Glycine tomentella</i>	woolly glycine		C		1/1
plants	land plants	Leguminosae	<i>Gompholobium</i>					1/1
plants	land plants	Leguminosae	<i>Gompholobium nitidum</i>			C		8/8

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plants	land plants	Leguminosae	<i>Guilandina bonduc</i>			C		1/1
plants	land plants	Leguminosae	<i>Hanslia ormocarpoides</i>			C		1/1
plants	land plants	Leguminosae	<i>Jacksonia thesioides</i>			C		11/11
plants	land plants	Leguminosae	<i>Labichea buettneriana</i>			C		10/10
plants	land plants	Leguminosae	<i>Lamprolobium fruticosum</i>			C		2/2
plants	land plants	Leguminosae	<i>Lysiphyllum binatum</i>			C		2/2
plants	land plants	Leguminosae	<i>Macroptilium atropurpureum</i>	siratro	Y			1
plants	land plants	Leguminosae	<i>Mimosa pudica</i>		Y			26
plants	land plants	Leguminosae	<i>Mimosa pudica</i> var. <i>unijuga</i>		Y			1/1
plants	land plants	Leguminosae	<i>Mucuna gigantea</i>	burny bean		C		1/1
plants	land plants	Leguminosae	<i>Pararchidendron pruinosum</i>			C		1/1
plants	land plants	Leguminosae	<i>Pycnospora lutescens</i>	pycnospora		C		1/1
plants	land plants	Leguminosae	<i>Senna obtusifolia</i>		Y			37/3
plants	land plants	Leguminosae	<i>Sophora tomentosa</i> subsp. <i>australis</i>			C		3/3
plants	land plants	Leguminosae	<i>Stylosanthes</i>					7
plants	land plants	Leguminosae	<i>Stylosanthes scabra</i>		Y			1/1
plants	land plants	Leguminosae	<i>Tephrosia</i> sp. (Iron Range L.J.Brass 19242)			C		1/1
plants	land plants	Leguminosae	<i>Vandasina retusa</i>			C		2/2
plants	land plants	Leguminosae	<i>Vigna marina</i>	dune bean		C		4/4
plants	land plants	Leguminosae	<i>Vigna vexillata</i> var. <i>youngiana</i>			C		1/1
plants	land plants	Leguminosae	<i>Zornia maritima</i>			C		2/2
plants	land plants	Lentibulariaceae	<i>Utricularia aurea</i>	golden bladderwort		SL		1/1
plants	land plants	Lentibulariaceae	<i>Utricularia caerulea</i>	blue bladderwort		SL		1/1
plants	land plants	Lentibulariaceae	<i>Utricularia chrysantha</i>			SL		4/4
plants	land plants	Leucobryaceae	<i>Campylopus</i>					1/1
plants	land plants	Linderniaceae	<i>Bonnaya ciliata</i>			C		1/1
plants	land plants	Lindsaeaceae	<i>Lindsaea ensifolia</i> subsp. <i>agatii</i>			C		1/1
plants	land plants	Loganiaceae	<i>Mitrasacme connata</i>			C		1/1
plants	land plants	Loganiaceae	<i>Mitrasacme paludosa</i>			C		2/2
plants	land plants	Loganiaceae	<i>Mitrasacme stellata</i>			C		1/1
plants	land plants	Loganiaceae	<i>Strychnos minor</i>			C		1/1
plants	land plants	Loranthaceae	<i>Amylothea dictyophleba</i>			C		1/1
plants	land plants	Loranthaceae	<i>Decaisnina brittenii</i> subsp. <i>brittenii</i>			C		1/1
plants	land plants	Loranthaceae	<i>Dendrophthoe glabrescens</i>			C		6/6
plants	land plants	Loranthaceae	<i>Diplatia furcata</i>			C		4/4
plants	land plants	Loranthaceae	<i>Diplatia tomentosa</i>			C		2/2
plants	land plants	Lycopodiaceae	<i>Pseudolycopodiella serpentina</i>			SL		2/2
plants	land plants	Lygodiaceae	<i>Lygodium reticulatum</i>			C		1/1
plants	land plants	Lythraceae	<i>Ammannia baccifera</i>			C		1/1
plants	land plants	Lythraceae	<i>Pemphis acidula</i>			C		7/5
plants	land plants	Lythraceae	<i>Sonneratia alba</i>			C		5/5
plants	land plants	Lythraceae	<i>Sonneratia alba</i> x <i>Sonneratia</i> x <i>gulngai</i>			C		1/1
plants	land plants	Lythraceae	<i>Sonneratia caseolaris</i>			C		2/2
plants	land plants	Lythraceae	<i>Sonneratia</i> x <i>gulngai</i>			C		3/3
plants	land plants	Macarthuriaceae	<i>Macarthuria neocambrica</i>			C		4/4
plants	land plants	Malvaceae	<i>Abutilon albescens</i>			C		4/4

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plants	land plants	Malvaceae	<i>Hibiscus meraukensis</i>	Merauke hibiscus		C		3/3
plants	land plants	Malvaceae	<i>Hibiscus sankowskyorum</i>			C		1/1
plants	land plants	Malvaceae	<i>Hibiscus tiliaceus</i>	cotton tree		C		3/3
plants	land plants	Malvaceae	<i>Sida</i>					28
plants	land plants	Malvaceae	<i>Sida cordifolia</i>		Y			8
plants	land plants	Malvaceae	<i>Thespesia populnea</i>			C		3/3
plants	land plants	Malvaceae	<i>Urena lobata</i>	urena weed	Y			38/2
plants	land plants	Marsileaceae	<i>Marsilea mutica</i>	shiny nardoo		C		1/1
plants	land plants	Melastomataceae	<i>Melastoma malabathricum subsp. malabathricum</i>			C		1/1
plants	land plants	Meliaceae	<i>Aglaia elaeagnoidea</i>			C		4/4
plants	land plants	Meliaceae	<i>Anthocarapa nitidula</i>	incense cedar		C		2/2
plants	land plants	Meliaceae	<i>Dysoxylum arborescens</i>			C		1/1
plants	land plants	Meliaceae	<i>Dysoxylum gaudichaudianum</i>	ivory mahogany		C		1/1
plants	land plants	Meliaceae	<i>Dysoxylum mollissimum subsp. molle</i>	miva mahogany		C		1/1
plants	land plants	Meliaceae	<i>Dysoxylum pettigrewianum</i>			C		2/2
plants	land plants	Meliaceae	<i>Toona ciliata</i>	red cedar		C		2/2
plants	land plants	Meliaceae	<i>Vavaea amicorum</i>			C		1/1
plants	land plants	Memecylaceae	<i>Memecylon hylandii</i>			C		1/1
plants	land plants	Menispermaceae	<i>Carronia protensa</i>			C		1/1
plants	land plants	Menispermaceae	<i>Hypserpa decumbens</i>			C		4/4
plants	land plants	Menispermaceae	<i>Legnephora moorei</i>			C		1/1
plants	land plants	Menispermaceae	<i>Pachygone ovata</i>			C		1/1
plants	land plants	Menispermaceae	<i>Pycnarrhena novoguineensis</i>			C		1/1
plants	land plants	Menispermaceae	<i>Stephania japonica var. japonica</i>			C		1/1
plants	land plants	Menispermaceae	<i>Tinospora esiangkara</i>			C		2/2
plants	land plants	Menispermaceae	<i>Tinospora smilacina</i>	snakevine		C		2/2
plants	land plants	Menyanthaceae	<i>Nymphoides aurantiaca</i>			SL		1/1
plants	land plants	Menyanthaceae	<i>Nymphoides exiliflora</i>			SL		4/4
plants	land plants	Menyanthaceae	<i>Nymphoides indica</i>	water snowflake		SL		1/1
plants	land plants	Monimiaceae	<i>Wilkiea longipes</i>			C		1/1
plants	land plants	Monimiaceae	<i>Wilkiea rigidifolia</i>			C		3/3
plants	land plants	Moraceae	<i>Antiaris toxicaria var. macrophylla</i>			C		1/1
plants	land plants	Moraceae	<i>Ficus benjamina</i>			C		1/1
plants	land plants	Moraceae	<i>Ficus coronata</i>	creek sandpaper fig		C		1/1
plants	land plants	Moraceae	<i>Ficus fraseri</i>	white sandpaper fig		C		2/2
plants	land plants	Moraceae	<i>Ficus hispida var. hispida</i>			C		1/1
plants	land plants	Moraceae	<i>Ficus obliqua</i>			C		1/1
plants	land plants	Moraceae	<i>Ficus opposita</i>			C		6/6
plants	land plants	Moraceae	<i>Ficus rubiginosa forma rubiginosa</i>			C		4/4
plants	land plants	Moraceae	<i>Ficus septica</i>			C		1/1
plants	land plants	Moraceae	<i>Streblus brunonianus</i>	whalebone tree		C		1/1
plants	land plants	Moraceae	<i>Trophis scandens subsp. scandens</i>			C		3/3
plants	land plants	Myristicaceae	<i>Myristica globosa subsp. muelleri</i>	native nutmeg		C		1/1
plants	land plants	Myrsinaceae	<i>Myrsine subsessilis subsp. cryptostemon</i>			C		1/1
plants	land plants	Myrsinaceae	<i>Myrsine urceolata</i>			C		4/4
plants	land plants	Myrtaceae	<i>Acmena hemilampra subsp. hemilampra</i>			C		2/2

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plants	land plants	Myrtaceae	<i>Acmenosperma claviflorum</i>	grey satinash		C		2/2
plants	land plants	Myrtaceae	<i>Asteromyrtus angustifolia</i>			C		11/11
plants	land plants	Myrtaceae	<i>Asteromyrtus lysicephala</i>			C		6/6
plants	land plants	Myrtaceae	<i>Asteromyrtus symphyocarpa</i>			C		1/1
plants	land plants	Myrtaceae	<i>Corymbia clarksoniana</i>			C		5/5
plants	land plants	Myrtaceae	<i>Corymbia dallachiana</i>			C		1/1
plants	land plants	Myrtaceae	<i>Corymbia intermedia</i>	pink bloodwood		C		1/1
plants	land plants	Myrtaceae	<i>Corymbia nesophila</i>			C		1/1
plants	land plants	Myrtaceae	<i>Corymbia tessellaris</i>	Moreton Bay ash		C		1/1
plants	land plants	Myrtaceae	<i>Decaspermum humile</i>	silky myrtle		C		1/1
plants	land plants	Myrtaceae	<i>Eucalyptus brassiana</i>	Cape York red gum		C		2/2
plants	land plants	Myrtaceae	<i>Eucalyptus crebra</i>	narrow-leaved red ironbark		C		1/1
plants	land plants	Myrtaceae	<i>Eucalyptus pellita</i>	large-fruited red mahogany		C		1/1
plants	land plants	Myrtaceae	<i>Eucalyptus phoenicea</i>	scarlet gum		C		4/4
plants	land plants	Myrtaceae	<i>Eucalyptus portuensis</i>			C		1/1
plants	land plants	Myrtaceae	<i>Eugenia reinwardtiana</i>	beach cherry		C		7/7
plants	land plants	Myrtaceae	<i>Gossia bidwillii</i>			C		1/1
plants	land plants	Myrtaceae	<i>Gossia lucida</i>			C		1/1
plants	land plants	Myrtaceae	<i>Gossia retusa</i>			C		1/1
plants	land plants	Myrtaceae	<i>Leptospermum amboinense</i>			C		1/1
plants	land plants	Myrtaceae	<i>Leptospermum polygalifolium</i>	tantoon		C		9/9
plants	land plants	Myrtaceae	<i>Lithomyrtus obtusa</i>			C		6/6
plants	land plants	Myrtaceae	<i>Lophostemon suaveolens</i>	swamp box		C		2/2
plants	land plants	Myrtaceae	<i>Melaleuca arcana</i>			C		11/11
plants	land plants	Myrtaceae	<i>Melaleuca dealbata</i>	swamp tea-tree		C		1/1
plants	land plants	Myrtaceae	<i>Melaleuca foliolosa</i>			C		2/2
plants	land plants	Myrtaceae	<i>Melaleuca leucadendra</i>	broad-leaved tea-tree		C		2/2
plants	land plants	Myrtaceae	<i>Melaleuca polandii</i>			C		6/6
plants	land plants	Myrtaceae	<i>Melaleuca quinquenervia</i>	swamp paperbark		C		3/3
plants	land plants	Myrtaceae	<i>Melaleuca stenostachya subsp. amplior</i>			C		1/1
plants	land plants	Myrtaceae	<i>Melaleuca viminalis</i>			C		1/1
plants	land plants	Myrtaceae	<i>Melaleuca viridiflora var. attenuata</i>			C		1/1
plants	land plants	Myrtaceae	<i>Melaleuca viridiflora var. viridiflora</i>			C		3/3
plants	land plants	Myrtaceae	<i>Neofabricia myrtifolia</i>			C		13/13
plants	land plants	Myrtaceae	<i>Osbornia octodonta</i>	myrtle mangrove		C		6/6
plants	land plants	Myrtaceae	<i>Syzygium banksii</i>			C		5/5
plants	land plants	Myrtaceae	<i>Syzygium forte subsp. forte</i>			C		1/1
plants	land plants	Myrtaceae	<i>Syzygium gustavioides</i>			C		1/1
plants	land plants	Myrtaceae	<i>Syzygium malaccense</i>	Malay apple		C		1/1
plants	land plants	Myrtaceae	<i>Syzygium suborbiculare</i>			C		3/3
plants	land plants	Myrtaceae	<i>Thryptomene oligandra</i>			C		2/2
plants	land plants	Myrtaceae	<i>Xanthostemon arenarius</i>				NT	3/3
plants	land plants	Najadaceae	<i>Najas</i>					2/2
plants	land plants	Nephrolepidaceae	<i>Nephrolepis biserrata</i>			C		1/1
plants	land plants	Nyctaginaceae	<i>Boerhavia albiflora</i>			C		1
plants	land plants	Nyctaginaceae	<i>Boerhavia albiflora var. albiflora</i>			C		5/5

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plants	land plants	Nyctaginaceae	<i>Boerhavia mutabilis</i>			C		2/2
plants	land plants	Nyctaginaceae	<i>Pisonia grandis</i>			C		3/2
plants	land plants	Nyctaginaceae	<i>Pisonia umbellifera</i>	birdlime tree		C		1/1
plants	land plants	Nymphaeaceae	<i>Nymphaea immutabilis</i>			SL		3/3
plants	land plants	Nymphaeaceae	<i>Nymphaea violacea</i>			SL		1/1
plants	land plants	Octoblepharaceae	<i>Octoblepharum albidum</i>			C		1/1
plants	land plants	Olacaceae	<i>Olax aphylla</i>			C		1/1
plants	land plants	Oleaceae	<i>Chionanthus axillaris</i>			C		1/1
plants	land plants	Oleaceae	<i>Jasminum elongatum</i>			C		1/1
plants	land plants	Oleaceae	<i>Jasminum longipetalum</i>			C		3/3
plants	land plants	Oleaceae	<i>Jasminum simplicifolium subsp. australiense</i>			C		1/1
plants	land plants	Oleaceae	<i>Notelaea sp. (Elcho Island C.R.Dunlop 7597)</i>			C		2/2
plants	land plants	Onagraceae	<i>Ludwigia hyssopifolia</i>		Y			2/2
plants	land plants	Orchidaceae	<i>Arthrochilus dockrillii</i>			SL		1/1
plants	land plants	Orchidaceae	<i>Bromheadia pulchra</i>			SL		1/1
plants	land plants	Orchidaceae	<i>Caladenia chamaephylla</i>			SL		1/1
plants	land plants	Orchidaceae	<i>Corymborkis veratrifolia</i>	cinnamon orchid		SL		1/1
plants	land plants	Orchidaceae	<i>Dendrobium discolor</i>			SL		6/6
plants	land plants	Orchidaceae	<i>Dendrobium trilamellatum</i>	yellow antelope orchid		SL		2/2
plants	land plants	Orchidaceae	<i>Dipodium ensifolium</i>	leafy hyacinth orchid		SL		2/2
plants	land plants	Orchidaceae	<i>Dockrillia calamiformis</i>			SL		1/1
plants	land plants	Orchidaceae	<i>Dockrillia rigida</i>			SL		2/2
plants	land plants	Orchidaceae	<i>Luisia atacta</i>			SL		1/1
plants	land plants	Pandanaceae	<i>Pandanus tectorius</i>			C		5/3
plants	land plants	Passifloraceae	<i>Adenia heterophylla subsp. heterophylla</i>			C		1/1
plants	land plants	Passifloraceae	<i>Passiflora aurantia var. aurantia</i>			C		1/1
plants	land plants	Passifloraceae	<i>Passiflora foetida</i>		Y			7/7
plants	land plants	Passifloraceae	<i>Passiflora pallida</i>		Y			1/1
plants	land plants	Pedaliaceae	<i>Josephinia imperatricis</i>			C		1/1
plants	land plants	Petiveriaceae	<i>Rivina humilis</i>		Y			1/1
plants	land plants	Philydraceae	<i>Philydrum lanuginosum</i>	frogsmouth		C		1/1
plants	land plants	Phyllanthaceae	<i>Breynia cernua</i>			C		2/2
plants	land plants	Phyllanthaceae	<i>Breynia oblongifolia</i>			C		1/1
plants	land plants	Phyllanthaceae	<i>Cleistanthus apodus</i>			C		3/3
plants	land plants	Phyllanthaceae	<i>Glochidion benthamianum</i>			C		1/1
plants	land plants	Phyllanthaceae	<i>Glochidion harveyanum var. harveyanum</i>			C		3/3
plants	land plants	Phyllanthaceae	<i>Phyllanthus</i>					3/3
plants	land plants	Phyllanthaceae	<i>Phyllanthus dallachyanus subsp. (Irvinebank P.I.Forster PIF14675)</i>			C		1/1
plants	land plants	Phyllanthaceae	<i>Phyllanthus novae-hollandiae</i>			C		1/1
plants	land plants	Picrodendraceae	<i>Choriceras tricorne</i>			C		4/4
plants	land plants	Picrodendraceae	<i>Neoroepera banksii</i>			C		8/8
plants	land plants	Picrodendraceae	<i>Petalostigma banksii</i>			C		1/1
plants	land plants	Picrodendraceae	<i>Petalostigma pubescens</i>	quinine tree		C		1/1
plants	land plants	Piperaceae	<i>Piper caninum</i>	peppervine		C		1/1
plants	land plants	Pittosporaceae	<i>Bursaria tenuifolia</i>			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Pittosporaceae	<i>Pittosporum rubiginosum</i>			C		2/2
plants	land plants	Plumbaginaceae	<i>Aegialitis annulata</i>	club mangrove		C		6/6
plants	land plants	Poaceae	<i>Aristida holathera</i> var. <i>holathera</i>			C		1/1
plants	land plants	Poaceae	<i>Cenchrus echinatus</i>	Mossman River grass	Y			1
plants	land plants	Poaceae	<i>Chloris inflata</i>	purpletop chloris	Y			1/1
plants	land plants	Poaceae	<i>Chrysopogon aciculatus</i>	Mackie's pest	Y			4
plants	land plants	Poaceae	<i>Coelachne pulchella</i>			C		1/1
plants	land plants	Poaceae	<i>Cymbopogon ambiguus</i>	lemon grass		C		1/1
plants	land plants	Poaceae	<i>Cymbopogon refractus</i>	barbed-wire grass		C		1/1
plants	land plants	Poaceae	<i>Digitaria fumida</i>			C		2/2
plants	land plants	Poaceae	<i>Digitaria leucostachya</i>			C		4/4
plants	land plants	Poaceae	<i>Ectrosia leporina</i>			C		5/5
plants	land plants	Poaceae	<i>Elionurus citreus</i>	lemon-scented grass		C		1/1
plants	land plants	Poaceae	<i>Eragrostis interrupta</i>			C		2/2
plants	land plants	Poaceae	<i>Eragrostis pubescens</i>			C		4/4
plants	land plants	Poaceae	<i>Eremochloa</i>					2/2
plants	land plants	Poaceae	<i>Eremochloa bimaculata</i>	poverty grass		C		1/1
plants	land plants	Poaceae	<i>Eriachne insularis</i>			C		2/2
plants	land plants	Poaceae	<i>Eriachne pallescens</i> var. <i>gracilis</i>			C		1/1
plants	land plants	Poaceae	<i>Eriachne pallescens</i> var. <i>pallescens</i>			C		2/2
plants	land plants	Poaceae	<i>Eriachne stipacea</i>			C		2/2
plants	land plants	Poaceae	<i>Eriachne triodioides</i>			C		1/1
plants	land plants	Poaceae	<i>Eriachne trisetata</i>			C		1/1
plants	land plants	Poaceae	<i>Heteropogon contortus</i>	black speargrass		C		1/1
plants	land plants	Poaceae	<i>Heteropogon triticeus</i>	giant speargrass		C		1/1
plants	land plants	Poaceae	<i>Hyparrhenia rufa</i>		Y			2
plants	land plants	Poaceae	<i>Imperata cylindrica</i>	blady grass		C		1/1
plants	land plants	Poaceae	<i>Isachne confusa</i>			C		1/1
plants	land plants	Poaceae	<i>Ischaemum fragile</i>			C		1/1
plants	land plants	Poaceae	<i>Ischaemum muticum</i>			C		2/2
plants	land plants	Poaceae	<i>Lepturus repens</i>	stalky grass		C		8/7
plants	land plants	Poaceae	<i>Megathyrsus maximus</i>		Y			1
plants	land plants	Poaceae	<i>Megathyrsus maximus</i> var. <i>maximus</i>		Y			3/3
plants	land plants	Poaceae	<i>Melinis repens</i>	red natal grass	Y			2
plants	land plants	Poaceae	<i>Mnesithea formosa</i>			C		1/1
plants	land plants	Poaceae	<i>Oplismenus imbecillis</i>			C		1/1
plants	land plants	Poaceae	<i>Oryza meridionalis</i>			C		1/1
plants	land plants	Poaceae	<i>Panicum seminudum</i> var. <i>cairnsianum</i>			C		1/1
plants	land plants	Poaceae	<i>Panicum simile</i>			C		1/1
plants	land plants	Poaceae	<i>Paspalidium distans</i>	shotgrass		C		1/1
plants	land plants	Poaceae	<i>Paspalidium spartellum</i>			C		2/2
plants	land plants	Poaceae	<i>Paspalum scrobiculatum</i>	ditch millet		C		3/3
plants	land plants	Poaceae	<i>Paspalum vaginatum</i>	saltwater couch	Y			1/1
plants	land plants	Poaceae	<i>Perotis rara</i>	comet grass		C		1/1
plants	land plants	Poaceae	<i>Sacciolepis myosuroides</i>			C		1/1
plants	land plants	Poaceae	<i>Sarga plumosum</i>			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Poaceae	<i>Setaria surgens</i>			C		2/2
plants	land plants	Poaceae	<i>Spinifex sericeus</i>	beach spinifex		C		1/1
plants	land plants	Poaceae	<i>Sporobolus fertilis</i>	giant Parramatta grass	Y			2/2
plants	land plants	Poaceae	<i>Sporobolus virginicus</i>	sand couch		C		7/7
plants	land plants	Poaceae	<i>Thaumastochloa monilifera</i>			C		1/1
plants	land plants	Poaceae	<i>Thaumastochloa pubescens</i>			C		3/3
plants	land plants	Poaceae	<i>Themeda arguens</i>			C		2/2
plants	land plants	Poaceae	<i>Themeda quadrivalvis</i>	grader grass	Y			12
plants	land plants	Poaceae	<i>Themeda triandra</i>	kangaroo grass		C		1/1
plants	land plants	Poaceae	<i>Thuarea involuta</i>	tropical beachgrass		C		5/5
plants	land plants	Poaceae	<i>Triodia microstachya</i>			C		3/3
plants	land plants	Poaceae	<i>Urochloa decumbens</i>		Y			22
plants	land plants	Poaceae	<i>Urochloa pubigera</i>			C		1/1
plants	land plants	Poaceae	<i>Whiteochloa airoides</i>			C		4/4
plants	land plants	Polygonaceae	<i>Muehlenbeckia zippelii</i>			C		1/1
plants	land plants	Polypodiaceae	<i>Drynaria quercifolia</i>			SL		1/1
plants	land plants	Polypodiaceae	<i>Drynaria sparsisora</i>			SL		3/3
plants	land plants	Polypodiaceae	<i>Pyrrhosia longifolia</i>			SL		1/1
plants	land plants	Portulacaceae	<i>Calandrinia arenicola</i>			C		2/2
plants	land plants	Portulacaceae	<i>Portulaca australis</i>			C		3/3
plants	land plants	Proteaceae	<i>Banksia dentata</i>			C		2/2
plants	land plants	Proteaceae	<i>Banksia robur</i>	broad-leaved banksia		C		1/1
plants	land plants	Proteaceae	<i>Grevillea glauca</i>	bushy's clothes peg		C		3/3
plants	land plants	Proteaceae	<i>Grevillea pteridifolia</i>	golden parrot tree		C		4/4
plants	land plants	Pteridaceae	<i>Cheilanthes contigua</i>			C		1/1
plants	land plants	Putranjivaceae	<i>Drypetes deplanchei</i>	grey boxwood		C		5/5
plants	land plants	Putranjivaceae	<i>Drypetes vernicosa</i>			C		5/5
plants	land plants	Restionaceae	<i>Baloskion tetraphyllum</i> subsp. <i>meiostachyum</i>			C		5/5
plants	land plants	Restionaceae	<i>Dapsilanthus ramosus</i>			C		6/6
plants	land plants	Rhamnaceae	<i>Alphitonia excelsa</i>	soap tree		C		3/3
plants	land plants	Rhamnaceae	<i>Colubrina asiatica</i>			C		6/6
plants	land plants	Rhamnaceae	<i>Rhamnella vitiensis</i>			C		2/2
plants	land plants	Rhizophoraceae	<i>Bruguiera cylindrica</i>			C		2/2
plants	land plants	Rhizophoraceae	<i>Bruguiera exaristata</i>			C		5/5
plants	land plants	Rhizophoraceae	<i>Bruguiera gymnorhiza</i>	large-fruited orange mangrove		C		5/5
plants	land plants	Rhizophoraceae	<i>Carallia brachiata</i>	carallia		C		1/1
plants	land plants	Rhizophoraceae	<i>Ceriops australis</i>			C		4/4
plants	land plants	Rhizophoraceae	<i>Ceriops tagal</i>	yellow mangrove		C		2/2
plants	land plants	Rhizophoraceae	<i>Rhizophora apiculata</i>			C		1/1
plants	land plants	Rhizophoraceae	<i>Rhizophora stylosa</i>	spotted mangrove		C		6/6
plants	land plants	Rubiaceae	<i>Atractocarpus sessilis</i>			C		6/6
plants	land plants	Rubiaceae	<i>Cyclophyllum maritimum</i>			C		1/1
plants	land plants	Rubiaceae	<i>Guettarda speciosa</i>			C		4/4
plants	land plants	Rubiaceae	<i>Gynochthodes jasminoides</i>			C		2/2
plants	land plants	Rubiaceae	<i>Ixora timorensis</i>			C		1/1
plants	land plants	Rubiaceae	<i>Larsenaikia ochreatea</i>			C		4/4

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Rubiaceae	<i>Morinda citrifolia</i>			C		5/5
plants	land plants	Rubiaceae	<i>Psychotria</i>					1/1
plants	land plants	Rubiaceae	<i>Psychotria fitzalanii</i>			C		1/1
plants	land plants	Rubiaceae	<i>Psychotria polioSTEMMA</i>			C		5/5
plants	land plants	Rubiaceae	<i>Psydrax banksii</i>			C		5/5
plants	land plants	Rubiaceae	<i>Psydrax odorata subsp. australiana</i>			C		1/1
plants	land plants	Rubiaceae	<i>Spermacoce marginata</i>			C		4/4
plants	land plants	Rubiaceae	<i>Tarenna dallachiana subsp. dallachiana</i>			C		1/1
plants	land plants	Rubiaceae	<i>Timonius timon var. timon</i>			C		1/1
plants	land plants	Rutaceae	<i>Boronia alulata</i>			C		11/11
plants	land plants	Rutaceae	<i>Eriostemon banksii</i>			C		7/7
plants	land plants	Rutaceae	<i>Glycosmis trifoliata</i>			C		3/3
plants	land plants	Rutaceae	<i>Micromelum minutum</i>	clusterberry		C		4/4
plants	land plants	Rutaceae	<i>Murraya ovatifoliolata</i>			C		3/3
plants	land plants	Salicaceae	<i>Casearia dallachii</i>			C		1/1
plants	land plants	Salicaceae	<i>Flacourtia sp. (Shiptons Flat L.W.Jessup+ GJD3200)</i>			C		3/3
plants	land plants	Salicaceae	<i>Scolopia braunii</i>	flintwood		C		1/1
plants	land plants	Santalaceae	<i>Anthobolus filifolius</i>			C		3/3
plants	land plants	Santalaceae	<i>Exocarpos latifolius</i>			C		5/5
plants	land plants	Sapindaceae	<i>Arytera divaricata</i>	coogera		C		2/2
plants	land plants	Sapindaceae	<i>Cupaniopsis anacardioides</i>	tuckeroo		C		1/1
plants	land plants	Sapindaceae	<i>Diploglottis diphyllostegia</i>			C		1/1
plants	land plants	Sapindaceae	<i>Dodonaea lanceolata var. subsessilifolia</i>			C		2/2
plants	land plants	Sapindaceae	<i>Dodonaea malvacea</i>			C		3/3
plants	land plants	Sapindaceae	<i>Dodonaea polyandra</i>			C		10/10
plants	land plants	Sapindaceae	<i>Elattostachys microcarpa</i>			C		1/1
plants	land plants	Sapindaceae	<i>Ganophyllum falcatum</i>			C		3/3
plants	land plants	Sapindaceae	<i>Guioa acutifolia</i>	northern guioa		C		4/4
plants	land plants	Sapindaceae	<i>Mischocarpus exangulatus</i>			C		1/1
plants	land plants	Sapindaceae	<i>Mischocarpus pyriformis subsp. pyriformis</i>			C		1/1
plants	land plants	Sapindaceae	<i>Synima cordierorum</i>			C		1/1
plants	land plants	Sapotaceae	<i>Amorphospermum antilogum</i>			C		4/4
plants	land plants	Sapotaceae	<i>Manilkara kauki</i>			C		6/6
plants	land plants	Sapotaceae	<i>Palaquium galactoxylon</i>			C		1/1
plants	land plants	Sapotaceae	<i>Planchonella chartacea</i>			C		1/1
plants	land plants	Sapotaceae	<i>Planchonella myrsinodendron</i>			C		2/2
plants	land plants	Sapotaceae	<i>Planchonella obovata</i>			C		1/1
plants	land plants	Sapotaceae	<i>Sersalisia sericea</i>			C		2/2
plants	land plants	Schizaeaceae	<i>Schizaea dichotoma</i>	branched comb fern		SL		2/2
plants	land plants	Scrophulariaceae	<i>Myoporum boninense subsp. australe</i>			C		2/2
plants	land plants	Simaroubaceae	<i>Brucea javanica</i>			C		1/1
plants	land plants	Smilacaceae	<i>Smilax calophylla</i>			C		1/1
plants	land plants	Solanaceae	<i>Capsicum frutescens</i>			Y		1/1
plants	land plants	Solanaceae	<i>Physalis angulata</i>			Y		1/1
plants	land plants	Solanaceae	<i>Solanum seafortianum</i>	Brazilian nightshade		Y		1/1
plants	land plants	Solanaceae	<i>Solanum torvum</i>	devil's fig		Y		2/2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Sparrmanniaceae	<i>Grewia oxyphylla</i>			C		1/1
plants	land plants	Sparrmanniaceae	<i>Triumfetta repens</i>			C		2/2
plants	land plants	Sparrmanniaceae	<i>Triumfetta rhomboidea</i>	chinese burr	Y			9/1
plants	land plants	Stackhousiaceae	<i>Stackhousia</i> sp. (McIvor River J.R.Clarkson 5201)			E		3/3
plants	land plants	Stemonuraceae	<i>Gomphandra australiana</i>			C		1/1
plants	land plants	Sterculiaceae	<i>Argyrodendron polyandrum</i>	brown tulip oak		C		1/1
plants	land plants	Sterculiaceae	<i>Argyrodendron trifoliolatum</i>	booyong		C		1/1
plants	land plants	Sterculiaceae	<i>Sterculia quadrifida</i>	peanut tree		C		1/1
plants	land plants	Stylidiaceae	<i>Stylidium adenophorum</i>			SL		2/2
plants	land plants	Stylidiaceae	<i>Stylidium pedunculatum</i>			SL		1/1
plants	land plants	Stylidiaceae	<i>Stylidium tenerum</i>			SL		2/2
plants	land plants	Surianaceae	<i>Suriana maritima</i>			C		5/5
plants	land plants	Tectariaceae	<i>Arthropteris palisotii</i>			C		3/3
plants	land plants	Thelypteridaceae	<i>Christella dentata</i>	creek fern		SL		1/1
plants	land plants	Thelypteridaceae	<i>Christella hispidula</i>			SL		1/1
plants	land plants	Urticaceae	<i>Pipturus argenteus</i>	white nettle		C		1/1
plants	land plants	Verbenaceae	<i>Lantana camara</i>	lantana	Y			41/3
plants	land plants	Verbenaceae	<i>Stachytarpheta jamaicensis</i>	Jamaica snakeweed	Y			41/3
plants	land plants	Violaceae	<i>Pigea enneasperma</i>			C		2/2
plants	land plants	Vitaceae	<i>Causonis maritima</i>			C		2/2
plants	land plants	Vitaceae	<i>Causonis trifolia</i>			C		2/2
plants	land plants	Vitaceae	<i>Cayratia cardiophylla</i>			C		5/5
plants	land plants	Vitaceae	<i>Cissus adnata</i>			C		1/1
plants	land plants	Vitaceae	<i>Cissus oblonga</i>			C		2/2
plants	land plants	Vitaceae	<i>Cissus repens</i>			C		1/1
plants	land plants	Vitaceae	<i>Leea novoguineensis</i>			C		2/2
plants	land plants	Vitaceae	<i>Tetrastigma nitens</i>	shining grape		C		1/1
plants	land plants	Vitaceae	<i>Tetrastigma thorsborneorum</i>			C		1/1
plants	land plants	Xanthorrhoeaceae	<i>Xanthorrhoea johnsonii</i>			SL		2/2
plants	land plants	Xyridaceae	<i>Xyris complanata</i>	yellow-eye		C		2/2
plants	land plants	Xyridaceae	<i>Xyris oligantha</i>			C		1/1
plants	land plants	Zygophyllaceae	<i>Tribulopsis solandri</i>			C		1/1
plants	land plants	Zygophyllaceae	<i>Tribulus cistoides</i>	bulls head vine		C		5/4

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*.

The codes are Extinct (EX), Extinct in the Wild (PE), Critically Endangered (CR), Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SL) and Least Concern (C).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999*.

The values of EPBC are Extinct (EX), Extinct in the Wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) and Conservation Dependent (CD).

Records - The first number indicates the total number of records of the taxon (wildlife records and species listings for selected areas).

This number is output as 99999 if it equals or exceeds this value. A second number located after a / indicates the number of specimen records for the taxon.

This number is output as 999 if it equals or exceeds this value.



Queensland Government

Department of Environment and Science

Environmental Reports

Regional Ecosystems

Biodiversity Status

For the selected area of interest
ml: 100284

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "central coordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the input coordinates.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no matters of interest have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Important Note to User

Information presented in this report is based upon the Queensland Herbarium's Regional Ecosystem framework. The Biodiversity Status has been used to depict the extent of "Endangered", "Of Concern" and "No Concern at Present" regional ecosystems in all cases, rather than the classes used for the purposes of the *Vegetation Management Act 1999* (VMA). Mapping and figures presented in this document reflect the Queensland Herbarium's Remnant and Pre-clearing Regional Ecosystem Datasets, and not the certified mapping used for the purpose of the VMA.

For matters relevant to vegetation management under the VMA, please refer to the Department of Resources website <https://www.resources.qld.gov.au/>

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Summary Information

The following table provides an overview of the AOI with respect to selected topographic and environmental themes. Refer to **Map 1** for locality information.

Table 1: Area of interest details: ml: 100284

Size (ha)	613.67
Local Government(s)	Hope Vale Aboriginal Shire
Bioregion(s)	Cape York Peninsula
Subregion(s)	Starke Coastal Lowlands
Catchment(s)	Jeannie

The table below summarizes the extent of remnant vegetation classed as "Endangered", "Of concern" and "No concern at present" regional ecosystems classified by Biodiversity Status within the area of interest (AOI).

Table 2: Summary table, biodiversity status of regional ecosystems within the AOI

Biodiversity Status	Area (Ha)	% of AOI
Endangered	0.0	0.0
Of concern	36.71	5.98
No concern at present	576.96	94.02
Total remnant vegetation	613.67	100.0

Refer to **Map 2** for further information.

Regional Ecosystems

1. Introduction

Regional ecosystems are vegetation communities in a bioregion that are consistently associated with particular combinations of geology, landform and soil (Sattler and Williams 1999). Descriptions of Queensland's Regional ecosystems are available online from the Regional Ecosystem Description Database (REDD). Descriptions are compiled from a broad range of information sources including vegetation, land system and geology survey and mapping and detailed vegetation site data. The regional ecosystem classification and descriptions are reviewed as new information becomes available. A number of vegetation communities may form a single regional ecosystem and are usually distinguished by differences in dominant species, frequently in the shrub or ground layers and are denoted by a letter following the regional ecosystem code (e.g. a, b, c). Vegetation communities and regional ecosystems are amalgamated into a higher level classification of broad vegetation groups (BVGs).

A published methodology for survey and mapping of regional ecosystems across Queensland (Neldner et al 2020) provides further details on regional ecosystem concepts and terminology.

This report provides information on the type, status, and extent of vegetation communities, regional ecosystems and broad vegetation groups present within a user specified area of interest. Please note, for the purpose of this report, the Biodiversity Status is used. This report has not been developed for application of the *Vegetation Management Act 1999* (VMA). Additionally, information generated in this report has been derived from the Queensland Herbarium's Regional Ecosystem Mapping, and not the regulated mapping certified for the purposes of the VMA. If your interest/matter relates to regional ecosystems and the VMA, users should refer to the Department of Resources website.

<https://www.resources.qld.gov.au/>

With respect to the Queensland Biodiversity Status,

"Endangered" regional ecosystems are described as those where:

- remnant vegetation is less than 10 per cent of its pre-clearing extent across the bioregion; or 10-30% of its pre-clearing extent remains and the remnant vegetation is less than 10,000 hectares, or
- less than 10 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss*, or
- 10-30 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss and the remnant vegetation is less than 10,000 hectares; or
- it is a rare** regional ecosystem subject to a threatening process.***

"Of concern" regional ecosystems are described as those where:

- the degradation criteria listed above for 'Endangered' regional ecosystems are not met and,
- remnant vegetation is 10-30 per cent of its pre-clearing extent across the bioregion; or more than 20 per cent of its pre-clearing extent remains and the remnant extent is less than 10,000 hectares, or
- 10-30 percent of its pre-clearing extent remains unaffected by moderate degradation and/or biodiversity loss.****

and "No concern at present" regional ecosystems are described as those where:

- remnant vegetation is over 30 per cent of its pre-clearing extent across the bioregion, and the remnant area is greater than 10,000 hectares, and
- the degradation criteria listed above for 'Endangered' or 'Of concern' regional ecosystems are not met.

**Severe degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 50 years even with the removal of threatening processes; or soil surface is severely degraded, for example, by loss of A horizon, surface expression of salinity; surface compaction, loss of organic matter or sheet erosion.*

***Rare regional ecosystem: pre-clearing extent (1000 ha); or patch size (100 ha and of limited total extent across its range).*

****Threatening processes are those that are reducing or will reduce the biodiversity and ecological integrity of a regional ecosystem. For example, clearing, weed invasion, fragmentation, inappropriate fire regime or grazing pressure, or infrastructure development.*

****Moderate degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 20 years even with the removal of threatening processes; or soil surface is moderately degraded.

2. Remnant Regional Ecosystems

The following table identifies the remnant regional ecosystems and vegetation communities mapped within the AOI and provides their short descriptions, Biodiversity Status, and remnant extent within the selected AOI. Please note, where heterogeneous vegetated patches (mixed patches of remnant vegetation mapped as containing multiple regional ecosystems) occur within the AOI, they have been split and listed as individual regional ecosystems (or vegetation communities where present) for the purposes of the table below. In such instances, associated area figures have been generated based upon the estimated proportion of each regional ecosystem (or vegetation community) predicted to be present within the larger mixed patch.

Table 3: Remnant regional ecosystems, description and status within the AOI

Regional Ecosystem	Short Description	BD Status	Area (Ha)	% of AOI
3.10.19	Asteromyrtus lysicephala and Neofabricia myrtifolia dwarf open heath or Schizachyrium pachyarthron closed tussock grassland on sandstone plateaus and headlands	No concern at present	28.93	4.72
3.10.6x4	Eucalyptus tetradonta +/- Corymbia stockeri subsp. stockeri woodland on sandstone plateaus	No concern at present	24.42	3.98
3.11.19a	Themeda triandra closed tussock grassland or Asteromyrtus lysicephala, Neofabricia myrtifolia, Grevillea pteridifolia dwarf open heathlands on headlands and islands	Of concern	6.93	1.13
3.11.19b	Themeda triandra closed tussock grassland or Asteromyrtus lysicephala, Neofabricia myrtifolia, Grevillea pteridifolia dwarf open heathlands on headlands and islands	Of concern	13.85	2.26
3.11.21	Deciduous vine thicket on metamorphic slopes	Of concern	13.85	2.26
3.2.10	Eucalyptus tetradonta and Corymbia clarksoniana +/- E. brassiana or Erythrophleum chlorostachys woodland on stabilised dunes	No concern at present	116.28	18.95
3.2.12b	Acacia crassicarpa, Syzygium banksii low closed forest +/- emergent Araucaria cunninghamii var. cunninghamii on coastal dunefields and beach ridges	No concern at present	15.29	2.49
3.2.21a	Neofabricia myrtifolia +/- Jacksonia thesioides open to closed heath on dunefields	No concern at present	387.89	63.21
3.2.22	Mixed dwarf open heath on dunes and headlands	Of concern	2.07	0.34
3.2.26	Sparse herbland and/or shrubland and bare sand areas predominantly on sand blows	No concern at present	4.15	0.68

Refer to **Map 2** for further information. **Map 3** also provides a visual estimate of the distribution of regional ecosystems present before clearing.

Table 4 provides further information in regards to the remnant regional ecosystems present within the AOI. Specifically, the extent of remnant vegetation remaining within the bioregion, the 1:1,000,000 broad vegetation group (BVG) classification, whether the regional ecosystem is identified as a wetland, and extent of representation in Queensland's Protected Area Estate. For a description of the vegetation communities within the AOI and classified according to the 1:1,000,000 BVG, refer to **Table 6**.

Table 4: Remnant regional ecosystems within the AOI, additional information

Regional Ecosystem	Remnant Extent	BVG (1 Million)	Wetland	Representation in protected estate
3.10.19	Pre-clearing 11000 ha; Remnant 2019 11000 ha	29a	Not a Wetland	No representation
3.10.6x4	Pre-clearing 396000 ha; Remnant 2019 396000 ha	14d	Not a Wetland	Low
3.11.19a	Pre-clearing 1000 ha; Remnant 2019 1000 ha	29a	Not a Wetland	High
3.11.19b	Pre-clearing 1000 ha; Remnant 2019 1000 ha	29a	Not a Wetland	High
3.11.21	Pre-clearing 5000 ha; Remnant 2019 5000 ha	7b	Not a Wetland	No representation
3.2.10	Pre-clearing 36000 ha; Remnant 2019 36000 ha	14b	Not a Wetland	Medium
3.2.12b	Pre-clearing 25000 ha; Remnant 2019 24000 ha	3a	Not a Wetland	Medium
3.2.21a	Pre-clearing 58000 ha; Remnant 2019 58000 ha	29a	Not a Wetland	Medium
3.2.22	Pre-clearing 4000 ha; Remnant 2019 4000 ha	29a	Not a Wetland	High
3.2.26	Pre-clearing 14000 ha; Remnant 2019 14000 ha	28d	Not a Wetland	Medium

Representation in Protected Area Estate: High greater than 10% of pre-clearing extent is represented; Medium 4 - 10% is represented; Low less than 4% is represented, No representation.

The distribution of mapped wetland systems within the area of interest is displayed in **Map 6**.

The following table lists known special values associated with a regional ecosystem type.

Table 5: Remnant regional ecosystems within the AOI, special values

Regional Ecosystem	Special Values
3.10.19	Potential habitat for NCA listed species: <i>Lepturus geminatus</i>
3.10.6x4	Potential habitat for NCA listed species: <i>Acacia guyeri</i> , <i>Cucumis costatus</i> , <i>Dianella incollata</i> , <i>Gardenia psidioides</i> , <i>Homoranthus tropicus</i> , <i>Stemona angusta</i> , <i>Stenanthemum argenteum</i> , <i>Syzygium rubrimolle</i>
3.11.19a	None
3.11.19b	None
3.11.21	Potential habitat for NCA listed species: <i>Dockrillia wassellii</i>
3.2.10	None
3.2.12b	High numbers of endemic plant species. The vulnerable plant species <i>Cycas silvestris</i> and near threatened species <i>Xanthostemon arenarius</i> occur in this ecosystem.
3.2.21a	Potential habitat for NCA listed species: <i>Acacia solenota</i> , <i>Dendrobium bigibbum</i> , <i>Dendrobium johannis</i> , <i>Dockrillia wassellii</i> , <i>Stackhousia</i> sp. (McIvor River J.R.Clarkson 5201)
3.2.22	Potential habitat for NCA listed species: <i>Dendrobium bigibbum</i>
3.2.26	Potential habitat for NCA listed species: <i>Dendrobium bigibbum</i> , <i>Dendrobium johannis</i>

3. Remnant Regional Ecosystems by Broad Vegetation Group

BVGs are a higher-level grouping of vegetation communities. Queensland encompasses a wide variety of landscapes across temperate, wet and dry tropics and semi-arid climatic zones. BVGs provide an overview of vegetation communities across the state or a bioregion and allow comparison with other states. There are three levels of BVGs which reflect the approximate scale at which they are designed to be used: the 1:5,000,000 (national), 1:2,000,000 (state) and 1:1,000,000 (regional) scales.

A comprehensive description of BVGs is available at:

<https://publications.qld.gov.au/dataset/redd/resource/>

The following table provides a description of the 1:1,000,000 BVGs present and their associated extent within the AOI.

Table 6: Broad vegetation groups (1 million) within the AOI

BVG (1 Million)	Description	Area (Ha)	% of AOI
14b	Woodlands dominated by <i>Eucalyptus tetrodonta</i> (Darwin stringybark) (or <i>E. megasepala</i> (Melville Island bloodwood)) or <i>E. chartaboma</i> (or <i>E. miniata</i> (Darwin woollybutt)), with <i>Corymbia clarksoniana</i> (grey bloodwood) on erosional surfaces, residual sands and occasionally alluvial plains. (land zones 5, 3, 7, 10, 2) (CYP, GUP, EIU, NWH, [DEU])	116.28	18.95
14d	Woodlands dominated by <i>Corymbia stockeri</i> (or <i>C. hylandii</i>) and <i>Eucalyptus megasepala</i> (or <i>E. tetrodonta</i> (Darwin stringybark)) on sandstone, metamorphic and ironstone ranges. (land zones 10, 11, 12, 7) (CYP, GUP, EIU, [DEU])	24.42	3.98
28d	Sand blows to closed herblands of <i>Lepturus repens</i> (stalky grass) and herbs on sand cays and shingle cays. (land zone 2) (CYP, SEQ, [CQC])	4.15	0.68
29a	Open heaths and dwarf open heaths on coastal dunefields, sandplains and headlands. (land zones 5, 2, 3, [7, 10, 12, 11]) (CYP, SEQ, [WET])	439.68	71.65
3a	Evergreen to semi-deciduous, notophyll to microphyll vine forest/thicket on beach ridges and coastal dunes, occasionally <i>Araucaria cunninghamii</i> (hoop pine) microphyll vine forest on dunes. <i>Pisonia grandis</i> on coral cays. (land zone 2, [5]) (CYP, GUP, SEQ, WET, BRB, CQC) (Tracey 1982 2b)	15.29	2.49
7b	Deciduous microphyll vine thicket on ranges and heavy clay alluvia in northern bioregions. (land zones 3, 12, 11, 10, 7) (CYP, WET)	13.85	2.26

Refer to **Map 4** for further information. **Map 5** also provides a representation of the distribution of vegetation communities as per the 1:5,000,000 BVG believed to be present prior to European settlement.

4. Technical and BioCondition Benchmark Descriptions

Technical descriptions provide a detailed description of the full range in structure and floristic composition of regional ecosystems (e.g. 11.3.1) and their component vegetation communities (e.g. 11.3.1a, 11.3.1b). See:

<http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/>

The descriptions are compiled using site survey data from the Queensland Herbarium's CORVEG database. Distribution maps, representative images (if available) and the pre-clearing and remnant extent (hectares) of each vegetation community derived from the regional ecosystem mapping data are included. The technical descriptions should be used in conjunction with the fields from the regional ecosystem description database (REDD) for a full description of the regional ecosystem.

Technical descriptions include data on canopy height, canopy cover and native plant species composition of the predominant layer, which are attributes relevant to assessment of the remnant status of vegetation under the *Vegetation Management Act 1999*. However, as technical descriptions reflect the full range in structure and floristic composition across the climatic, natural disturbance and geographic range of the regional ecosystem, local reference sites should be used for remnant assessment where possible (Neldner et al. 2020 (PDF)* section 3.3 of:

<https://publications.qld.gov.au/dataset/redd/resource/>

The technical descriptions are subject to review and are updated as additional data becomes available.

When conducting a BioCondition assessment, these technical descriptions should be used in conjunction with BioCondition benchmarks for the specific regional ecosystem, or component vegetation community.

<http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/>

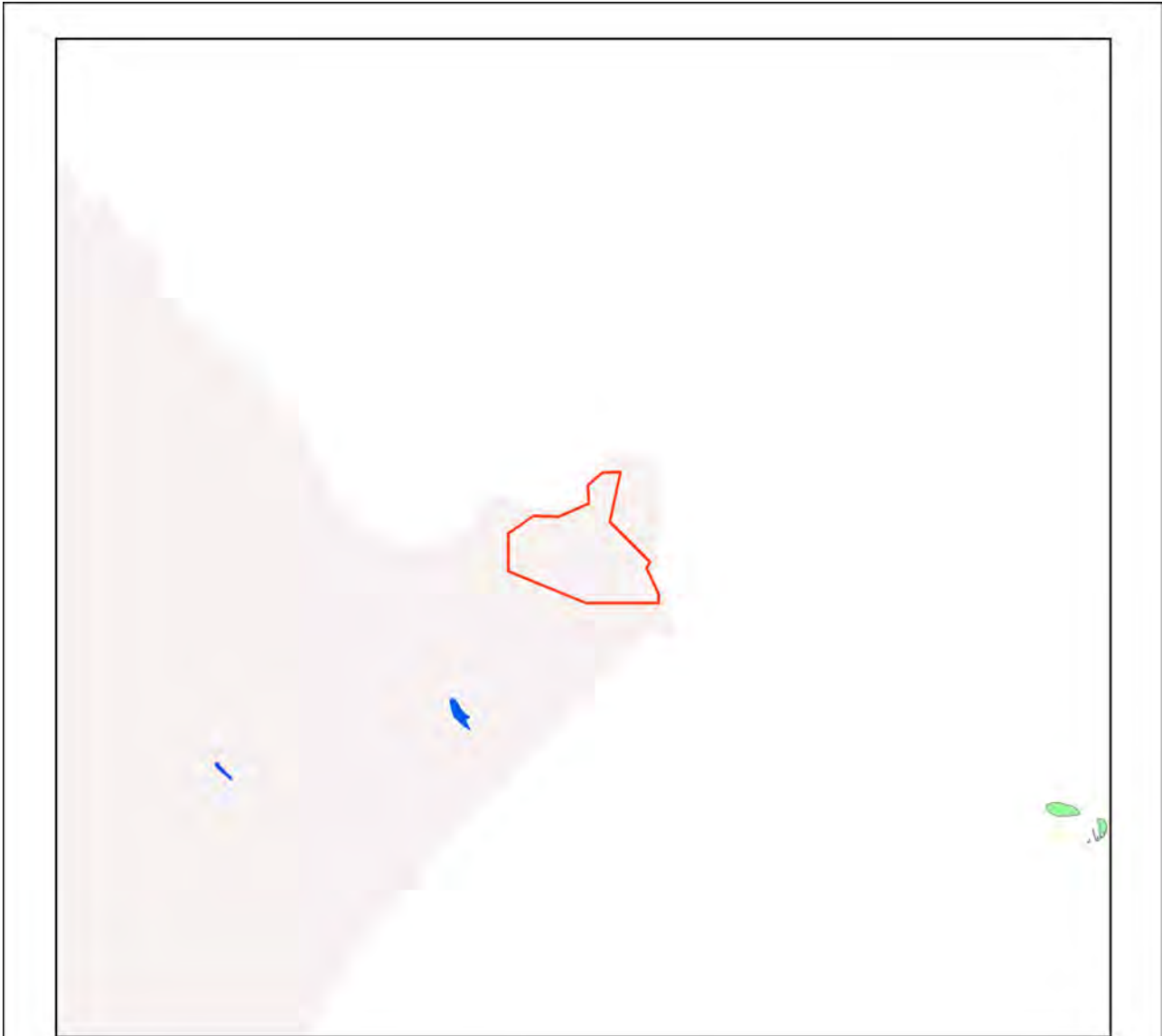
Benchmarks are based on a combination of quantitative and qualitative information and should be used as a guide only. Benchmarks are specific to one regional ecosystem vegetation community, however, the natural variability in structure and floristic composition under a range of climatic and natural disturbance regimes has been considered throughout the geographic extent of the regional ecosystem. Local reference sites should be used for this spatial and temporal (seasonal and annual) variability.

Table 7: List of remnant regional ecosystems within the AOI for which technical and biocondition benchmark descriptions are available

Regional ecosystems mapped as within the AOI	Technical Descriptions	Biocondition Benchmarks
3.10.19	Not currently available	Not currently available
3.10.6x4	Not currently available	Not currently available
3.11.19a	Not currently available	Not currently available
3.11.19b	Not currently available	Not currently available
3.11.21	Not currently available	Not currently available
3.2.10	Not currently available	Not currently available
3.2.12b	Not currently available	Not currently available
3.2.21a	Not currently available	Not currently available
3.2.22	Not currently available	Not currently available
3.2.26	Not currently available	Not currently available

Maps

Map 1 - Location



Locality Map

Legend

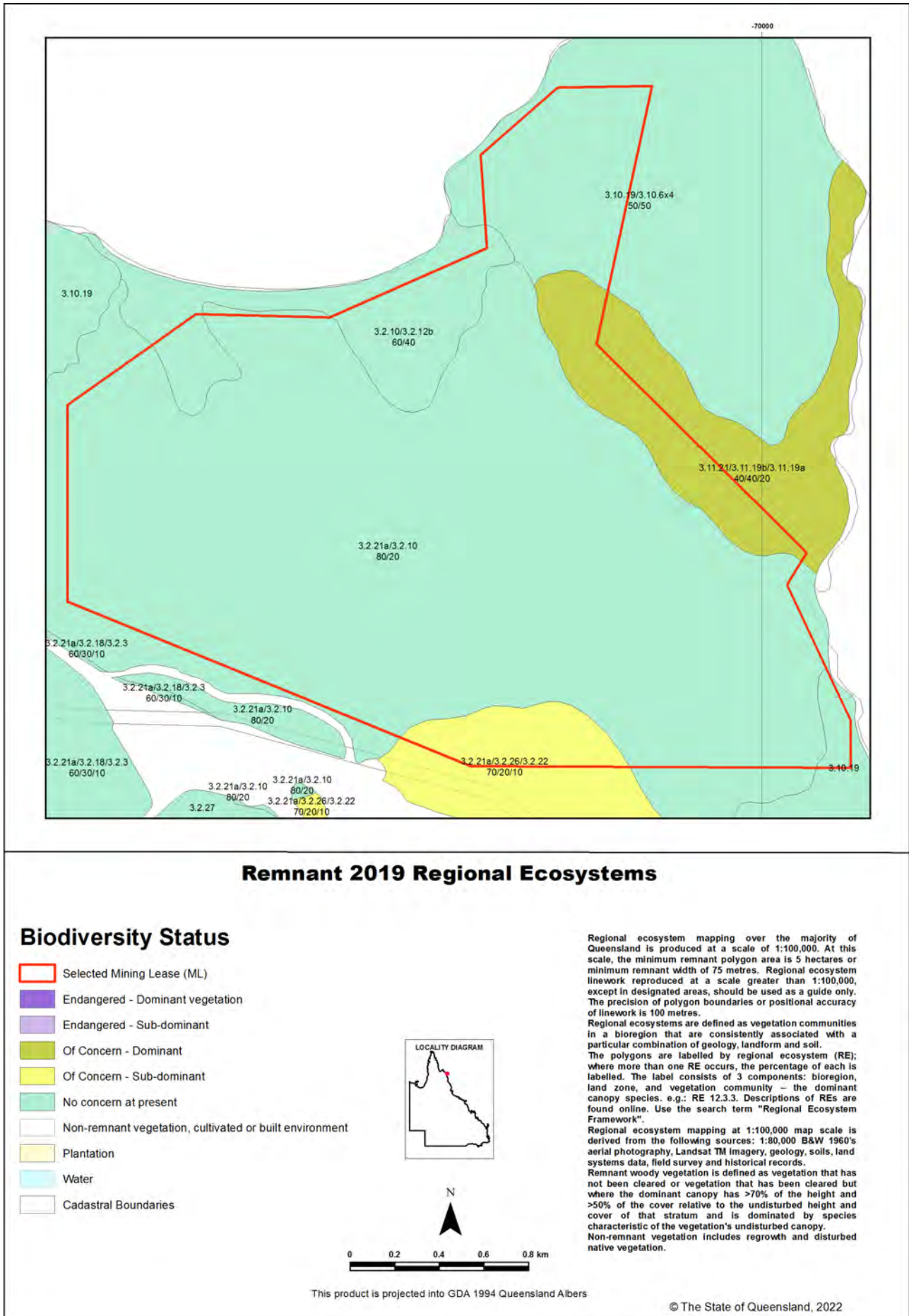
- Selected Mining Lease (ML)
- Towns
- Highway
- Connector
- Street/Local Road
- Reservoirs
- Lakes
- National Park (Scientific)
- National Park
- National Park (CYPAL)
- Conservation Park
- Resources Reserve
- Forest Reserve
- State Forest
- Timber Reserve
- Nature Refuges
- Coordinated Conservation Areas
- Major rivers/creeks
- Queensland



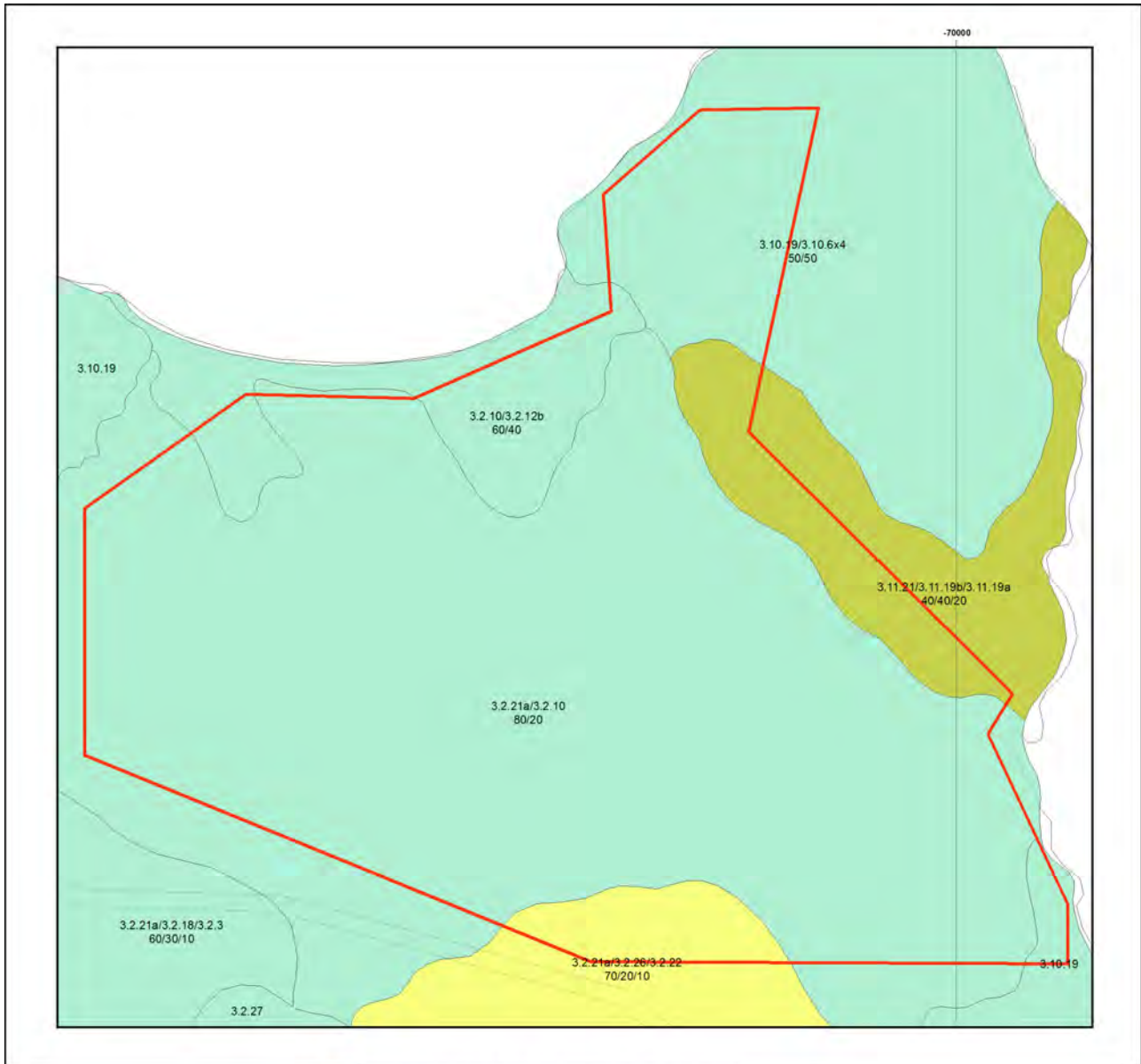
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Map 2 - Remnant 2019 regional ecosystems



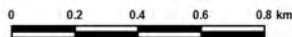
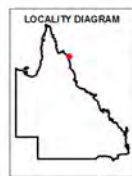
Map 3 - Pre-clearing regional ecosystems



Pre-clearing Regional Ecosystems

Biodiversity Status

- Selected Mining Lease (ML)
- Endangered - Dominant vegetation
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- No concern at present
- Water
- Cadastral Boundaries



Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.

Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. The polygons are labelled by regional ecosystem (RE); where more than one RE occurs, the percentage of each is labelled. The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".

Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

This product is projected into GDA 1994 Queensland Albers

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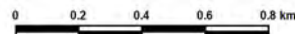
Map 4 - Remnant 2019 regional ecosystems by BVG (5M)



Remnant 2019 Regional Ecosystems coloured by Broad Vegetation Groups

Broad Vegetation Groups BVG5M Description (BVG1M codes)

- Selected Mining Lease (ML)
- 1. Rainforests and scrubs (1-7b)
- 2. Wet eucalypt open forests (8-8b)
- 3. Eucalypt woodlands to open forests (mainly eastern Qld) (9-15b)
- 4. Eucalypt open forests to woodlands on floodplains (16-16d)
- 5. Eucalypt dry woodlands on inland depositional plains (17-18d)
- 6. Eucalypt low open woodlands usually with spinifex understorey (19-19d)
- 7. Callitris woodland - open forests (20a)
- 8. Melaleuca open woodlands on depositional plains (21-22c)
- 9. Acacia aneura (mulga) dominated open forests, woodlands and shrublands (23-23b)
- 10. Other acacia dominated open forests, woodlands and shrublands (24-26a)
- 11. Mixed species woodlands, open woodland - (inland bioregions) includes wooded downs (27-27c)
- 12. Other coastal communities or heaths (28-29b)
- 13. Tussock grasslands, forblands (30-32b)
- 14. Hummock grasslands (33-33b)
- 15. Wetlands (swamps and lakes) (34-34g)
- 16. Mangroves and saltmarshes (35-35b)
- Non-remnant vegetation, cultivated or built environment
- Water
- Cadastral Boundaries



This product is projected into GDA 1994 Queensland Albers

Broad Vegetation Groups (BVG) of Queensland are applied by look up table to the regional ecosystem vegetation communities. Each polygon is coloured by the dominant BVG5M and the component regional ecosystems labelled. Where more than one regional ecosystem occurs, the percentage of each is labelled.

Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.

Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.

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Remnant woody vegetation is defined as vegetation that has not been cleared or vegetation that has been cleared but where the dominant canopy has >70% of the height and >50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy.

Non-remnant vegetation includes regrowth and disturbed native vegetation.

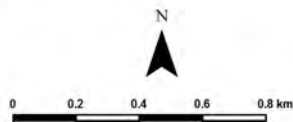
Map 5 - Pre-clearing regional ecosystems by BVG (5M)



Pre-clearing Regional Ecosystems coloured by Broad Vegetation Groups

Broad Vegetation Groups BVG5M Description (BVG1M codes)

- Selected Mining Lease (ML)
- 1. Rainforests and scrubs (1-7b)
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- 3. Eucalypt woodlands to open forests (mainly eastern Qld) (9-15b)
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- 16. Mangroves and saltmarshes (35-35b)
- Water
- Cadastral Boundaries



This product is projected into GDA 1994 Queensland Albers

Broad Vegetation Groups (BVG) of Queensland are applied by look up table to the regional ecosystem vegetation communities. Each polygon is coloured by the dominant BVG5M and the component regional ecosystems labelled. Where more than one regional ecosystem occurs, the percentage of each is labelled.

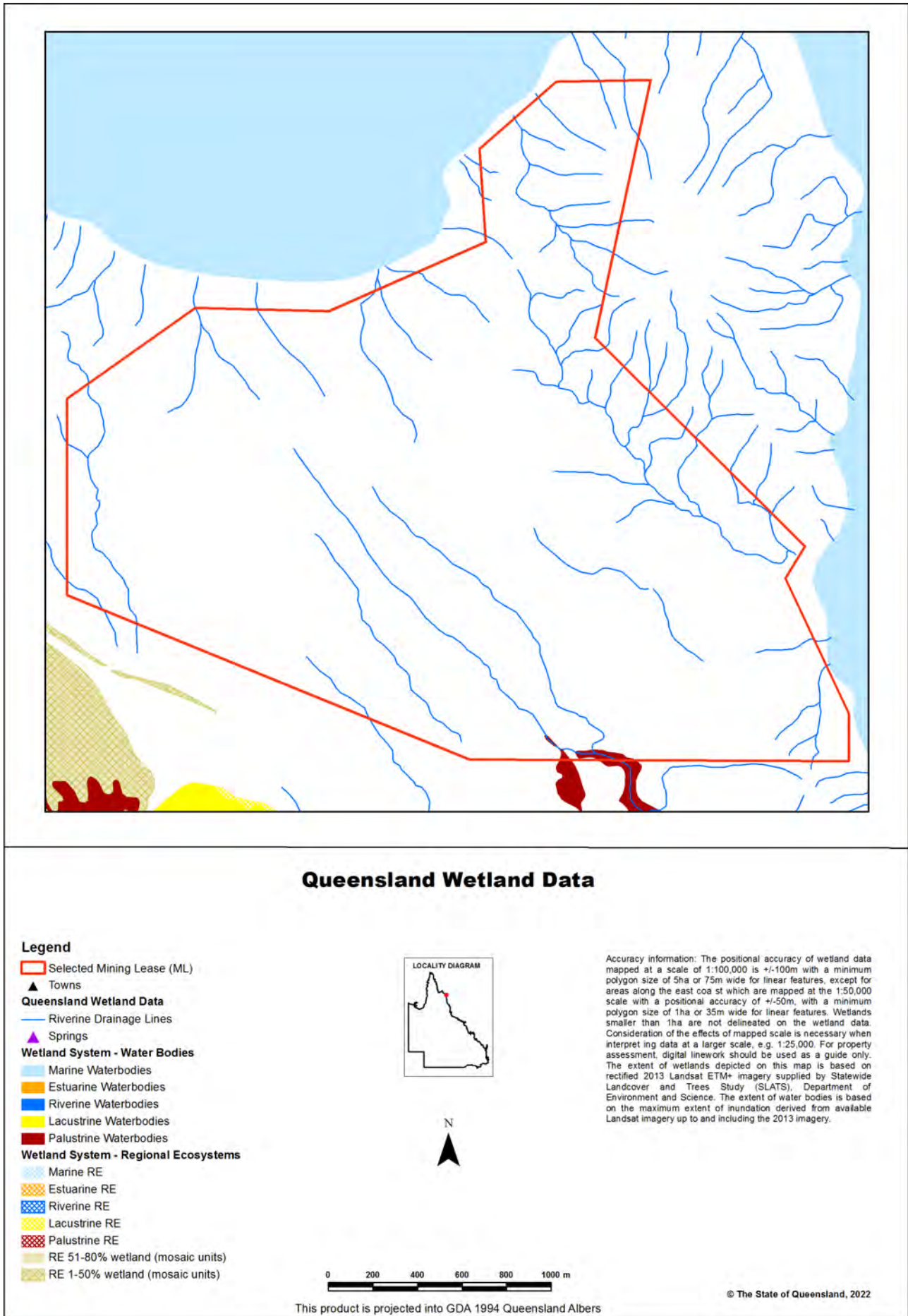
Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem line work reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of line work is 100 metres.

Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.

The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".

Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

Map 6 - Wetlands and waterways



Links and Other Information Sources

The Department of Environment and Science's Website -

<http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/>

provides further information on the regional ecosystem framework, including access to links to the Regional Ecosystem Database, Broad Vegetation Group Definitions, Regional Ecosystem and Land zone descriptions.

Descriptions of the broad vegetation groups of Queensland can be downloaded from:

<https://publications.qld.gov.au/dataset/redd/resource/>

The methodology for mapping regional ecosystems can be downloaded from:

<https://publications.qld.gov.au/dataset/redd/resource/>

Technical descriptions for regional ecosystems can be obtained from:

<http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/>

Benchmarks can be obtained from:

<http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/>

For further information associated with the remnant regional ecosystem dataset used by this report, refer to the metadata associated with the Biodiversity status of pre-clearing and Remnant Regional Ecosystems of Queensland dataset (version listed in **Appendix 1**) which is available through the Queensland Government Information System portal,

<http://dds.information.qld.gov.au/dds/>

The Queensland Globe is a mapping and data application. As an interactive online tool, Queensland Globe allows you to view and explore Queensland maps, imagery (including up-to-date satellite images) and other spatial data, including regional ecosystem mapping. To further view and explore regional ecosystems over an area of interest, access the Biota Globe (a component of the Queensland Globe). The Queensland Globe can be accessed via the following link:

<https://qldglobe.information.qld.gov.au/>

References

Neldner, V.J., Niehus, R.E., Wilson, B.A., McDonald, W.J.F., Ford, A.J. and Accad, A. (2019). The Vegetation of Queensland. Descriptions of Broad Vegetation Groups. Version 4.0. Queensland Herbarium, Department of Environment and Science.

<https://publications.qld.gov.au/dataset/redd/resource/78209e74-c7f2-4589-90c1-c33188359086>

Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S., Butler, D.W., McDonald, W.J.F., Addicott, E.P. and Appelman, C.N. (2020). Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland. Version 5.1. Updated March 2020. Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.

<https://publications.qld.gov.au/dataset/redd/resource/6dee78ab-c12c-4692-9842-b7257c2511e4>

Sattler, P.S. and Williams, R.D. (eds) (1999). *The Conservation Status of Queensland's Bioregional Ecosystems*. Environmental Protection Agency, Brisbane.

Appendices

Appendix 1 - Source Data

The dataset listed below is available for download from:

<http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/download/>

- Regional Ecosystem Description Database

The datasets listed below are available for download from:

<http://dds.information.qld.gov.au/dds/>

- Biodiversity status of pre-clearing and 2019 remnant regional ecosystems of Queensland
- Pre-clearing Vegetation Communities and Regional Ecosystems of Queensland
- Queensland Wetland Data Version - Wetland lines
- Queensland Wetland Data Version - Wetland points
- Queensland Wetland Data Version - Wetland areas

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
VMA	- <i>Vegetation Management Act 1999</i>



Vegetation management report

For Lot: 35 Plan: SP232620

20/09/2022

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Recent changes

Updated mapping

Updated vegetation mapping was released on 8 September 2022 and includes the most recent Queensland Herbarium scientific updates to the Regulated Vegetation Management Map, regional ecosystems, wetland, high-value regrowth and essential habitat mapping.

The Department of Environment and Science have also updated their protected plant and koala protection mapping to align with the Queensland Herbarium scientific updates.

Overview

Based on the lot on plan details you have supplied, this report provides the following detailed information:

Property details - information about the specified Lot on Plan, lot size, local government area, bioregion(s), subregion(s) and catchment(s);

Vegetation management framework - an explanation of the application of the framework and contact details for the Department of Resources who administer the framework;

Vegetation management framework details for the specified Lot on Plan including:

- the vegetation management categories on the property;
- the vegetation management regional ecosystems on the property;
- vegetation management watercourses or drainage features on the property;
- vegetation management wetlands on the property;
- vegetation management essential habitat on the property;
- whether any area management plans are associated with the property;
- whether the property is coastal or non-coastal; and
- whether the property is mapped as Agricultural Land Class A or B;

Protected plant framework - an explanation of the application of the framework and contact details for the Department of Environment and Science who administer the framework, including:

- high risk areas on the protected plant flora survey trigger map for the property;

Koala protection framework - an explanation of the application of the framework and contact details for the Department of Environment and Science who administer the framework; and

Koala protection framework details for the specified Lot on Plan including:

- the koala district the property is located in;
- koala priority areas on the property;
- core and locally refined koala habitat areas on the property;
- whether the lot is located in an identified koala broad-hectare area; and
- koala habitat regional ecosystems on the property for core koala habitat areas.

This information will assist you to determine your options for managing vegetation under:

- the vegetation management framework, which may include:

- exempt clearing work;
- accepted development vegetation clearing code;
- an area management plan;
- a development approval;

- the protected plant framework, which may include:

- the need to undertake a flora survey;
- exempt clearing;
- a protected plant clearing permit;

- the koala protection framework, which may include:

- exempted development;
- a development approval;
- the need to undertake clearing sequentially and in the presence of a koala spotter.

Other laws

The clearing of native vegetation is regulated by both Queensland and Australian legislation, and some local governments also regulate native vegetation clearing. You may need to obtain an approval or permit under another Act, such as the Commonwealth Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Section 8 of this guide provides contact details of other agencies you should confirm requirements with, before commencing vegetation clearing.

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1. Property details

1.1 Tenure and title area

All of the lot, plan, tenure and title area information associated with property Lot: 35 Plan: SP232620, are listed in Table 1.

Table 1: Lot, plan, tenure and title area information for the property

Lot	Plan	Tenure	Property title area (sq metres)
35	SP232620	Freehold	1,100,000,000

The tenure of the land may affect whether clearing is considered exempt clearing work or may be carried out under an accepted development vegetation clearing code.

1.2 Property location

Table 2 provides a summary of the locations for property Lot: 35 Plan: SP232620, in relation to natural and administrative boundaries.

Table 2: Property location details

Local Government(s)
Hope Vale Aboriginal Shire

Bioregion(s)	Subregion(s)
Cape York Peninsula	Battle Camp Sandstones
Cape York Peninsula	Starke Coastal Lowlands

Catchment(s)
Endeavour
Jeannie

2. Vegetation management framework (administered by the Department of Resources)

The *Vegetation Management Act 1999* (VMA), the *Vegetation Management Regulation 2012*, the *Planning Act 2016* and the *Planning Regulation 2017*, in conjunction with associated policies and codes, form the Vegetation Management Framework.

The VMA does not apply to all land tenures or vegetation types. State forests, national parks, forest reserves and some tenures under the *Forestry Act 1959* and *Nature Conservation Act 1992* are not regulated by the VMA. Managing or clearing vegetation on these tenures may require approvals under these laws.

The following native vegetation is not regulated under the VMA but may require permit(s) under other laws:

- grass or non-woody herbage;
- a plant within a grassland regional ecosystem prescribed under Schedule 5 of the *Vegetation Management Regulation 2012*; and
- a mangrove.

2.1 Exempt clearing work

Exempt clearing work is an activity for which you do not need to notify the Department of Resources or obtain an approval under the vegetation management framework. Exempt clearing work was previously known as exemptions.

In areas that are mapped as Category X (white in colour) on the regulated vegetation management map (see section 4.1), and where the land tenure is freehold, indigenous land and leasehold land for agriculture and grazing purposes, the clearing of vegetation is considered exempt clearing work and does not require notification or development approval under the vegetation management framework. For all other land tenures, contact the Department of Resources before commencing clearing to ensure that the proposed activity is exempt clearing work.

A range of routine property management activities are considered exempt clearing work. A list of exempt clearing work is available at

<https://www.qld.gov.au/environment/land/management/vegetation/clearing-approvals/exemptions>.

Exempt clearing work may be affected if the proposed clearing area is subject to development approval conditions, a covenant, an environmental offset, an exchange area, a restoration notice, or an area mapped as Category A. Exempt clearing work may require approval under other Commonwealth, State or Local Government laws, or local government planning schemes. Contact the Department of Resources prior to clearing in any of these areas.

2.2 Accepted development vegetation clearing codes

Some clearing activities can be undertaken under an accepted development vegetation clearing code. The codes can be downloaded at

<https://www.qld.gov.au/environment/land/management/vegetation/clearing-approvals/codes>

If you intend to clear vegetation under an accepted development vegetation clearing code, you must notify the Department of Resources before commencing. The information in this report will assist you to complete the online notification form.

You can complete the online form at

<https://apps.dnrm.qld.gov.au/vegetation/>

2.3 Area management plans

Area Management Plans (AMP) provide an alternative approval system for vegetation clearing under the vegetation management framework. They list the purposes and clearing conditions that have been approved for the areas covered by the plan. It is not necessary to use an AMP, even when an AMP applies to your property.

On 8 March 2020, AMPs ended for fodder harvesting, managing thickened vegetation and managing encroachment. New notifications cannot be made for these AMPs. You will need to consider options for fodder harvesting, managing thickened vegetation or encroachment under a relevant accepted development vegetation clearing code or apply for a development approval.

New notifications can be made for all other AMPs. These will continue to apply until their nominated end date.

If an Area Management Plan applies to your property for which you can make a new notification, it will be listed in Section 3.6 of this report. Before clearing under one of these AMPs, you must first notify the Department of Resources and then follow the conditions and requirements listed in the AMP.

<https://www.qld.gov.au/environment/land/management/vegetation/clearing-approvals/area-management-plans>

2.4 Development approvals

If under the vegetation management framework your proposed clearing is not exempt clearing work, or is not permitted under an accepted development vegetation clearing code, or an AMP, you may be able to apply for a development approval.

Information on how to apply for a development approval is available at

<https://www.qld.gov.au/environment/land/management/vegetation/clearing-approvals/development>

2.5. Contact information for the Department of Resources

For further information on the vegetation management framework:

Phone 135VEG (135 834)

Email vegetation@resources.qld.gov.au

Visit <https://www.resources.qld.gov.au/?contact=vegetation> to submit an online enquiry.

3. Vegetation management framework for Lot: 35 Plan: SP232620

3.1 Vegetation categories

The vegetation categories on your property are shown on the regulated vegetation management map in section 4.1 of this report. A summary of vegetation categories on the subject lot are listed in Table 3. Descriptions for these categories are shown in Table 4.

Table 3: Vegetation categories for subject property. Total area: 109759.76ha

Vegetation category	Area (ha)
Category B	107610.0
Category C	491.4
Category R	90.3
Category Water	105.5
Category X	1462.6

Table 4: Description of vegetation categories

Category	Colour on Map	Description	Requirements / options under the vegetation management framework
A	red	Compliance areas, environmental offset areas and voluntary declaration areas	Special conditions apply to Category A areas. Before clearing, contact the Department of Resources to confirm any requirements in a Category A area.
B	dark blue	Remnant vegetation areas	Exempt clearing work, or notification and compliance with accepted development vegetation clearing codes, area management plans or development approval.
C	light blue	High-value regrowth areas	Exempt clearing work, or notification and compliance with managing Category C regrowth vegetation accepted development vegetation clearing code.
R	yellow	Regrowth within 50m of a watercourse or drainage feature in the Great Barrier Reef catchment areas	Exempt clearing work, or notification and compliance with managing Category R regrowth accepted development vegetation clearing code or area management plans.
X	white	Clearing on freehold land, indigenous land and leasehold land for agriculture and grazing purposes is considered exempt clearing work under the vegetation management framework. Contact the Department of Resources to clarify whether a development approval is required for other State land tenures.	No permit or notification required on freehold land, indigenous land and leasehold land for agriculture and grazing. A development approval may be required for some State land tenures.

Property Map of Assessable Vegetation (PMAV)

There is no Property Map of Assessable Vegetation (PMAV) present on this property.

3.2 Regional ecosystems

The endangered, of concern and least concern regional ecosystems on your property are shown on the vegetation management supporting map in section 4.2 and are listed in Table 5.

A description of regional ecosystems can be accessed online at

<https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/descriptions/>

Table 5: Regional ecosystems present on subject property

Regional Ecosystem	VMA Status	Category	Area (Ha)	Short Description	Structure Category
3.1.1	Least concern	B	500.55	Rhizophora stylosa and/or Bruguiera spp. closed forest	Dense
3.1.2	Least concern	B	18.78	Avicennia marina low open forest	Mid-dense
3.1.3	Least concern	B	291.57	Ceriops tagal and/or C. australis +/- Avicennia marina low open forest	Mid-dense
3.1.4	Of concern	B	127.87	Excoecaria agallocha +/- Aegiceras corniculatum low open forest	Mid-dense
3.1.6	Least concern	B	332.60	Sparse herbland or bare saltpans on salt plains and saline flats	None
3.10.1	Of concern	B	1,741.28	Seepage springs from sandstone or Tertiary plateaus and associated rainforests and vine thickets	Dense
3.10.14	Of concern	B	245.29	Allocasuarina littoralis +/- Acacia crassicarpa low woodland on sandstone plateaus	Sparse
3.10.19	Least concern	B	1,580.82	Asteromyrtus lysicephala and Neofabricia myrtifolia dwarf open heath or Schizachyrium pachyarthon closed tussock grassland on sandstone plateaus and headlands	Mid-dense
3.10.20	Of concern	B	257.47	Sedgeland, fernlands and closed heathlands associated with springs on sandstone tablelands	Other
3.10.21	Of concern	B	124.80	Corymbia nesophila +/- Eucalyptus crebra or E. tetradonta woodland to open forest on sandstone plateaus and slopes	Sparse
3.10.6	Least concern	B	4,574.49	Eucalyptus tetradonta +/- Corymbia stockeri subsp. stockeri woodland on sandstone plateaus	Sparse
3.10.7	Least concern	B	172.79	Eucalyptus phoenicea on wetter sandstone	Sparse
3.10.9	Least concern	B	239.24	Corymbia clarksoniana +/- Eucalyptus tetradonta woodland on sandstone plateaus	Sparse
3.11.11	Least concern	B	934.16	Corymbia stockeri +/- Eucalyptus tetradonta woodland on hills and erosional surfaces	Sparse
3.11.12	Least concern	B	730.32	Eucalyptus leptophleba +/- E. platyphylla woodland on rolling metamorphic hills	Sparse
3.11.13	Least concern	B	12,749.17	Corymbia nesophila +/- E. brassiana woodland on metamorphic hills and ranges	Sparse
3.11.13	Least concern	C	0.50	Corymbia nesophila +/- E. brassiana woodland on metamorphic hills and ranges	Sparse
3.11.13	Least concern	R	0.19	Corymbia nesophila +/- E. brassiana woodland on metamorphic hills and ranges	Sparse

Regional Ecosystem	VMA Status	Category	Area (Ha)	Short Description	Structure Category
3.11.19	Of concern	B	678.81	Themeda triandra closed tussock grassland or Asteromyrtus lysicephala, Neofabricia myrtifolia, Grevillea pteridifolia dwarf open heathlands on headlands and islands	Grassland Sch 5
3.11.2	Of concern	B	730.35	Semi-deciduous mesophyll vine forest on metamorphic ranges in the south	Dense
3.11.21	Of concern	B	91.82	Deciduous vine thicket on metamorphic slopes	Dense
3.11.3	Least concern	B	811.60	Simple evergreen notophyll vine forest on exposed metamorphic and granitic slopes	Dense
3.11.3	Least concern	R	0.22	Simple evergreen notophyll vine forest on exposed metamorphic and granitic slopes	Dense
3.11.4	Of concern	B	275.63	Corymbia nesophila +/- Eucalyptus spp. open forest on wetter ranges in south-east	Mid-dense
3.11.4	Of concern	R	0.77	Corymbia nesophila +/- Eucalyptus spp. open forest on wetter ranges in south-east	Mid-dense
3.11.6	Of concern	B	50.50	Eucalyptus platyphylla +/- E. leptophleba +/- Corymbia nesophila open forest to woodland on hill slopes	Mid-dense
3.11.7	Least concern	B	1,058.97	Eucalyptus cullenii and Corymbia clarksoniana woodland on low metamorphic hills and rises	Sparse
3.12.10	Least concern	B	124.04	Eucalyptus cullenii +/- Corymbia clarksoniana woodland or E. chlorophylla woodland on granitic ranges	Sparse
3.12.40	Least concern	B	367.28	Corymbia nesophila +/- Eucalyptus tetradonta open forest on igneous hills and rises	Mid-dense
3.2.10	Least concern	B	367.93	Eucalyptus tetradonta and Corymbia clarksoniana +/- E. brassiana or Erythrophleum chlorostachys woodland on stabilised dunes	Sparse
3.2.10	Least concern	R	0.02	Eucalyptus tetradonta and Corymbia clarksoniana +/- E. brassiana or Erythrophleum chlorostachys woodland on stabilised dunes	Sparse
3.2.12	Least concern	B	6,601.81	Acacia crassicaarpa, Syzygium banksii low closed forest +/- emergent Araucaria cunninghamii var. cunninghamii on coastal dunefields and beach ridges	Dense
3.2.12	Least concern	C	0.36	Acacia crassicaarpa, Syzygium banksii low closed forest +/- emergent Araucaria cunninghamii var. cunninghamii on coastal dunefields and beach ridges	Dense
3.2.12	Least concern	R	0.06	Acacia crassicaarpa, Syzygium banksii low closed forest +/- emergent Araucaria cunninghamii var. cunninghamii on coastal dunefields and beach ridges	Dense
3.2.13	Least concern	B	21.56	Semi-deciduous notophyll vine forest on beach ridges on the east coast	Dense
3.2.14	Of concern	B	888.64	Melaleuca arcana low open forest associated with dune swamps	Mid-dense

Regional Ecosystem	VMA Status	Category	Area (Ha)	Short Description	Structure Category
3.2.14	Of concern	C	7.47	Melaleuca arcana low open forest associated with dune swamps	Mid-dense
3.2.14	Of concern	R	0.67	Melaleuca arcana low open forest associated with dune swamps	Mid-dense
3.2.17	Least concern	B	1,720.88	Leucopogon yorkensis open scrub on dunefields	Mid-dense
3.2.17	Least concern	R	0.12	Leucopogon yorkensis open scrub on dunefields	Mid-dense
3.2.18	Least concern	B	7,891.47	Thryptomene oligandra open heath +/- Asteromyrtus lysicephala on flat sand plains	Mid-dense
3.2.18	Least concern	C	1.38	Thryptomene oligandra open heath +/- Asteromyrtus lysicephala on flat sand plains	Mid-dense
3.2.18	Least concern	R	0.33	Thryptomene oligandra open heath +/- Asteromyrtus lysicephala on flat sand plains	Mid-dense
3.2.21	Least concern	B	21,547.51	Neofabricia myrtifolia +/- Jacksonia thesioides open to closed heath on dunefields	Mid-dense
3.2.21	Least concern	C	167.97	Neofabricia myrtifolia +/- Jacksonia thesioides open to closed heath on dunefields	Mid-dense
3.2.21	Least concern	R	8.82	Neofabricia myrtifolia +/- Jacksonia thesioides open to closed heath on dunefields	Mid-dense
3.2.22	Of concern	B	2,309.57	Mixed dwarf open heath on dunes and headlands	Mid-dense
3.2.22	Of concern	C	21.67	Mixed dwarf open heath on dunes and headlands	Mid-dense
3.2.22	Of concern	R	0.47	Mixed dwarf open heath on dunes and headlands	Mid-dense
3.2.24	Least concern	B	1,133.76	Mixed open tussock grassland and open forblands or shrublands on exposed foredunes and islands	Sparse
3.2.24	Least concern	C	3.37	Mixed open tussock grassland and open forblands or shrublands on exposed foredunes and islands	Sparse
3.2.26	Least concern	B	6,510.89	Sparse hermland and/or shrubland and bare sand areas predominantly on sand blows	Other
3.2.26	Least concern	C	49.30	Sparse hermland and/or shrubland and bare sand areas predominantly on sand blows	Other
3.2.26	Least concern	R	2.28	Sparse hermland and/or shrubland and bare sand areas predominantly on sand blows	Other
3.2.27	Least concern	B	2,929.31	Sedgeland fringing perennial lakes in coastal dunefields	Other
3.2.27	Least concern	C	2.14	Sedgeland fringing perennial lakes in coastal dunefields	Other
3.2.27	Least concern	R	0.79	Sedgeland fringing perennial lakes in coastal dunefields	Other
3.2.3	Least concern	B	52.41	Melaleuca dealbata or Lophostemon suaveolens open forest in dune swales	Mid-dense
3.2.3	Least concern	C	0.46	Melaleuca dealbata or Lophostemon suaveolens open forest in dune swales	Mid-dense

Regional Ecosystem	VMA Status	Category	Area (Ha)	Short Description	Structure Category
3.2.3	Least concern	R	0.11	Melaleuca dealbata or Lophostemon suaveolens open forest in dune swales	Mid-dense
3.2.33	Of concern	B	3,286.40	Gahnia sieberiana open to closed heath in drainage swamps in east coast dunefields	Other
3.2.4	Of concern	B	120.45	Melaleuca spp. open forest in dune swales and swampy areas	Mid-dense
3.2.6	Of concern	B	52.10	Casuarina equisetifolia woodland to open forest on foredunes on mainland and islands	Sparse
3.2.9	Of concern	B	1,555.72	Eucalyptus phoenicea +/- Corymbia nesophila woodland on dunefields around Cape Bedford	Mid-dense
3.3.1	Least concern	B	5,591.65	Semi-deciduous notophyll vine forest on loamy alluvia	Dense
3.3.1	Least concern	C	21.13	Semi-deciduous notophyll vine forest on loamy alluvia	Dense
3.3.1	Least concern	R	10.18	Semi-deciduous notophyll vine forest on loamy alluvia	Dense
3.3.10	Least concern	B	64.98	Melaleuca fluviatilis and/or Melaleuca argentea woodland or M. saligna or M. dealbata woodland fringing watercourses	Mid-dense
3.3.10	Least concern	C	0.03	Melaleuca fluviatilis and/or Melaleuca argentea woodland or M. saligna or M. dealbata woodland fringing watercourses	Mid-dense
3.3.20	Least concern	B	6,951.77	Corymbia clarksoniana or C. novoguineensis woodland on alluvial plains	Sparse
3.3.20	Least concern	C	50.37	Corymbia clarksoniana or C. novoguineensis woodland on alluvial plains	Sparse
3.3.20	Least concern	R	14.76	Corymbia clarksoniana or C. novoguineensis woodland on alluvial plains	Sparse
3.3.24	Least concern	B	427.75	Eucalyptus leptophleba +/- Erythrophleum chlorostachys woodland on riverine levees and alluvial plains	Sparse
3.3.24	Least concern	C	3.53	Eucalyptus leptophleba +/- Erythrophleum chlorostachys woodland on riverine levees and alluvial plains	Sparse
3.3.24	Least concern	R	1.60	Eucalyptus leptophleba +/- Erythrophleum chlorostachys woodland on riverine levees and alluvial plains	Sparse
3.3.27	Of concern	B	3,155.75	Corymbia nesophila +/- Erythrophleum chlorostachys +/- Eucalyptus tetrodonta woodland on alluvial plains and floodplains	Sparse
3.3.27	Of concern	C	27.22	Corymbia nesophila +/- Erythrophleum chlorostachys +/- Eucalyptus tetrodonta woodland on alluvial plains and floodplains	Sparse
3.3.27	Of concern	R	3.63	Corymbia nesophila +/- Erythrophleum chlorostachys +/- Eucalyptus tetrodonta woodland on alluvial plains and floodplains	Sparse
3.3.28	Least concern	B	816.94	Eucalyptus platyphylla and Corymbia clarksoniana woodland on alluvial plains	Sparse
3.3.28	Least concern	R	0.43	Eucalyptus platyphylla and Corymbia clarksoniana woodland on alluvial plains	Sparse

Regional Ecosystem	VMA Status	Category	Area (Ha)	Short Description	Structure Category
3.3.31	Least concern	B	28.38	Eucalyptus tetrodonta +/- Corymbia spp. woodland on coastal plains	Sparse
3.3.31	Least concern	R	0.04	Eucalyptus tetrodonta +/- Corymbia spp. woodland on coastal plains	Sparse
3.3.4	Of concern	B	103.71	Evergreen mesophyll and/or notophyll vine forest with Archontophoenix spp. on stream banks	Dense
3.3.4	Of concern	C	0.22	Evergreen mesophyll and/or notophyll vine forest with Archontophoenix spp. on stream banks	Dense
3.3.4	Of concern	R	0.13	Evergreen mesophyll and/or notophyll vine forest with Archontophoenix spp. on stream banks	Dense
3.3.49	Least concern	B	924.39	Melaleuca viridiflora +/- Corymbia clarksoniana low open woodland on floodplains and alluvial plains	Very sparse
3.3.49	Least concern	C	6.02	Melaleuca viridiflora +/- Corymbia clarksoniana low open woodland on floodplains and alluvial plains	Very sparse
3.3.5	Least concern	B	1,611.11	Evergreen to semi-deciduous notophyll vine forest on alluvia on major watercourses	Dense
3.3.5	Least concern	C	0.82	Evergreen to semi-deciduous notophyll vine forest on alluvia on major watercourses	Dense
3.3.5	Least concern	R	0.47	Evergreen to semi-deciduous notophyll vine forest on alluvia on major watercourses	Dense
3.3.50	Least concern	B	27.55	Melaleuca spp. woodland on swamps on floodplains and non-floodplain landforms	Sparse
3.3.53	Least concern	B	244.63	Neofabricia myrtifolia +/- Melaleuca viridiflora low woodland on streams and alluvial plains	Sparse
3.3.53	Least concern	R	0.04	Neofabricia myrtifolia +/- Melaleuca viridiflora low woodland on streams and alluvial plains	Sparse
3.3.6	Of concern	B	145.43	Evergreen notophyll vine forest with Melaleuca leucadendra on swamps	Dense
3.3.64	Least concern	B	82.41	Baloskion tetraphyllum subsp. meiostachyum and/or Leptocarpus spp. and/or Dapsilanthus spathaceus open sedgeland in drainage swamps	Other
3.3.8	Least concern	B	42.30	Corymbia tessellaris, C. clarksoniana woodland to open forest on coastal alluvial plains	Sparse
3.5.19	Least concern	B	514.93	Asteromyrtus lysicephala and/or Neofabricia myrtifolia and/or Jacksonia thesioides open heath to shrubland on sand sheets	Mid-dense
3.5.36	Least concern	B	40.87	Eucalyptus tetrodonta and Corymbia nesophila woodland to open forest on undulating plains and remnant plateaus	Sparse
3.5.6	Least concern	B	79.12	Eucalyptus phoenicea woodland on sandy outwash plains	Sparse
3.8.2	Of concern	B	530.24	Semi-deciduous notophyll and/or microphyll vine forest on basalt	Dense

Regional Ecosystem	VMA Status	Category	Area (Ha)	Short Description	Structure Category
3.8.2	Of concern	C	62.45	Semi-deciduous notophyll and/or microphyll vine forest on basalt	Dense
3.8.2	Of concern	R	11.37	Semi-deciduous notophyll and/or microphyll vine forest on basalt	Dense
3.8.3	Of concern	B	397.32	Eucalyptus leptophleba or Corymbia clarksoniana +/- C. tessellaris woodland on basalt flows	Sparse
3.8.3	Of concern	C	65.01	Eucalyptus leptophleba or Corymbia clarksoniana +/- C. tessellaris woodland on basalt flows	Sparse
3.8.3	Of concern	R	32.80	Eucalyptus leptophleba or Corymbia clarksoniana +/- C. tessellaris woodland on basalt flows	Sparse
3.8.4	Of concern	B	26.87	Heteropogon contortus or Themeda triandra closed tussock grasslands on basalt cones and rises	Grassland Sch 5
7.3.14	Of concern	B	1.45	Eucalyptus leptophleba +/- Corymbia clarksoniana +/- Melaleuca dealbata woodland to open forest on alluvium in low rainfall areas of the west and north	Sparse
non-rem	None	X	1,462.57	None	None
water	None	Water	105.49	None	None

Please note:

1. All area and area derived figures included in this table have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.
2. If Table 5 contains a Category 'plant', please be aware that this refers to 'plantations' such as forestry, and these areas are considered non-remnant under the VMA.

The VMA status of the regional ecosystem (whether it is endangered, of concern or least concern) also determines if any of the following are applicable:

- exempt clearing work;
- accepted development vegetation clearing codes;
- performance outcomes in State Code 16 of the State Development Assessment Provisions (SDAP).

3.3 Watercourses

Vegetation management watercourses and drainage features for this property are shown on the vegetation management supporting map in section 4.2.

3.4 Wetlands

Vegetation management wetlands are present on this property and are shown on the vegetation management supporting map in section 4.2 of this report.

3.5 Essential habitat

Under the VMA, essential habitat for protected wildlife is native wildlife prescribed under the *Nature Conservation Act 1992* (NCA) as critically endangered, endangered, vulnerable or near-threatened wildlife.

Essential habitat for protected wildlife includes suitable habitat on the lot, or where a species has been known to occur up to 1.1 kilometres from a lot on which there is assessable vegetation. These important habitat areas are protected under the VMA.

Any essential habitat on this property will be shown as blue hatching on the vegetation supporting map in section 4.2.

If essential habitat is identified on the lot, information about the protected wildlife species is provided in Table 6 below. The numeric labels on the vegetation management supporting map can be cross referenced with Table 6 to outline the essential habitat factors for that particular species. There may be essential habitat for more than one species on each lot, and areas of Category A, Category B and Category C can be mapped as Essential Habitat.

Essential habitat is compiled from a combination of species habitat models and buffered species records. Regional ecosystem is a mandatory essential habitat factor, unless otherwise stated. Essential habitat, for protected wildlife, means an area of vegetation shown on the Regulated Vegetation Management Map -

- 1) that has at least 3 essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database. Essential habitat factors are comprised of - regional ecosystem (mandatory for most species), vegetation community, altitude, soils, position in landscape; or
- 2) in which the protected wildlife, at any stage of its life cycle, is located.

If there is no essential habitat mapping shown on the vegetation management supporting map for this lot, and there is no table in the sections below, it confirms that there is no essential habitat on the lot.

Category A and/or Category B and/or Category C

Table 6: Essential habitat in Category A and/or Category B and/or Category C

Label	Scientific Name	Common Name	NCA Status	Vegetation Community	Altitude	Soils	Position in Landscape
31	<i>Dermochelys coriacea</i>	leatherback turtle	E	Sub-tropical and temperate seas (less common in tropical and colder seas), especially calmer water of bays, estuaries and tidal river mouths, less common inshore of Great Barrier Reef. Nests behind beach with deep water approach.	Sea level to 50m.	Sandy substrates.	Beach.
141	<i>Lygisaurus tanneri</i>	Endeavour River litter-skink	V	In leaf litter and among smaller branches and twigs in upper gentle slopes of deeply incised watercourses, in riverine forest/rainforest and monsoon forest.	Sea level to 100m.	Loamy substrates.	None
168	<i>Lerista ingrami</i>	Ingram's lerista	V	Humid heaths; in sand of first beach dune with sparse low vegetation and scattered small trees and palms.	Sea level to 100m.	Sandy substrates.	Beach dune.
232	<i>Ctenotus rawlinsoni</i>	Cape heath ctenotus	V	Heath, ephemeral and permanent paperbark swamps & woodland.	Sea level to 100m.	Sandy substrates.	Dunefields.

Label	Scientific Name	Common Name	NCA Status	Vegetation Community	Altitude	Soils	Position in Landscape
584	<i>Crocodylus porosus</i>	estuarine crocodile	V	Estuaries and major rivers, billabongs and swamps in dry season; freshwater swamps in wet season, occasionally found in open sea; also in dune swale swamps and dams; mostly within 40-50km of coastline (some breeding populations up to 100km from sea). Nest sites vegetated areas (preference for Melaleuca swamp forest with <i>Thoracostachyum</i> or <i>Scleria</i> sedgeswamp &/or <i>Stenoclaena</i> fern) near permanent freshwater (<100-200m), often on north-west banks, prime areas associated with productive deepwater estuaries; will also use marginal sites, e.g. grassy areas (<i>Imperata</i> , <i>Ischaemum</i> , <i>Themeda</i> , <i>Sorghum</i>) near forest edge or with sparse eucalypt, riverbank/fringe forest (<i>Melaleuca</i> , <i>Corypha</i> , <i>Acacia</i>), mangrove fringe, salt meadow behind mangrove, and sparse short (<40cm) sedgeland/swamp.	Sea level to 100m.	None	Near and in waterbodies.
1843	<i>Numenius madagascariensis</i>	eastern curlew	E	Foraging on soft, intertidal mudflat, with a preference for broad flats, often in sheltered areas near mangroves and estuaries/creeks, also on sandflats and occasionally ocean beaches, rock platforms and coral reefs. Roost on saltflat, saltmarsh, mangroves, reef flat, sandy spits and grassland near water.	Sea level to 100m.	Sand, sandy mud and mud substrates.	Associated with coastlines and wetlands.
1856	<i>Calidris tenuirostris</i>	great knot	CE	Foraging on intertidal mudflat/sandflat in sheltered coastal areas, exposed reef, rock platform, mangrove, near coastal swamp/lagoon and salt lake. Roost on sandy beach, mudflat and coastal claypan .	Sea level to 100m.	Mud and sand substrates.	Associated with coastlines and wetlands.
1867	<i>Limosa lapponica baueri</i>	Western Alaskan bar-tailed godwit	V	Foraging on large intertidal mudflat/sandflat, banks in estuaries, inlets, bays and coastal lagoons; also saline wetlands, saltmarsh, sandy beach, rock platform and coral reef-flat. Roost on sandy beach/spit and near saltmarsh.	Sea level to 100m.	Sand and mud substrates.	Associated with coastlines and wetlands.
1877	<i>Calidris canutus</i>	red knot	E	Foraging on intertidal mudflat/sandflat and sandy beach of sheltered coastal areas, also saline wetlands/saltmarsh. Roost on sandy beach or spit, mudflat and coastal claypan .	Sea level to 100m.	Sand and mud substrates.	Associated with coastlines and wetlands.
1878	<i>Calidris ferruginea</i>	curlew sandpiper	CE	Foraging on intertidal mudflat in sheltered estuaries, bays, inlets and lagoons; non-tidal swamps and inland ephemeral and permanent lakes, dams or waterholes. Roost on shingle/sand/shell beaches, saltmarsh, mangrove and close to wetlands.	Sea level to 100m.	Sand and mud substrates.	Associated with coastlines and coastal and inland wetlands.

Label	Scientific Name	Common Name	NCA Status	Vegetation Community	Altitude	Soils	Position in Landscape
1936	Charadrius mongolus	lesser sand plover	E	Foraging on sandy beach, intertidal mudflat/sandflat and mangrove mudflat of coastal bays and estuaries. Also inland at lakes and soaks. Roost on beach, banks, sand/shell spits, rocky spits and exposed reef.	Sea level to 100m.	Sand and mud substrates.	Associated with coastlines and coastal and inland wetlands.
1948	Charadrius leschenaultii	greater sand plover	V	Foraging on intertidal mudflats, sandbank, sandy/shelly/muddy beaches, rock platforms, coral reefs and tidal lagoons. Roost on sandspit, beach, lagoons edge, rocky points, coastal saltmarsh and claypan.	Sea level to 100m.	Sand and mud substrates.	Associated with coastlines and wetlands.
3362	Acacia solenota	None	V	heathland or shrubland occasionally with Corymbia intermedia emergents	0 to 100 m	sandy	sand hill and swales
6891	Stackhousia sp. (McIvor River J.R.Clarkson 5201)	None	E	grassland	0 to 100 m	coastal quaternary sands	coastal foredune
8149	Xanthostemon arenarius	None	NT	closed scrub; tall to low closed forest with a shrubby understory	0 to 200 m	sand	coastal dunefield, beach ridge
12228	Myrmecodia beccarii	None	V	mangrove forest to shrubland; woodland dominated by paperbarks (Melaleuca spp.) on swampy ground	0 to 500 m	no soil information, grows on tree trunks (epiphyte)	coastal and upland swamp, creek bank, alluvial terrace, alluvial flat, tidal flat
12617	Dianella incollata	None	NT	scrub dominated by Blepharocarya involucrigera and Schefflera actinophylla, associated species: Gahnia sieberana, Arthrostylis aphylla, Ipomoea gracilis and Mnesithea rottboellioides; fragmented deciduous vine thicket amongst sandstone on escarpment; woodland of Corymbia hylandii and Eucalyptus tetradonta; open woodland of Melaleuca spp.; open forest of Eucalyptus spp.	0 to 500 m	sandy soil often skeletal derived from sandstone substrates	rocky sandstone hill slope, ridge line or escarpment, small gullies over sandstone plateau
12816	Habenaria xanthantha	None	NT	low woodland to open forest with Eucalyptus/Melaleuca	0 to 100 m	sand	hill slope, alluvial or coastal plain
26863	Livistona concinna	None	NT	riparian rainforest	0 to 100 m	rudosols	watercourse, alluvial flat
34717	Stylidium elacophyllum	None	E	There are no essential habitat factors shown as this species has only been found in areas not subject to the VMA 1999 (eg State Forests and National Parks)	There are no essential habitat factors shown as this species has only been found in areas not subject to the VMA 1999 (eg State Forests and National Parks)	There are no essential habitat factors shown as this species has only been found in areas not subject to the VMA 1999 (eg State Forests and National Parks)	There are no essential habitat factors shown as this species has only been found in areas not subject to the VMA 1999 (eg State Forests and National Parks)

Label	Regional Ecosystem (mandatory unless otherwise specified)
31	All regional ecosystems adjacent to beach.
141	3.2.1, 3.2.2, 3.2.3, 3.2.4, 3.2.11, 3.2.12, 3.2.13, 3.2.14, 3.2.21, 3.2.26, 3.2.29, 3.2.30, 3.3.1, 3.3.2, 3.3.4, 3.3.5, 3.3.6, 3.3.7, 3.3.8, 3.3.9, 3.3.10, 3.3.11, 3.3.12, 3.3.13, 3.3.17, 3.3.38, 3.3.39, 3.3.40, 3.3.41, 3.3.67, 3.3.68, 3.3.70, 3.5.3, 3.5.4, 3.5.20, 3.5.21, 3.5.32, 3.5.33, 3.7.1, 3.7.2, 3.7.6, 3.8.1, 3.8.2, 3.8.3, 3.8.5, 3.10.1, 3.10.2, 3.10.3, 3.10.5, 3.10.6, 3.10.12, 3.10.13, 3.11.1, 3.11.2, 3.11.3, 3.11.4, 3.11.6, 3.11.10, 3.12.1, 3.12.2, 3.12.3, 3.12.4, 3.12.5, 3.12.6, 3.12.7, 3.12.8, 3.12.9, 3.12.20, 3.12.21, 3.12.22, 3.12.23, 3.12.24, 3.12.25, 3.12.35, 3.12.36, 3.12.39, 3.12.44

Label	Regional Ecosystem (mandatory unless otherwise specified)
168	3.2.5, 3.2.6, 3.2.7, 3.2.8, 3.2.9, 3.2.10, 3.2.15, 3.2.17, 3.2.18, 3.2.19, 3.2.20, 3.2.22, 3.3.14, 3.3.15, 3.3.16, 3.3.17, 3.3.18, 3.3.19, 3.3.20, 3.3.21, 3.3.22, 3.3.23, 3.3.24, 3.3.25, 3.3.26, 3.3.27, 3.3.28, 3.3.29, 3.3.30, 3.3.31, 3.3.32, 3.3.33, 3.3.34, 3.3.35, 3.3.36, 3.3.37, 3.3.40, 3.3.44, 3.3.45, 3.3.46, 3.3.47, 3.3.48, 3.3.49, 3.3.50, 3.3.53, 3.3.54, 3.3.69, 3.5.5, 3.5.6, 3.5.7, 3.5.8, 3.5.9, 3.5.10, 3.5.11, 3.5.12, 3.5.13, 3.5.14, 3.5.17, 3.5.18, 3.5.19, 3.5.22, 3.5.23, 3.5.24, 3.5.25, 3.5.26, 3.5.27, 3.5.31, 3.5.34, 3.5.35, 3.5.36, 3.5.37, 3.5.38, 3.5.39, 3.5.40, 3.5.41, 3.5.42, 3.5.43, 3.7.3, 3.7.4, 3.7.5, 3.7.6, 3.8.3, 3.9.2, 3.9.4, 3.9.5, 3.9.6, 3.10.6, 3.10.7, 3.10.8, 3.10.9, 3.10.10, 3.10.11, 3.10.15, 3.10.16, 3.10.18, 3.10.21, 3.11.6, 3.11.7, 3.11.8, 3.11.9, 3.11.10, 3.11.11, 3.11.12, 3.11.13, 3.11.14, 3.11.15, 3.11.17, 3.11.18, 3.11.20, 3.11.21, 3.12.10, 3.12.11, 3.12.12, 3.12.13, 3.12.14, 3.12.15, 3.12.16, 3.12.17, 3.12.18, 3.12.19, 3.12.26, 3.12.40, 3.12.41, 3.12.42, 3.12.44, 3.12.45, 3.12.46, 3.12.47
232	3.2.5, 3.2.6, 3.2.7, 3.2.8, 3.2.9, 3.2.10, 3.2.15, 3.2.16, 3.2.17, 3.2.18, 3.2.19, 3.2.20, 3.2.22, 3.3.14, 3.3.15, 3.3.16, 3.3.17, 3.3.18, 3.3.19, 3.3.20, 3.3.21, 3.3.22, 3.3.23, 3.3.24, 3.3.25, 3.3.26, 3.3.27, 3.3.28, 3.3.29, 3.3.30, 3.3.31, 3.3.32, 3.3.33, 3.3.34, 3.3.35, 3.3.36, 3.3.37, 3.3.40, 3.3.42, 3.3.43, 3.3.44, 3.3.45, 3.3.46, 3.3.47, 3.3.48, 3.3.49, 3.3.50, 3.3.53, 3.3.54, 3.3.69, 3.5.1, 3.5.2, 3.5.5, 3.5.6, 3.5.7, 3.5.8, 3.5.9, 3.5.10, 3.5.11, 3.5.12, 3.5.13, 3.5.14, 3.5.15, 3.5.16, 3.5.17, 3.5.18, 3.5.19, 3.5.22, 3.5.23, 3.5.24, 3.5.25, 3.5.26, 3.5.27, 3.5.31, 3.5.34, 3.5.35, 3.5.36, 3.5.37, 3.5.38, 3.5.39, 3.5.40, 3.5.41, 3.5.42, 3.5.43, 3.7.3, 3.7.4, 3.7.5, 3.7.6, 3.8.3, 3.9.2, 3.9.4, 3.9.5, 3.9.6, 3.10.6, 3.10.7, 3.10.8, 3.10.9, 3.10.10, 3.10.11, 3.10.14, 3.10.15, 3.10.16, 3.10.18, 3.10.21, 3.11.6, 3.11.7, 3.11.8, 3.11.9, 3.11.10, 3.11.11, 3.11.12, 3.11.13, 3.11.14, 3.11.15, 3.11.17, 3.11.18, 3.11.20, 3.11.21, 3.12.10, 3.12.11, 3.12.12, 3.12.13, 3.12.14, 3.12.15, 3.12.16, 3.12.17, 3.12.18, 3.12.19, 3.12.26, 3.12.27, 3.12.40, 3.12.41, 3.12.42, 3.12.44, 3.12.45, 3.12.46, 3.12.47
584	All regional ecosystems within the stream/wetland buffer as determined by VMA code.
1843	2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.5, 3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.1.5, 3.1.6, 7.1.1, 7.1.2, 7.1.3, 8.1.1, 8.1.2, 8.1.3, 8.1.4, 11.1.1, 11.1.2, 11.1.3, 11.1.4, 12.1.2, 12.1.3
1856	2.1.1, 2.1.2, 2.1.3, 2.1.5, 3.1.1, 3.1.2, 3.1.3, 3.1.4, 7.1.1, 7.1.3, 8.1.2, 11.1.2, 11.1.4, 12.1.3
1867	2.1.1, 2.1.4, 2.1.5, 3.1.6, 7.1.2, 7.1.3, 8.1.2, 8.1.3, 8.1.4, 11.1.1, 11.1.2, 11.1.3, 12.1.2, 12.1.3
1877	2.1.1, 2.1.4, 2.1.5, 3.1.6, 7.1.2, 7.1.3, 8.1.2, 8.1.3, 8.1.4, 11.1.1, 11.1.2, 11.1.3, 12.1.2, 12.1.3
1878	2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.5, 3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.1.5, 3.1.6, 7.1.1, 7.1.2, 7.1.3, 8.1.1, 8.1.2, 8.1.3, 8.1.4, 11.1.1, 11.1.2, 11.1.3, 11.1.4, 12.1.2, 12.1.3
1936	2.1.1, 2.1.2, 2.1.3, 2.1.5, 3.1.1, 3.1.2, 3.1.3, 3.1.4, 7.1.1, 7.1.3, 8.1.2, 11.1.2, 11.1.4, 12.1.3
1948	2.1.1, 2.1.4, 2.1.5, 3.1.6, 7.1.2, 7.1.3, 8.1.2, 8.1.3, 8.1.4, 11.1.1, 11.1.2, 11.1.3, 12.1.2, 12.1.3
3362	3.2.7, 3.2.18, 3.2.21
6891	3.2.21, 3.2.24
8149	3.2.9, 3.2.12, 3.2.17, 3.2.21
12228	3.1.3, 3.2.1, 3.2.12, 3.3.6, 3.3.10, 3.3.50, 3.3.52, 7.1.1, 7.1.5, 7.2.10, 7.2.11, 7.3.5, 7.3.8, 7.3.13, 7.3.16, 7.3.25, 7.3.34, 7.3.45
12617	3.3.20, 3.3.27, 3.3.49, 3.5.6, 3.10.5, 3.10.6, 3.10.7, 3.10.9, 3.11.11, 9.11.3
12816	3.2.18, 3.3.49, 3.3.53, 12.12.5, 12.12.11
26863	3.3.1, 3.3.4, 3.3.5
34717	There are no essential habitat factors shown as this species has only been found in areas not subject to the VMA 1999 (eg State Forests and National Parks)

3.6 Area Management Plan(s)

Nil

3.7 Coastal or non-coastal

For the purposes of the accepted development vegetation clearing codes and State Code 16 of the State Development Assessment Provisions (SDAP), this property is regarded as*

Coastal

Non Coastal

*See also Map 4.3

3.8 Agricultural Land Class A or B

The following can be used to identify Agricultural Land Class A or B areas under the "Managing regulated regrowth vegetation" accepted development vegetation clearing code:

Does this lot contain land that is mapped as Agricultural Land Class A or B in the State Planning Interactive Mapping System?

Class A (with urban areas masked as per SPP): 3681.8ha

Class B (with urban areas masked as per SPP): 2643.11ha

Note - This confirms Agricultural Land Classes as per the State Planning Interactive Mapping System only. This response does not include Agricultural Land Classes identified under local government planning schemes. For further information, check the Planning Scheme for your local government area.

See Map 4.4 to identify the location and extent of Class A and/or Class B Agricultural land on Lot: 35 Plan: SP232620.

4. Vegetation management framework maps

Vegetation management maps included in this report may also be requested individually at:

<https://www.resources.qld.gov.au/qld/environment/land/vegetation/vegetation-map-request-form>

Regulated vegetation management map

The regulated vegetation management map shows vegetation categories needed to determine clearing requirements. These maps are updated monthly to show new [property maps of assessable vegetation \(PMAV\)](#).

Vegetation management supporting map

The vegetation management supporting map provides information on regional ecosystems, wetlands, watercourses and essential habitat.

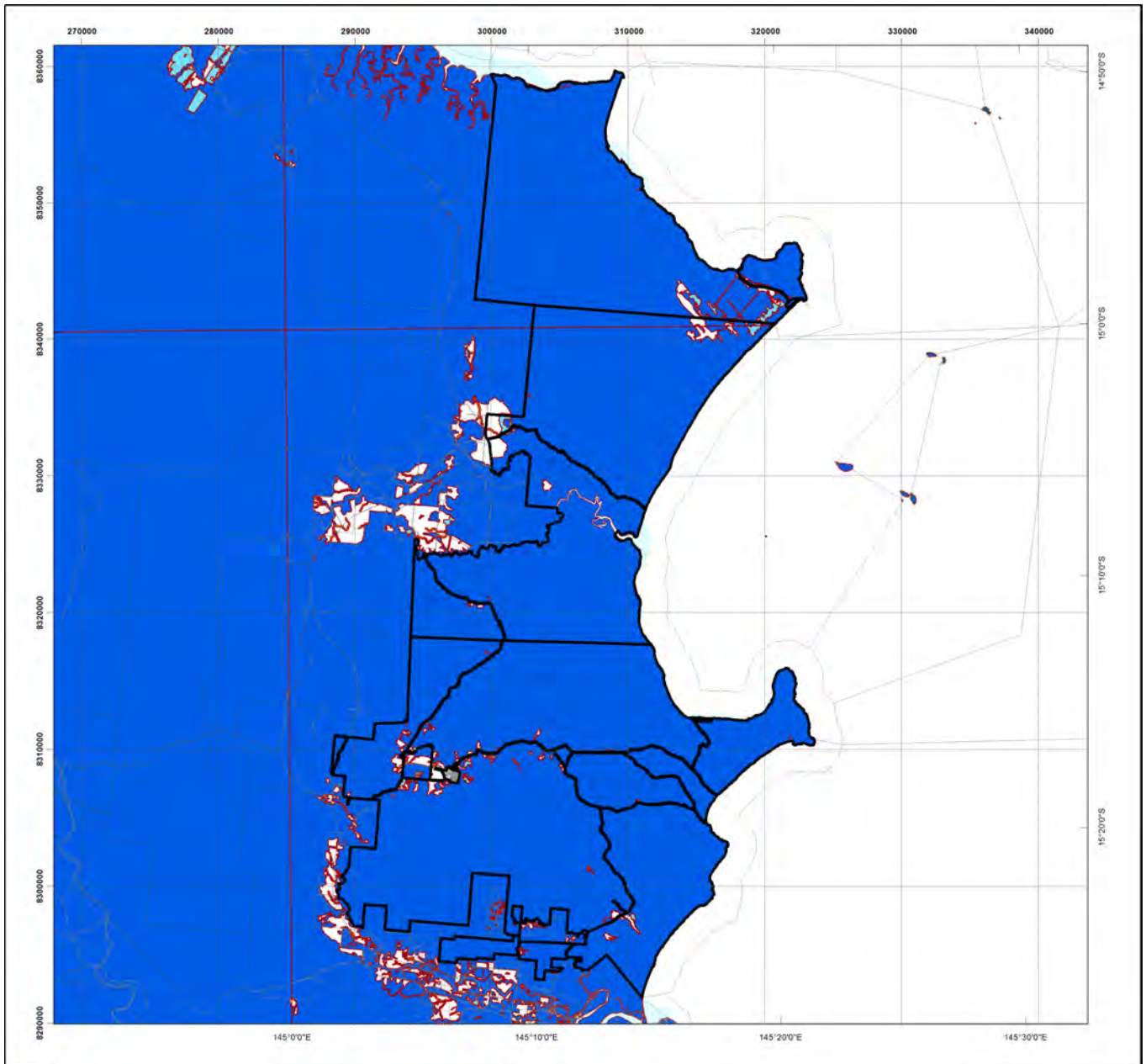
Coastal/non-coastal map

The coastal/non-coastal map confirms whether the lot, or which parts of the lot, are considered coastal or non-coastal for the purposes of the accepted development vegetation clearing codes and State Code 16 of the State Development Assessment Provisions (SDAP).

Agricultural Land Class A or B as per State Planning Policy: State Interest for Agriculture

The Agricultural Land Class map confirms the location and extent of land mapped as Agricultural Land Classes A or B as identified on the State Planning Interactive Mapping System. Please note that this map does not include areas identified as Agricultural Land Class A or B in local government planning schemes. This map can be used to identify Agricultural Land Class A or B areas under the "Managing regulated regrowth vegetation" accepted development vegetation clearing code.

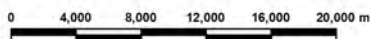
4.1 Regulated vegetation management map



Regulated Vegetation Management Map

Legend

- Selected Lot and Plan
- Category A area (Vegetation offsets/compliance notices/VDecs)
- Category B area (Remnant vegetation)
- Category C area (High-value regrowth vegetation)
- Category R area (Reef regrowth watercourse vegetation)
- Category X area (Exempt clearing work on Freehold, Indigenous and Leasehold land)
- Water
- Other land parcel boundaries



This product is projected into:
GDA 1994 MGA Zone 55

Disclaimer:

While every care is taken to ensure the accuracy of this product, the Department of Resources makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incur as a result of the product being inaccurate or incomplete in any way and for any reason.

Additional information required for the assessment of vegetation values is provided in the accompanying "Vegetation Management Supporting map". For further information go to the web site: www.resources.qld.gov.au or contact the Department of Resources.

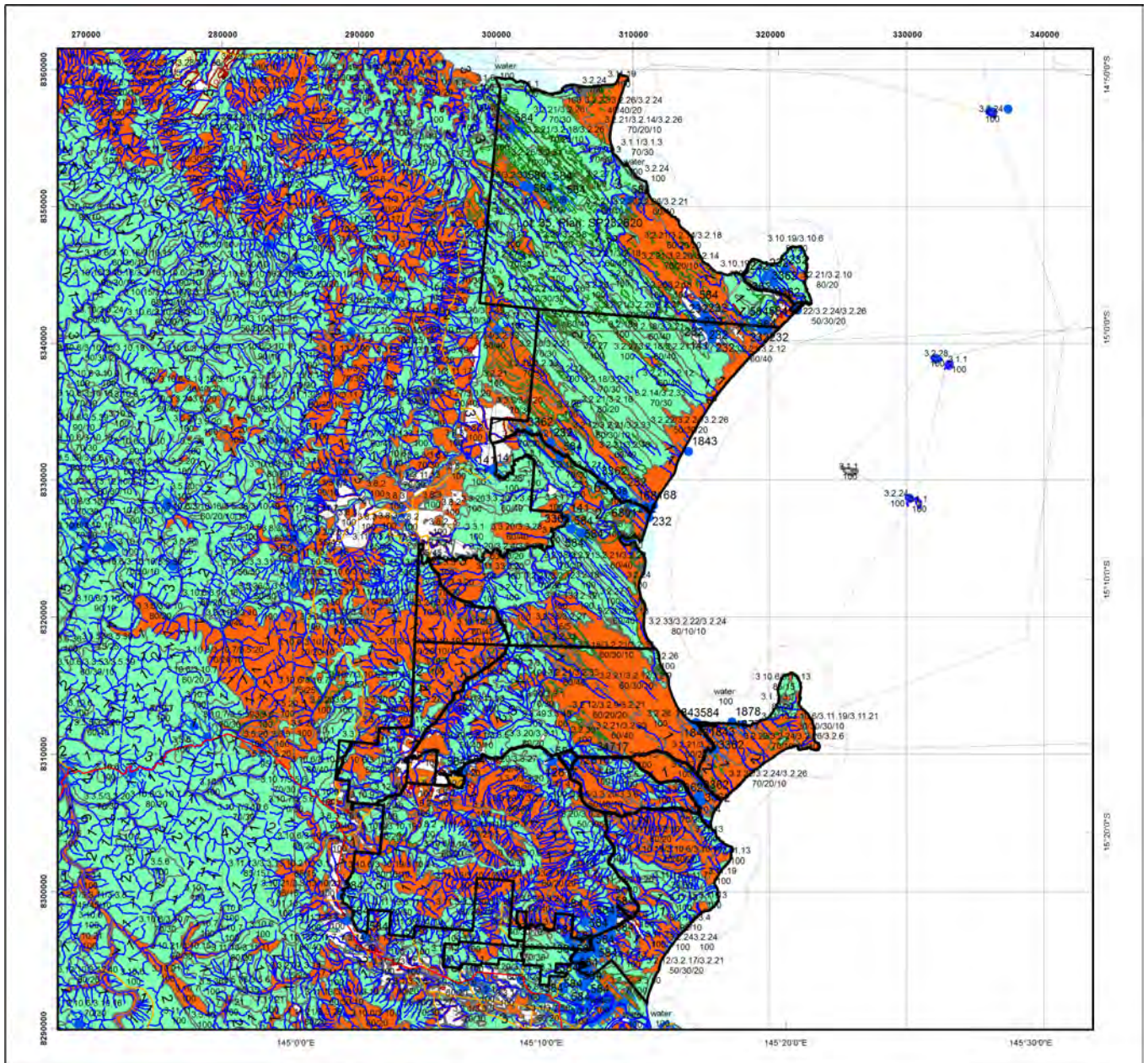
Digital data for the regulated vegetation management map is available from the Queensland Spatial Portal at <http://www.information.qld.gov.au/>

Land parcel boundaries are provided as locational aid only.

This map is updated on a monthly basis to ensure new PMAVs are included as they are approved.



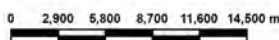
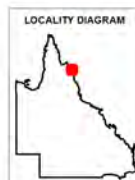
4.2 Vegetation management supporting map



Vegetation Management Supporting Map

Legend

- Selected Lot and Plan
- Category A or B area containing endangered regional ecosystems
- Category A or B area containing of concern regional ecosystems
- Category A or B area that is a least concern regional ecosystem
- Category C or R area containing endangered regional ecosystems
- Category C or R area containing of concern regional ecosystems
- Category C or R area that is a least concern regional ecosystem
- Category X area
- Water
- Wetland on the vegetation management wetlands map
- Essential habitat on the essential habitat map
- Essential habitat species record
- Watercourses and drainage features on the vegetation management watercourse and drainage features map (Stream order shown as black number against stream where available)
- Highway
- Connector
- Street/Local Road
- National Parks, State Forest and other reserves
- Other land parcel boundaries



This product is projected into:
GDA 1994 MGA Zone 55

Labels for Essential Habitat are centred on the area of enquiry.

Regional ecosystem linework has been compiled at a scale of 1:100 000, except in designated areas where a compilation scale of 1:50 000 is available. Linework should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100 000 is +/- 100 metres.

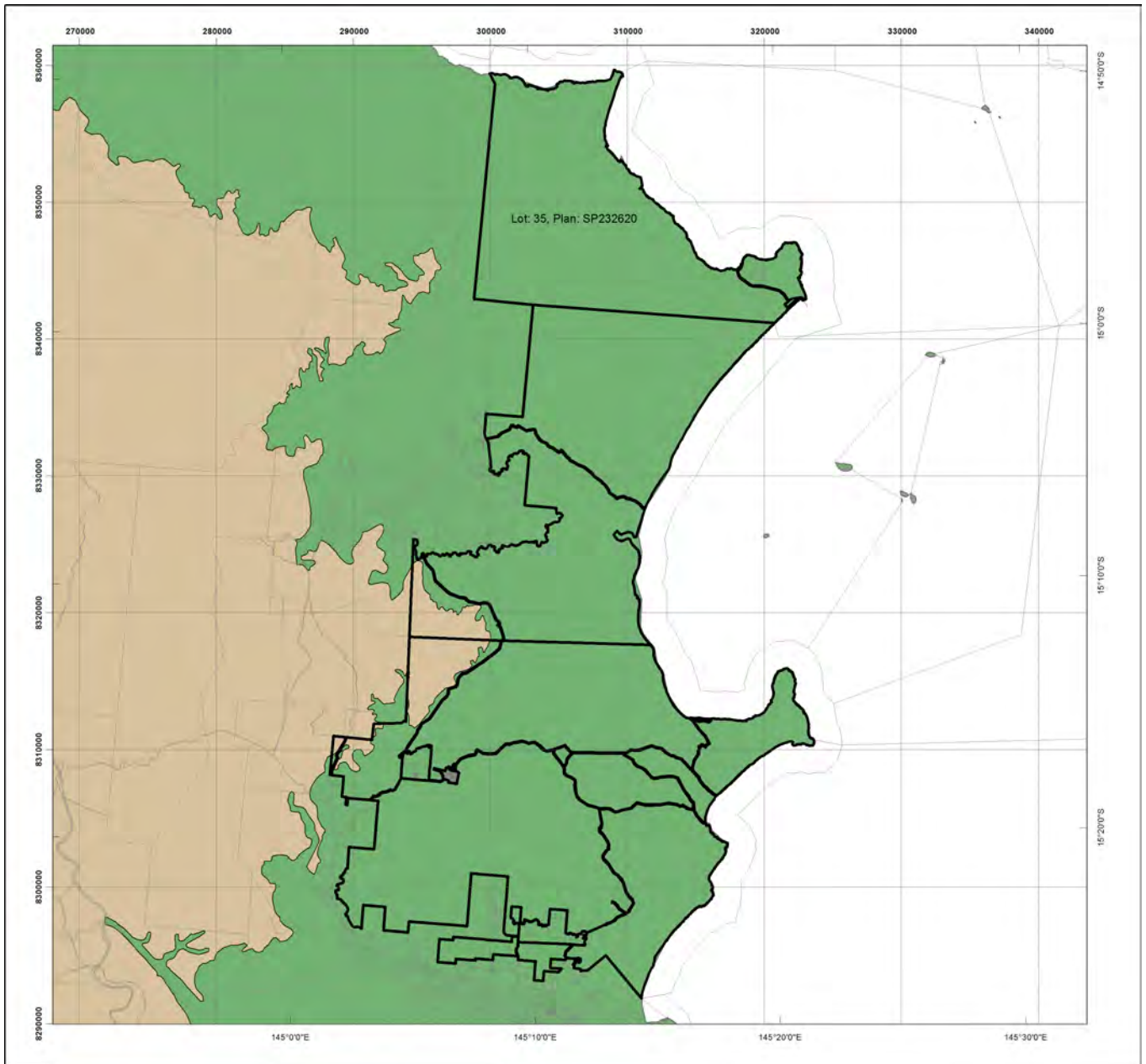
Disclaimer:
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Additional information may be required for the purposes of land clearing or assessment of a regional ecosystem map or PMAV applications. For further information go to the web site: www.resources.qld.gov.au or contact the Department of Resources.

Digital data for the vegetation management watercourse and drainage feature map, vegetation management wetlands map, essential habitat map and the vegetation management remnant and regional ecosystem map are available from the Queensland Spatial Portal at <http://www.information.qld.gov.au/>





Land parcel boundaries are provided as locational aid only.

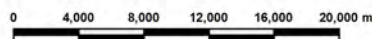
4.3 Coastal/non-coastal map



Coastal/Non Coastal Map

Legend

-  Selected Lot and Plan
-  Coastal
-  Non Coastal
-  Other land parcel boundaries



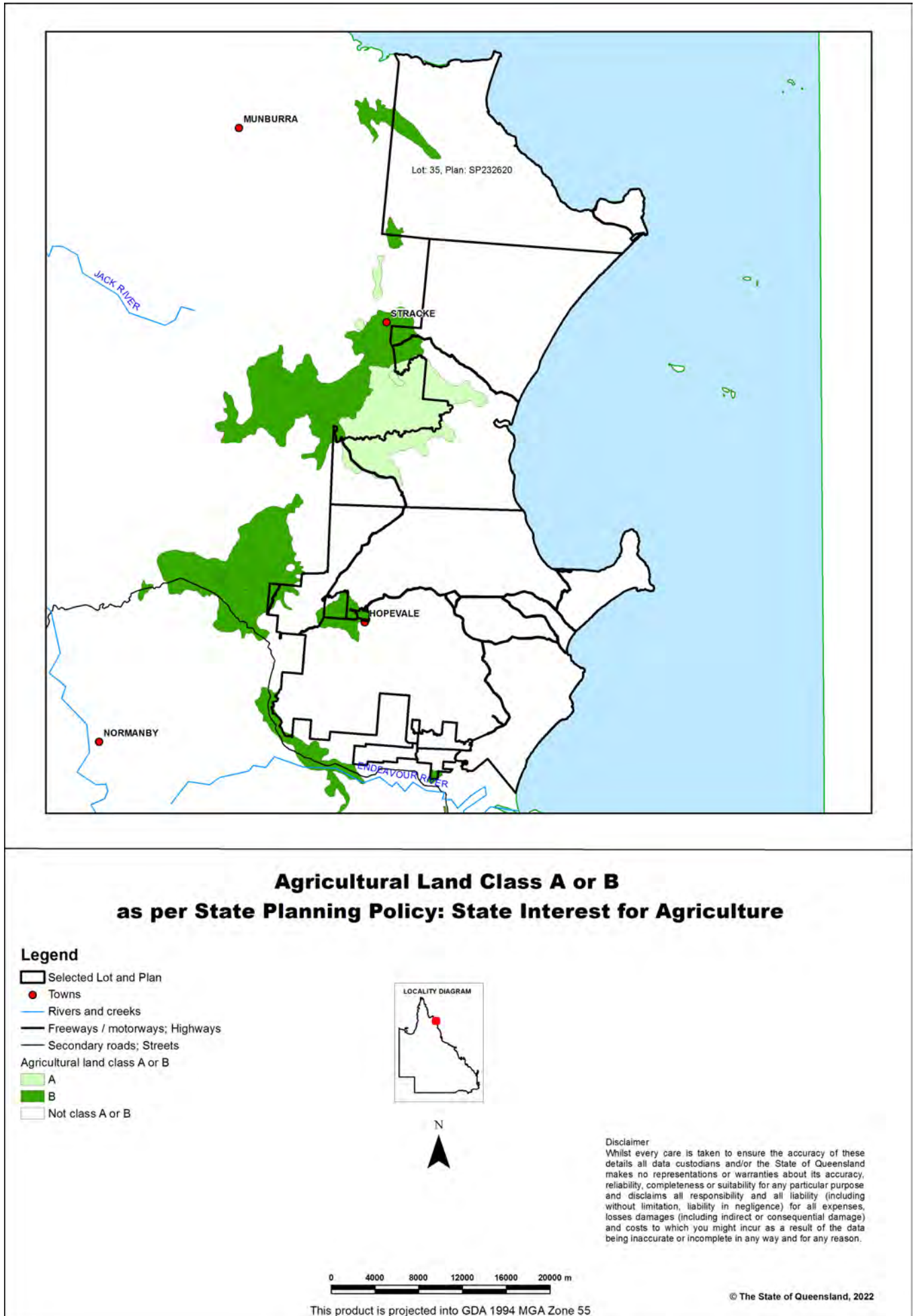
This product is projected into:
GDA 1994 MGA Zone 55

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Land parcel boundaries shown are provided as a locational aid only.



4.4 Agricultural Land Class A or B as per State Planning Policy: State Interest for Agriculture



5. Protected plants framework (administered by the Department of Environment and Science (DES))

In Queensland, all plants that are native to Australia are protected plants under the [Nature Conservation Act 1992](#) (NCA). The NCA regulates the clearing of protected plants 'in the wild' (see [Operational policy: When a protected plant in Queensland is considered to be 'in the wild'](#)) that are listed as critically endangered, endangered, vulnerable or near threatened under the Act.

Please note that the protected plant clearing framework applies irrespective of the classification of the vegetation under the *Vegetation Management Act 1999* and any approval or exemptions given under another Act, for example, the *Vegetation Management Act 1999* or *Planning Regulation 2017*.

5.1 Clearing in high risk areas on the flora survey trigger map

The flora survey trigger map identifies high-risk areas for threatened and near threatened plants. These are areas where threatened or near threatened plants are known to exist or are likely to exist based on the habitat present. The flora survey trigger map for this property is provided in section 5.5.

If you are proposing to clear an area shown as high risk on the flora survey trigger map, a flora survey of the clearing impact area must be undertaken by a suitably qualified person in accordance with the [Flora survey guidelines](#). The main objective of a flora survey is to locate any threatened or near threatened plants that may be present in the clearing impact area.

If the flora survey identifies that threatened or near threatened plants are not present within the clearing impact area or clearing within 100m of a threatened or near threatened plant can be avoided, the clearing activity is exempt from a permit. An [exempt clearing notification form](#) must be submitted to the Department of Environment and Science, with a copy of the flora survey report, at least one week prior to clearing.

If the flora survey identifies that threatened or near threatened plants are present in, or within 100m of, the area to be cleared, a clearing permit is required before any clearing is undertaken. The flora survey report, as well as an impact management report, must be submitted with the [clearing permit application form](#).

5.2 Clearing outside high risk areas on the flora survey trigger map

In an area other than a high risk area, a clearing permit is only required where a person is, or becomes aware that threatened or near threatened plants are present in, or within 100m of, the area to be cleared. You must keep a copy of the flora survey trigger map for the area subject to clearing for five years from the day the clearing starts. If you do not clear within the 12 month period that the flora survey trigger map was printed, you need to print and check a new flora survey trigger map.

5.3 Exemptions

Many activities are 'exempt' under the protected plant clearing framework, which means that clearing of native plants that are in the wild can be undertaken for these activities with no need for a flora survey or a protected plant clearing permit. The Information sheet - General exemptions for the take of protected plants provides some of these exemptions.

Some exemptions under the NCA are the same as exempt clearing work (formerly known as exemptions) under the *Vegetation Management Act 1999* (i.e. listed in Schedule 21 of the Planning Regulations 2017) while some are different.

5.4 Contact information for DES

For further information on the protected plants framework:

Phone 1300 130 372 (and select option four)

Email palm@des.qld.gov.au

Visit <https://www.qld.gov.au/environment/plants-animals/plants/protected-plants>

5.5 Protected plants flora survey trigger map

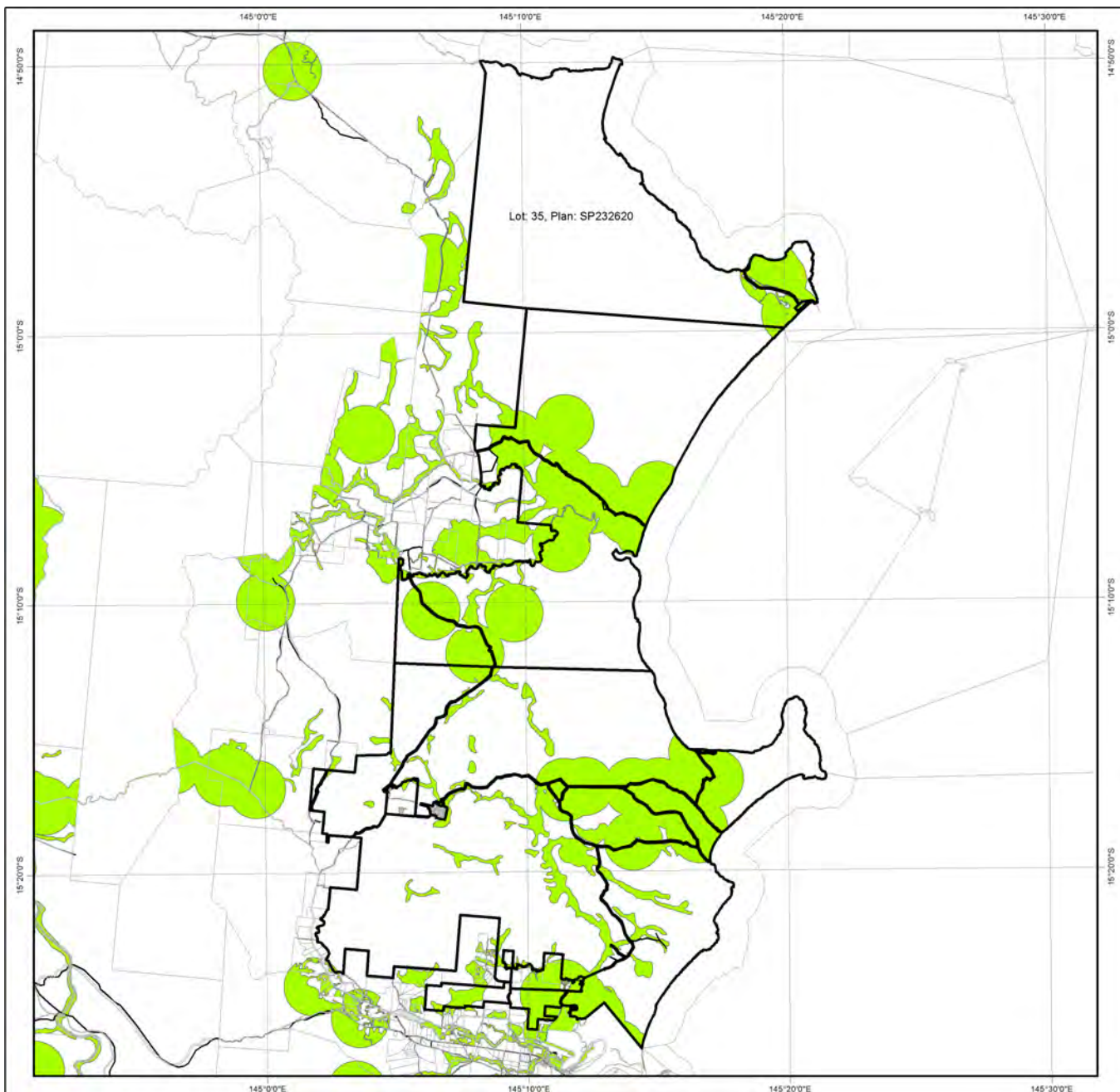
This map included may also be requested individually at: <https://apps.des.qld.gov.au/map-request/flora-survey-trigger/>.

Updates to the data informing the flora survey trigger map

The flora survey trigger map will be reviewed, and updated if necessary, at least every 12 months to ensure the map reflects the most up-to-date and accurate data available.






Species information

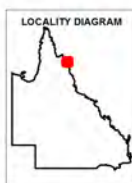
Please note that flora survey trigger maps do not identify species associated with 'high risk areas'. While some species information may be publicly available, for example via the [Queensland Spatial Catalogue](#), the Department of Environment and Science does not provide species information on request. Regardless of whether species information is available for a particular high risk area, clearing plants in a high risk area may require a flora survey and/or clearing permit. Please see the Department of Environment and Science webpage on the [clearing of protected plants](#) for more information.



Protected Plants Flora Survey Trigger Map

Legend

-  Selected Lot and Plan
-  High risk area
-  Other land parcel boundaries
-  Freeways / motorways / highways
-  Secondary roads / streets



0 2,600 5,200 7,800 10,400 13,000 m

This product is projected into:
GDA 1994 MGA Zone 55

This map shows areas where particular provisions of the Nature Conservation Act 1992 apply to the clearing of protected plants.

Land parcel boundaries are provided as locational aid only.

This map is produced at a scale relevant to the size of the area selected and should be printed as A4 size in portrait orientation.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Science at palm@des.qld.gov.au

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6. Koala protection framework (administered by the Department of Environment and Science (DES))

The koala (*Phascolarctos cinereus*) is listed in Queensland as vulnerable by the Queensland Government under *Nature Conservation Act 1992* and by the Australian Government under the *Environment Protection and Biodiversity Conservation Act 1999*.

The Queensland Government's koala protection framework is comprised of the *Nature Conservation Act 1992*, the Nature Conservation (Animals) Regulation 2020, the Nature Conservation (Koala) Conservation Plan 2017, the *Planning Act 2016* and the Planning Regulation 2017.

6.1 Koala mapping

6.1.1 Koala districts

The parts of Queensland where koalas are known to occur has been divided into three koala districts - koala district A, koala district B and koala district C. Each koala district is made up of areas with comparable koala populations (e.g. density, extent and significance of threatening processes affecting the population) which require similar management regimes.

Section 7.1 identifies which koala district your property is located in.

6.1.2 Koala habitat areas

Koala habitat areas are areas of vegetation that have been determined to contain koala habitat that is essential for the conservation of a viable koala population in the wild based on the combination of habitat suitability and biophysical variables with known relationships to koala habitat (e.g. landcover, soil, terrain, climate and ground water). In order to protect this important koala habitat, clearing controls have been introduced into the Planning Regulation 2017 for development in koala habitat areas.

Please note that koala habitat areas only exist in koala district A which is the South East Queensland "Shaping SEQ" Regional Plan area. These areas include the local government areas of Brisbane, Gold Coast, Logan, Lockyer Valley, Ipswich, Moreton Bay, Noosa, Redland, Scenic Rim, Somerset, Sunshine Coast and Toowoomba (urban extent).

There are two different categories of koala habitat area (core koala habitat area and locally refined koala habitat), which have been determined using two different methodologies. These methodologies are described in the document [Spatial modelling in South East Queensland](#).

Section 7.2 shows any koala habitat area that exists on your property.

Under the Nature Conservation (Koala) Conservation Plan 2017, an owner of land (or a person acting on the owner's behalf with written consent) can request to make, amend or revoke a koala habitat area determination if they believe, on reasonable grounds, that the existing determination for all or part of their property is incorrect.

More information on requests to make, amend or revoke a koala habitat area determination can be found in the document [Guideline - Requests to make, amend or revoke a koala habitat area determination](#).

The koala habitat area map will be updated at least annually to include any koala habitat areas that have been made, amended or revoked.

Changes to the koala habitat area map which occur between annual updates because of a request to make, amend or revoke a koala habitat area determination can be viewed on the register of approved requests to make, amend or revoke a koala habitat area available at: <https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping/koalamaps>. The register includes the lot on plan for the change, the date the decision was made and the map issued to the landholder that shows areas determined to be koala habitat areas.

6.1.3 Koala priority areas

Koala priority areas are large, connected areas that have been determined to have the highest likelihood of achieving conservation outcomes for koalas based on the combination of habitat suitability, biophysical variables with known relationships to koala habitat (e.g. landcover, soil, terrain, climate and ground water) and a koala conservation cost benefit analysis.

Conservation efforts will be prioritised in these areas to ensure the conservation of viable koala populations in the wild including a focus on management (e.g. habitat protection, habitat restoration and threat mitigation) and monitoring. This includes a prohibition on clearing in koala habitat areas that are in koala priority areas under the Planning Regulation 2017 (subject to some exemptions).

Please note that koala priority areas only exist in koala district A which is the South East Queensland "Shaping SEQ" Regional Plan area. These areas include the local government areas of Brisbane, Gold Coast, Logan, Lockyer Valley,

Ipswich, Moreton Bay, Noosa, Redland, Scenic Rim, Somerset, Sunshine Coast and Toowoomba (urban extent).

Section 7.2 identifies if your property is in a koala priority area.

6.1.4 Identified koala broad-hectare areas

There are seven identified koala broad-hectare areas in SEQ. These are areas of koala habitat that are located in areas committed to meet development targets in the SEQ Regional Plan to accommodate SEQ's growing population including bring-forward Greenfield sites under the Queensland Housing Affordability Strategy and declared master planned areas under the repealed *Sustainable Planning Act 2009* and the repealed *Integrated Planning Act 1997*.

Specific assessment benchmarks apply to development applications for development proposed in identified koala broad-hectare areas to ensure koala conservation measures are incorporated into the proposed development.

Section 7.2 identifies if your property is in an identified koala broad-hectare area.

6.2 Koala habitat planning controls

On 7 February 2020, the Queensland Government introduced new planning controls to the Planning Regulation 2017 to strengthen the protection of koala habitat in South East Queensland (i.e. koala district A).

More information on these planning controls can be found here:

<https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping/legislation-policy>.

As a high-level summary, the koala habitat planning controls make:

- development that involves interfering with koala habitat (defined below) in an area that is both a koala priority area and a koala habitat area, prohibited development (i.e. development for which a development application cannot be made);
- development that involves interfering with koala habitat (defined below) in an area that is a koala habitat area but is not a koala priority area, assessable development (i.e. development for which development approval is required); and
- development that is for extractive industries where the development involves interfering with koala habitat (defined below) in an area that is both a koala habitat area and a key resource area, assessable development (i.e. development for which development approval is required).

Interfering with koala habitat means:

- 1) Removing, cutting down, ringbarking, pushing over, poisoning or destroying in anyway, including by burning, flooding or draining native vegetation in a koala habitat area; but
- 2) Does not include destroying standing vegetation by stock or lopping a tree.

However, these planning controls do not apply if the development is exempted development as defined in Schedule 24 of the [Planning Regulation 2017](#). More information on exempted development can be found here:

<https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping/legislation-policy>.

There are also assessment benchmarks that apply to development applications for:

- building works, operational works, material change of use or reconfiguration of a lot where:
 - the local government planning scheme makes the development assessable;
 - the premises includes an area that is both a koala priority area and a koala habitat area; and
 - the development does not involve interfering with koala habitat (defined above); and
- development in identified koala broad-hectare areas.

The [Guideline - Assessment Benchmarks in relation to Koala Habitat in South East Queensland assessment benchmarks](#) outlines these assessment benchmarks, the intent of these assessment benchmarks and advice on how proposed development may meet these assessment benchmarks.

6.3 Koala Conservation Plan clearing requirements

Section 10 and 11 of the [Nature Conservation \(Koala\) Conservation Plan 2017](#) prescribes requirements that must be met when clearing koala habitat in koala district A and koala district B.

These clearing requirements are independent to the koala habitat planning controls introduced into the Planning Regulation 2017, which means they must be complied with irrespective of any approvals or exemptions offered under other legislation.

Unlike the clearing controls prescribed in the Planning Regulation 2017 that are to protect koala habitat, the clearing requirements prescribed in the Nature Conservation (Koala) Conservation Plan 2017 are in place to prevent the injury or death of koalas when koala habitat is being cleared.

6.4 Contact information for DES

For further information on the koala protection framework:

Phone 13 QGOV (13 74 68)

Email koala.assessment@des.qld.gov.au

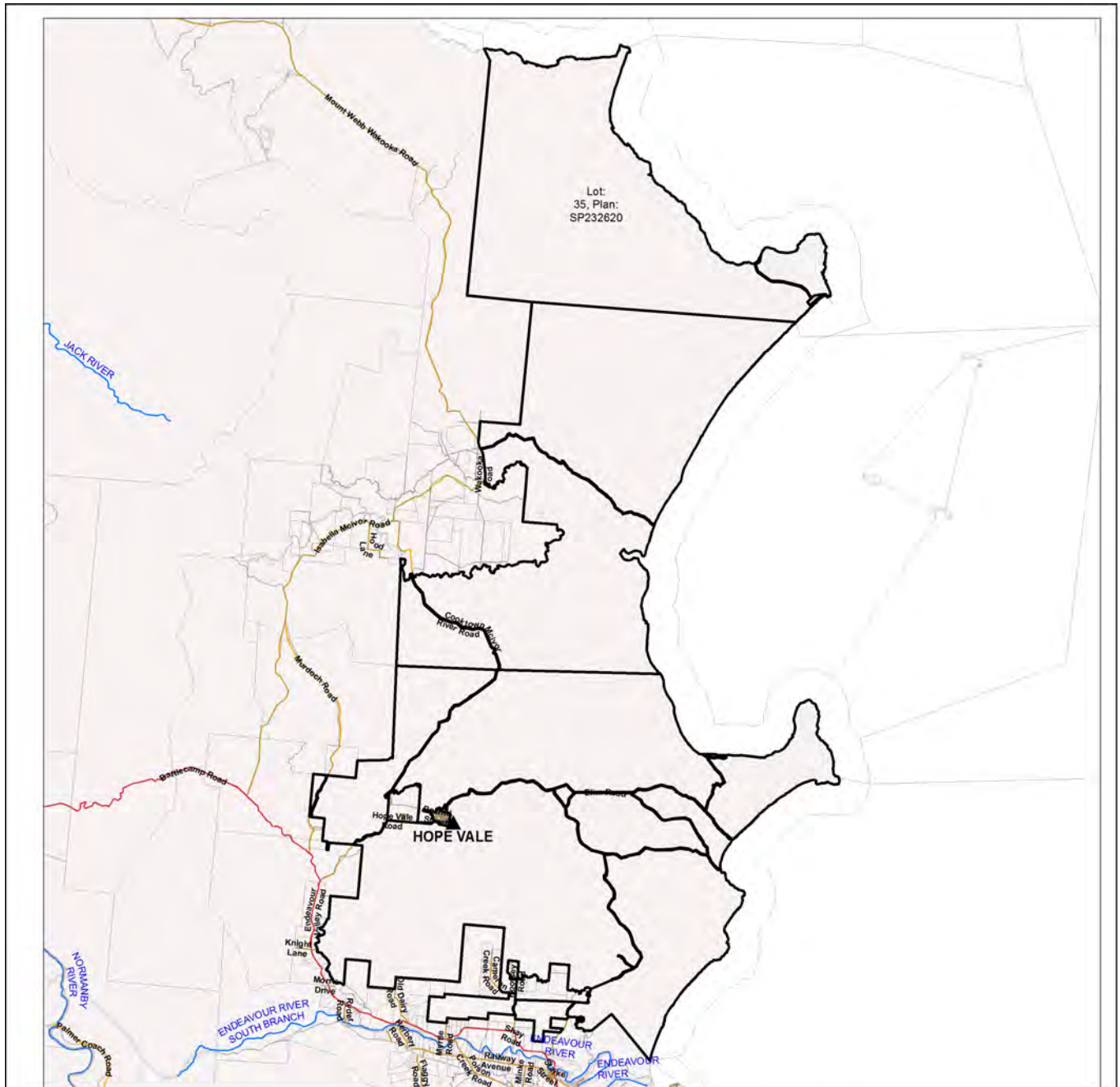
Visit <https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping>

7. Koala protection framework details for Lot: 35 Plan: SP232620

7.1 Koala districts

(no results)

7.2 Koala priority area, koala habitat area and identified koala broad-hectare area map

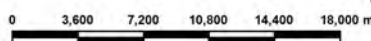


Koala priority area, koala habitat area and identified koala broad-hectare area map

Legend

- Selected Lot and Plan
- Koala habitat area (core)
- Koala habitat area (locally refined)
- Koala priority area
- Identified koala broad-hectare area
- Cadastral Boundaries
- Towns
- Highway
- Connector
- Street/Local Road
- Major rivers/creeks
- Queensland

The koala habitat mapping within South East Queensland uses regional ecosystem linework compiled at a scale varying from 1:25,000 to 1:100,000. Linework should be used as a guide only. The positional accuracy of regional ecosystem data mapped at a scale of 1:100,000 is +/- 100 metres.

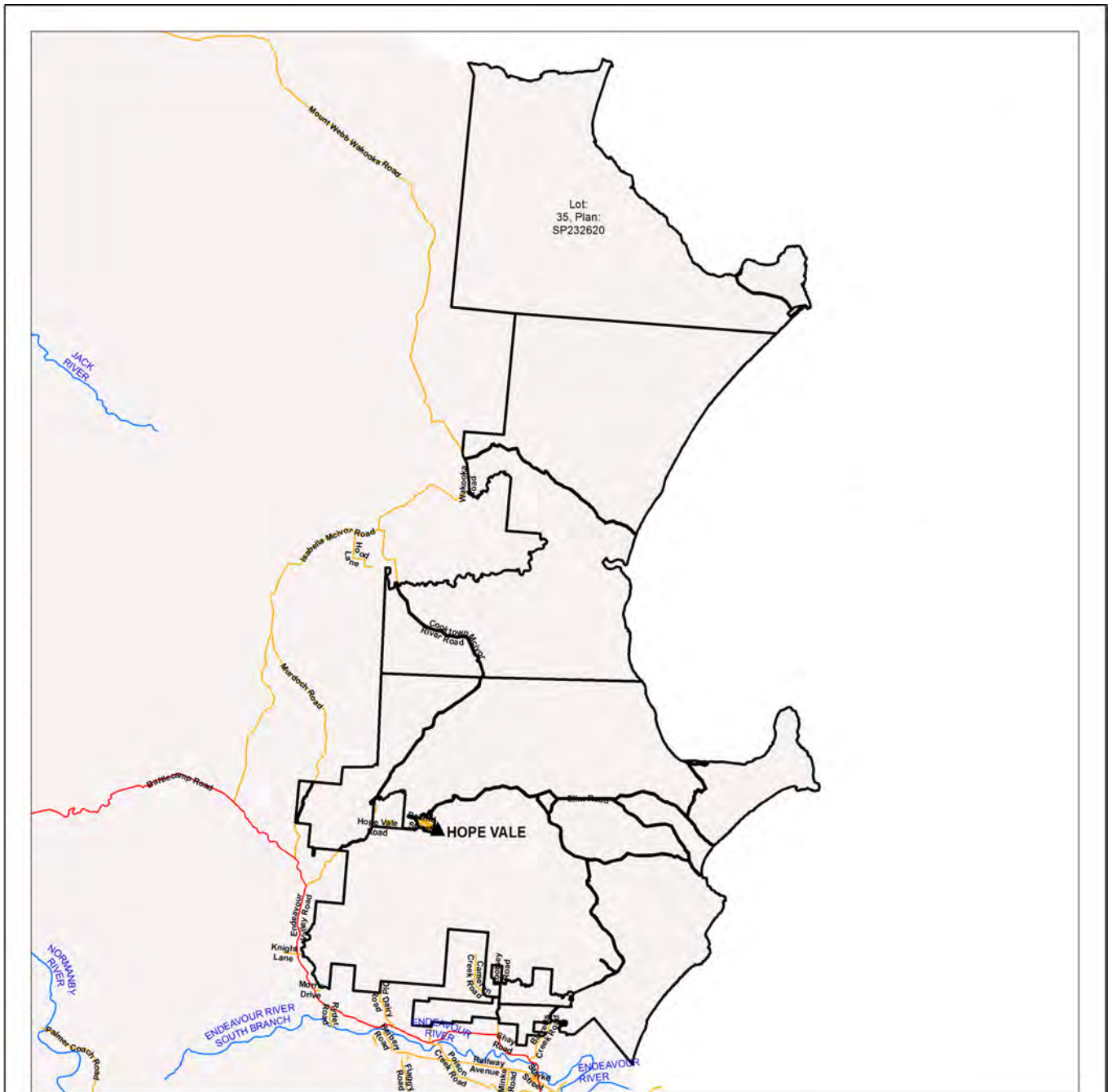


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The koala conservation plan maps will be updated at least annually to include any koala habitat areas that have been made, amended or revoked.

In order to ensure that the most recent map for an area of interest can be accessed, prior to the annual update, a register of changes made to koala habitat areas as a result of the map amendment process will be available at:
<https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping/>.
The register will include lot on plan for the change, the date the decision was made and the map issued to the landholder which shows areas determined to be koala habitat areas.

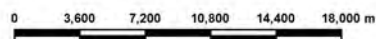
7.3 Koala habitat regional ecosystems for core koala habitat areas



Koala habitat regional ecosystems for core koala habitat areas

Legend

- Selected Lot and Plan
- Koala habitat area (core)
- Towns
- Highway
- Connector
- Street/Local Road
- Major rivers/creeks
- Queensland



The koala habitat mapping within South East Queensland uses regional ecosystem linework compiled at a scale varying from 1:25,000 to 1:100,000. Linework should be used as a guide only. The positional accuracy of regional ecosystem data mapped at a scale of 1:100,000 is +/- 100 metres.

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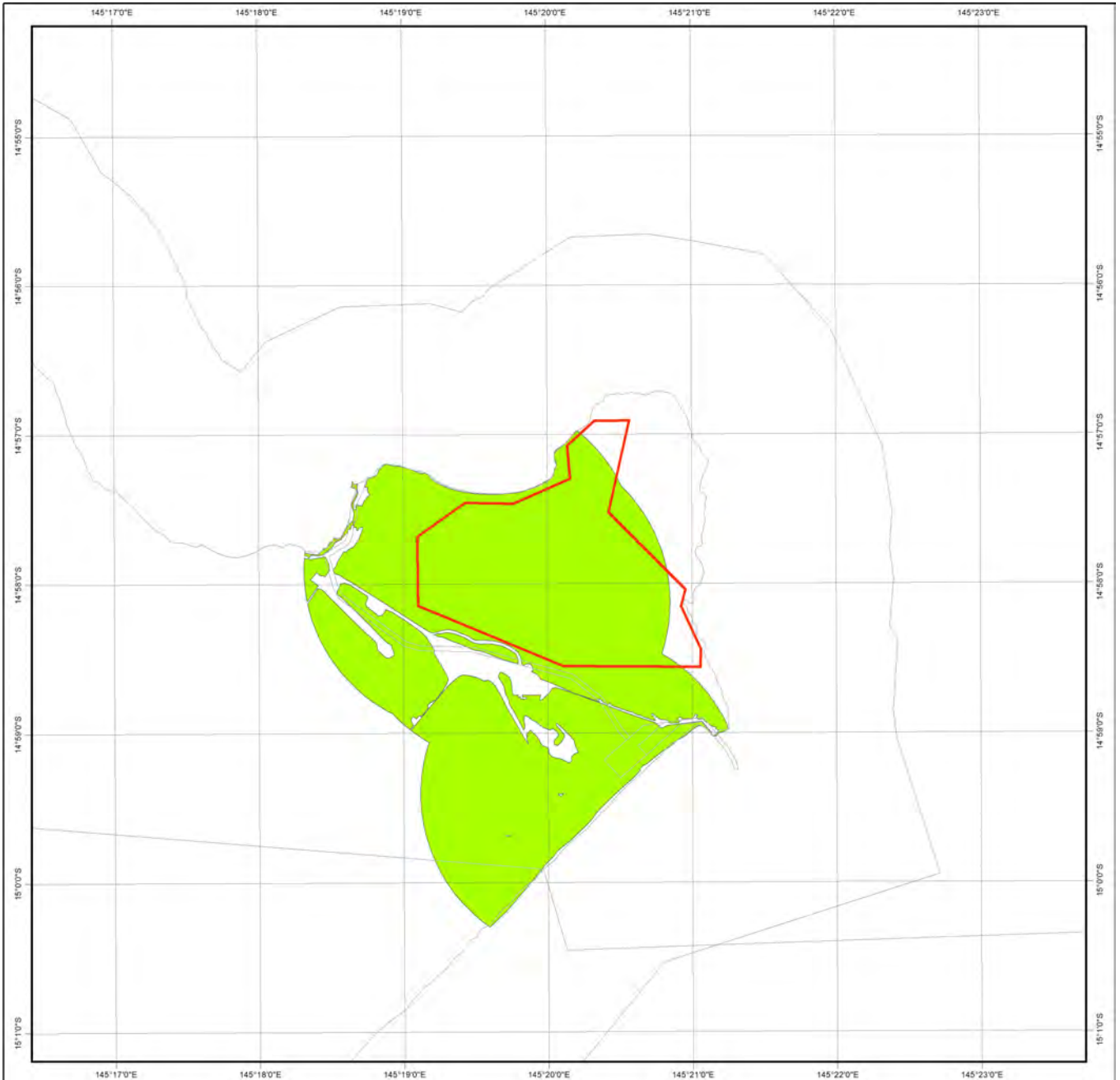
This product is projected into GDA 1994 MGA Zone 55

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

8. Other relevant legislation contacts list

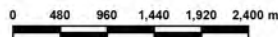
Activity	Legislation	Agency	Contact details
<ul style="list-style-type: none"> • Interference with overland flow • Earthworks, significant disturbance 	<i>Water Act 2000</i> <i>Soil Conservation Act 1986</i>	Department of Regional Development, Manufacturing and Water (Queensland Government) Department of Resources (Queensland Government)	Ph: 13 QGOV (13 74 68) www.rdmw.qld.gov.au www.resources.qld.gov.au
<ul style="list-style-type: none"> • Indigenous Cultural Heritage 	<i>Aboriginal Cultural Heritage Act 2003</i> <i>Torres Strait Islander Cultural Heritage Act 2003</i>	Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships	Ph: 13 QGOV (13 74 68) www.datsip.qld.gov.au
<ul style="list-style-type: none"> • Mining and environmentally relevant activities • Infrastructure development (coastal) • Heritage issues 	<i>Environmental Protection Act 1994</i> <i>Coastal Protection and Management Act 1995</i> <i>Queensland Heritage Act 1992</i>	Department of Environment and Science (Queensland Government)	Ph: 13 QGOV (13 74 68) www.des.qld.gov.au
<ul style="list-style-type: none"> • Protected plants and protected areas 	<i>Nature Conservation Act 1992</i>	Department of Environment and Science (Queensland Government)	Ph: 1300 130 372 (option 4) palm@des.qld.gov.au www.des.qld.gov.au
<ul style="list-style-type: none"> • Koala mapping and regulations 	<i>Nature Conservation Act 1992</i>	Department of Environment and Science (Queensland Government)	Ph: 13 QGOV (13 74 68) Koala.assessment@des.qld.gov.au
<ul style="list-style-type: none"> • Interference with fish passage in a watercourse, mangroves • Forestry activities on State land tenures 	<i>Fisheries Act 1994</i> <i>Forestry Act 1959</i>	Department of Agriculture and Fisheries (Queensland Government)	Ph: 13 QGOV (13 74 68) www.daf.qld.gov.au
<ul style="list-style-type: none"> • Matters of National Environmental Significance including listed threatened species and ecological communities 	<i>Environment Protection and Biodiversity Conservation Act 1999</i>	Department of Agriculture, Water and the Environment (Australian Government)	Ph: 1800 803 772 www.environment.gov.au
<ul style="list-style-type: none"> • Development and planning processes 	<i>Planning Act 2016</i> <i>State Development and Public Works Organisation Act 1971</i>	Department of State Development, Infrastructure, Local Government and Planning (Queensland Government)	Ph: 13 QGOV (13 74 68) www.dsdmip.qld.gov.au
<ul style="list-style-type: none"> • Local government requirements 	<i>Local Government Act 2009</i> <i>Planning Act 2016</i>	Department of State Development, Infrastructure, Local Government and Planning (Queensland Government)	Ph: 13 QGOV (13 74 68) Your relevant local government office
<ul style="list-style-type: none"> • Harvesting timber in the Wet Tropics of Qld World Heritage area 	<i>Wet Tropics World Heritage Protection and Management Act 1993</i>	Wet Tropics Management Authority	Ph: (07) 4241 0500 www.wettropics.gov.au



Protected Plants Flora Survey Trigger Map

Legend

-  polygon
-  High risk area
-  Other land parcel boundaries
-  Freeways / motorways / highways
-  Secondary roads / streets



This product is projected into:
GDA 1994 Queensland Albers

This map shows areas where particular provisions of the Nature Conservation Act 1992 apply to the clearing of protected plants.

Land parcel boundaries are provided as locational aid only.

This map is produced at a scale relevant to the size of the area selected and should be printed as A4 size in portrait orientation.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Science at palm@des.qld.gov.au

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Protected plants flora survey trigger map

The protected plants flora survey trigger map identifies 'high risk areas' where threatened and near threatened plants are known to exist or are likely to exist. Under the *Nature Conservation Act 1992* (the Act) it is an offence to clear protected plants that are 'in the wild' unless you are authorised or the clearing is exempt, for more information see [section 89](#) of the Act.

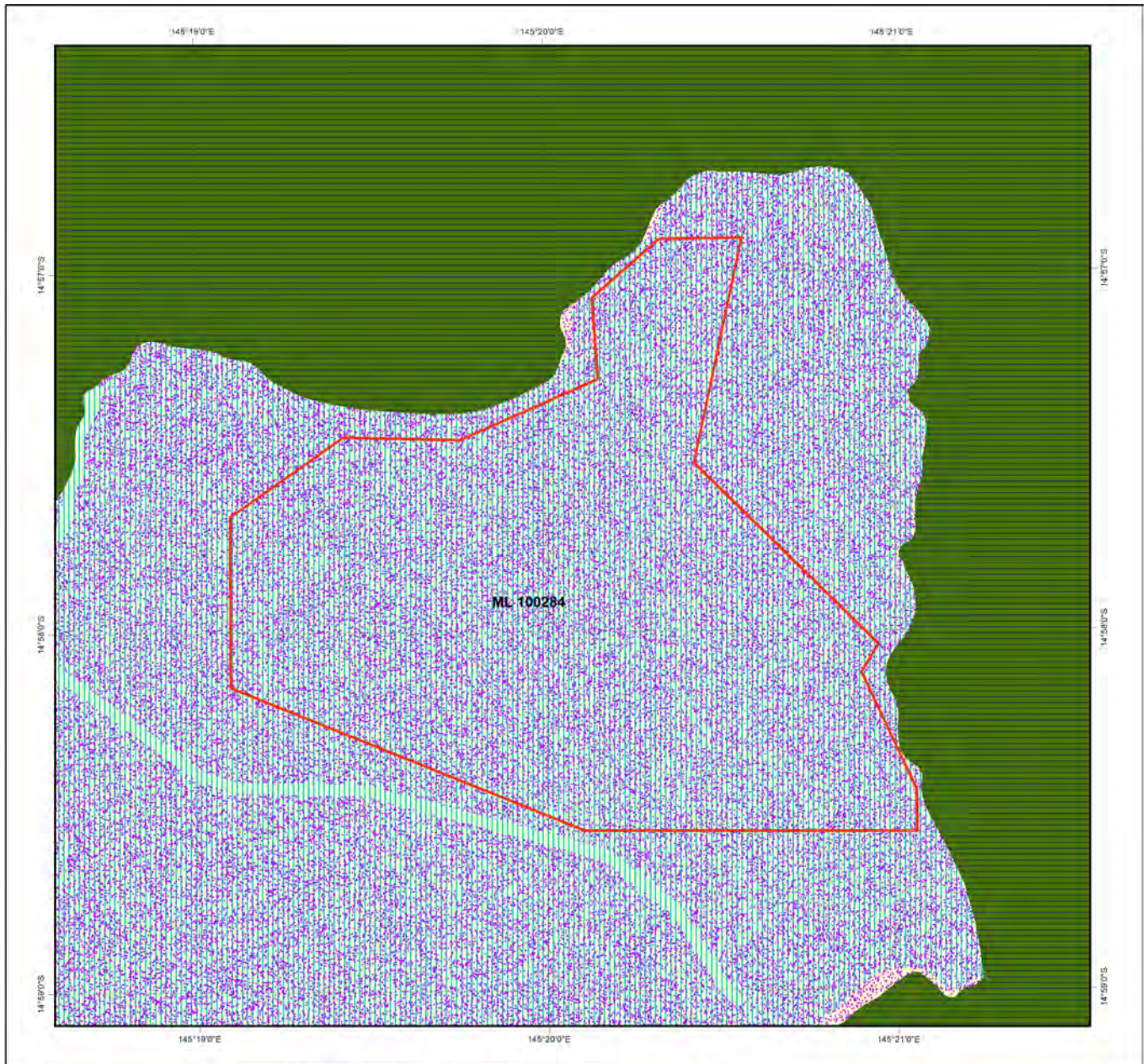
Please see the Department of Environment and Science webpage on the [clearing of protected plants](#) for information on what exemptions may apply in your circumstances, whether you may need to undertake a flora survey, and whether you may need a protected plants clearing permit.

Updates to the data informing the flora survey trigger map

The flora survey trigger map will be reviewed, and updated if necessary, at least every 12 months to ensure the map reflects the most up-to-date and accurate data available.

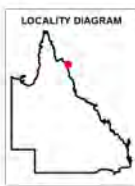
Species information

Please note that flora survey trigger maps do not identify species associated with 'high risk areas'. While some species information may be publicly available, for example via the [Queensland Spatial Catalogue](#), the Department of Environment and Science does not provide species information on request. Regardless of whether species information is available for a particular high risk area, clearing plants in a high risk area may require a flora survey and/or clearing permit. Please see the Department of Environment and Science webpage on the [clearing of protected plants](#) for more information.



ENVIRONMENTALLY SENSITIVE AREAS - Mining Activities

- Selected Mining Lease (ML)
- CATEGORY A**
- National Parks
- Conservation Parks
- Forest Reserves
- Special Wildlife Reserve
- Wet Tropics World Heritage Area
- Great Barrier Reef Marine Park Area
- Marine Parks other than General Use Zones
- CATEGORY B**
- Queensland Heritage Register Places
- Ramsar Sites
- Cultural Heritage Registered Areas and DLA's other than Stanbroke
- Special Forestry Areas
- Seaward Side of Highest Astronomical Tide
- Fish Habitat Areas
- Coordinated Conservation Areas
- Endangered Regional Ecosystems - regrowth and remnant (Biodiversity Status)
- General Use Zones of Marine Parks
- Marine Plants
- CATEGORY C**
- Nature Refuges
- Resources Reserve
- State Forests
- Timber Reserves
- River Improvement Areas
- Stanbroke DLA
- Coastal Management District
- Dams and Weirs
- OTHERS**
- Towns
- Roads
- Repealed Wild River Nominated Waterways
- Repealed Wild River Preservation Areas
- Repealed Wild River High Preservation Areas
- Mahogany Glider Habitat
- Directory of Important Wetlands
- Queensland



This product is projected into GDA 1994 MGA Zone 55

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NOTE TO USER: Themes presented in this map are indicative only. Field survey may be required to verify the 'true' spatial extent and value. Not all environmentally sensitive areas are presented in this map. A user should refer to the particular circumstances relevant to their situation to assess the 'completeness' of themes provided.

The user should note that some boundaries and indicated values are ambient and may change over time (e.g. regional ecosystem boundaries and conservation status, watercourse mapping etc).

The user should be aware that due to multiple overlapping themes/layers present, some themes/layers may be obscured by others. Ordering in the Legend does not accurately reflect the order by which themes/layers are displayed.

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Appendix 3 - Acronyms and Abbreviations

AOI	- Area of Interest
DES	- Department of Environment and Science
EP Act	- <i>Environmental Protection Act 1994</i>
EPP	- Environmental Protection Policy
GDA94	- Geocentric Datum of Australia 1994
GEM	- General Environmental Matters
GIS	- Geographic Information System
MSES	- Matters of State Environmental Significance
NCA	- <i>Nature Conservation Act 1992</i>
RE	- Regional Ecosystem
SPP	- State Planning Policy
VMA	- <i>Vegetation Management Act 1999</i>



Queensland Government

Department of Environment and Science

Environmental Reports

Biodiversity and Conservation Values

Biodiversity Planning Assessments and Aquatic Conservation Assessments

For the selected area of interest
ml: 100284

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or Area of Interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "Central co-ordinates" option, the resulting assessment area encompasses an area extending from 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Please direct queries about these reports to: biodiversity.planning@des.qld.gov.au

Disclaimer

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Summary Information

Tables 1 to 8 provide an overview of the AOI with respect to selected topographic and environmental values.

Table 1: Area of interest details: ml: 100284

Size (ha)	613.67
Local Government(s)	Hope Vale Aboriginal Shire
Bioregion(s)	Cape York Peninsula
Subregion(s)	Starke Coastal Lowlands
Catchment(s)	Jeannie

The following table identifies available Biodiversity Planning Assessments (BPAs) and Aquatic Conservation Assessments (ACAs) with respect to the AOI.

Table 2: Available Biodiversity Planning and Aquatic Conservation Assessments

Assessment Type	Assessment Area and Version
Biodiversity Planning Assessment(s)	Cape York v1.1
Aquatic Conservation Assessment(s) (riverine)	Cape York Catchments v1.1
Aquatic Conservation Assessment(s) (non-riverine)	Cape York Catchments v1.1

Table 3: Remnant regional ecosystems within the AOI as per the Qld Herbarium's 'biodiversity status'

Biodiversity Status	Area (Ha)	% of AOI
Endangered	0.0	0.0
Of concern	36.71	5.98
No concern at present	576.96	94.02

The following table identifies the extent and proportion of the user specified area of interest (AOI) which is mapped as being of "State", "Regional" or "Local" significance via application of the Queensland Department of Environment and Science's *Biodiversity Assessment and Mapping Methodology* (BAMM).

Table 4: Summary table, biodiversity significance

Biodiversity significance	Area (Ha)	% of AOI
State Habitat for EVNT taxa	34.57	5.63
State	579.09	94.37
Regional	0.0	0.0
Local or Other Values	0.0	0.0

Table 5: Non-riverine wetlands intersecting the AOI

Non-riverine wetland types intersecting the area of interest	#
Number of Palustrine wetlands	2
Number of Lacustrine wetlands	0

Non-riverine wetland types intersecting the area of interest	#
Total number of non-riverine wetlands	2

NB. The figures presented in the table above are derived from the relevant non-riverine Aquatic Conservation Assessment(s). Later releases of wetland mapping produced via the Queensland Wetland Mapping Program may provide more recent information in regards to wetland extent.

Table 6: Named waterways intersecting the AOI

(no results)

Refer to **Map 1** for general locality information.

The following two tables identify the extent and proportion of the user specified AOI which is mapped as being of "Very High", "High", "Medium", "Low", or "Very Low" aquatic conservation value for riverine and non-riverine wetlands via application of the Queensland Department of Environment and Science's *Aquatic Biodiversity Assessment and Mapping Method* (AquaBAMM).

Table 7: Summary table, aquatic conservation significance (riverine)

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
Very High	576.31	93.91
High	37.35	6.09
Medium	0.0	0.0
Low	0.0	0.0
Very Low	0.0	0.0

Table 8: Summary table, aquatic conservation significance (non-riverine)

Aquatic conservation significance (non-riverine wetlands)	Area (Ha)	% of AOI
Very High	1.09	0.18
High	0.0	0.0
Medium	0.0	0.0
Low	0.0	0.0
Very Low	0.0	0.0

Biodiversity Planning Assessments

Introduction

The Department of Environment and Science (DES) attributes biodiversity significance on a bioregional scale through a Biodiversity Planning Assessment (BPA). A BPA involves the integration of ecological criteria using the *Biodiversity assessment and Mapping Methodology* (BAMM) and is developed in two stages: 1) **diagnostic criteria**, and 2) **expert panel criteria**. The diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion, while the expert panel criteria allows for the refinement of the mapped information from the diagnostic output by incorporating local knowledge and expert opinion.

The BAMM methodology has application for identifying areas with various levels of significance solely for biodiversity reasons. These include threatened ecosystems or taxa, large tracts of habitat in good condition, ecosystem diversity, landscape context and connection, and buffers to wetlands or other types of habitat important for the maintenance of biodiversity or ecological processes. While natural resource values such as dryland salinity, soil erosion potential or land capability are not dealt with explicitly, they are included to some extent within the biodiversity status of regional ecosystems recognised by the DES.

Biodiversity Planning Assessments (BPAs) assign three levels of overall biodiversity significance.

- **State significance** - areas assessed as being significant for biodiversity at the bioregional or state scales. They also include areas assessed by other studies/processes as being significant at national or international scales. In addition, areas flagged as being of State significance due to the presence of endangered, vulnerable and/or near threatened taxa, are identified as "State Habitat for EVNT taxa".
- **Regional significance** - areas assessed as being significant for biodiversity at the subregional scale. These areas have lower significance for biodiversity than areas assessed as being of State significance.
- **Local significance and/or other values** - areas assessed as not being significant for biodiversity at state or regional scales. Local values are of significance at the local government scale.

For further information on released BPAs and a copy of the underlying methodology, go to:

<http://www.qld.gov.au/environment/plants-animals/biodiversity/planning/>

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

<http://qspatial.information.qld.gov.au/geoportal/>

The following table identifies the extent and proportion of the user specified AOI which is mapped as being of "State", "Regional" or "Local" significance via application of the BAMM.

Table 9: Summary table, biodiversity significance

Biodiversity significance	Area (Ha)	% of AOI
State Habitat for EVNT taxa	34.57	5.63
State	579.09	94.37
Regional	0.0	0.0
Local or Other Values	0.0	0.0

Refer to **Map 2** for further information.

Diagnostic Criteria

Diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion. These criteria are diagnostic in that they are used to filter the available data and provide a "first-cut" or initial determination of biodiversity significance. This initial assessment is then combined through a second group of other essential criteria.

A description of the individual diagnostic criteria is provided in the following sections.

Criteria A. Habitat for EVNT taxa: Classifies areas according to their significance based on the presence of endangered, vulnerable and/or rare (EVNT) taxa. EVNT taxa are those scheduled under the *Nature Conservation Act 1992* and/or the

Environment Protection and Biodiversity Conservation Act 1999. It excludes highly mobile fauna taxa which are instead considered in Criterion H and brings together information on EVNT taxa using buffering of recorded sites or habitat suitability models (HSM) where available.

Criteria B. Ecosystem value: Classifies on the basis of biodiversity status of regional ecosystems, their extent in protected areas (presence of poorly conserved regional ecosystems), the presence of significant wetlands; and areas of national importance such as the presence of Threatened Ecological Communities, World Heritage areas and Ramsar sites. Ecosystem value is applied at a bioregional (**B1**) and regional (**B2**) scale.

Criteria C. Tract size: Measures the relative size of tracts of vegetation in the landscape. The size of any tract is a major indicator of ecological significance, and is also strongly correlated with the long-term viability of biodiversity values. Larger tracts are less susceptible to ecological edge effects and are more likely to sustain viable populations of native flora and fauna than smaller tracts.

Criteria D. Relative size of regional ecosystems: Classifies the relative size of each regional ecosystem unit within its bioregion (**D1**) and its subregion (**D2**). Remnant units are compared with all other occurrences with the same regional ecosystem. Large examples of a regional ecosystem are more significant than smaller examples of the same regional ecosystem because they are more representative of the biodiversity values particular to the regional ecosystem, are more resilient to the effects of disturbance, and constitute a significant proportion of the total area of the regional ecosystem.

Criteria F. Ecosystem diversity: Is an indicator of the number of regional ecosystems occurring within an area. An area with high ecosystem diversity will have many regional ecosystems and ecotones relative to other areas within the bioregion.

Criteria G. Context and connection: Represents the extent to which a remnant unit incorporates, borders or buffers areas such as significant wetlands, endangered ecosystems; and the degree to which it is connected to other vegetation.

A summary of the biodiversity status based upon the diagnostic criteria is provided in the following table.

Table 10: Summary of biodiversity significance based upon diagnostic criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains at least 1 Endangered or 2 Vulnerable or Near Threatened species (A)	34.57	5.63
State	Significant Wetland (B1)	579.09	94.37

Assessment of diagnostic criteria with respect to the AOI

The following table reflects an assessment of the individual diagnostic criteria noted above in regards to the AOI.

Table 11: Assessment of individual diagnostic criteria with respect to the AOI

Diagnostic Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
A: Habitat for EVNT Taxa	34.57	5.6			579.09	94.4		
B1: Ecosystem Value (Bioregion)	613.66	100.0						
B2: Ecosystem Value (Subregion)	48.84	8.0			530.19	86.4	34.63	5.6
C: Tract Size			613.66	100.0				
D1: Relative RE Size (Bioregion)	83.47	13.6			4.52	0.7	525.67	85.7
D2: Relative RE Size (Subregion)	83.47	13.6	4.52	0.7	504.94	82.3	20.73	3.4
F: Ecosystem Diversity	83.47	13.6	530.19	86.4				
G: Context and Connection	466.72	76.1	146.94	23.9				

Other Essential Criteria

Other essential criteria (also known as expert panel criteria) are based on non-uniform information sources and which may rely more upon expert opinion than on quantitative data. These criteria are used to provide a "second-cut" determination of biodiversity significance, which is then combined with the diagnostic criteria for an overall assessment of relative biodiversity significance. A summary of the biodiversity status based upon the other essential criteria is provided in the following table.

Table 12: Summary of biodiversity significance based upon other essential criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I)	613.67	100.0

A description of each of the other essential criteria and associated assessment in regards to the AOI is provided in the following sections.

Criteria H. Essential and general habitat for priority taxa: Priority taxa are those which are at risk or of management concern, taxa of scientific interest as relictual (ancient or primitive), endemic taxa or locally significant populations (such as a flying fox camp or heronry), highly specialised taxa whose habitat requirements are complex and distributions are not well correlated with any particular regional ecosystem, taxa important for maintaining genetic diversity (such as complex spatial patterns of genetic variation, geographic range limits, highly disjunct populations), taxa critical for management or monitoring of biodiversity (functionally important or ecological indicators), or economic and culturally important taxa.

Criteria I. Special biodiversity values: areas with special biodiversity values are important because they contain multiple taxa in a unique ecological and often highly biodiverse environment. Areas with special biodiversity values can include the following:

- Ia - centres of endemism - areas where concentrations of taxa are endemic to a bioregion or subregion are found.
- Ib - wildlife refugia (Morton *et al.* 1995), for example, islands, mound springs, caves, wetlands, gorges, mountain ranges and topographic isolates, ecological refuges, refuges from exotic animals, and refuges from clearing. The latter may include large areas that are not suitable for clearing because of land suitability/capability.
- Ic - areas with concentrations of disjunct populations.
- Id - areas with concentrations of taxa at the limits of their geographic ranges.
- Ie - areas with high species richness.
- If - areas with concentrations of relictual populations (ancient and primitive taxa).
- Ig - areas containing REs with distinct variation in species composition associated with geomorphology and other environmental variables.
- Ih - an artificial waterbody or managed/manipulated wetland considered by the panel/s to be of ecological significance.
- Ii - areas with a high density of hollow-bearing trees that provide habitat for animals.
- Ij - breeding or roosting sites used by a significant number of individuals.
- Ik - climate change refuge.

The following table identifies the value and extent area of the Other Essential Criteria H and I within the AOI.

Table 13: Relative importance of expert panel criteria (H and I) used to assess overall biodiversity significance with respect to the AOI

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
H: Core Habitat Priority Taxa	384.81	62.7			225.06	36.7		
Ia: Centres of Endemism	613.66	100.0						
Ib: Wildlife Refugia	613.66	100.0						
Ic: Disjunct Populations	613.66	100.0						
Id: Limits of Geographic Ranges	575.44	93.8						
Ie: High Species Richness	587.87	95.8						
If: Relictual Populations	575.44	93.8						
Ig: Variation in Species Composition	609.48	99.3	4.18	0.7				

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
lh: Artificial Wetland								
li: Hollow Bearing Trees								
lj: Breeding or Roosting Site			613.66	100.0				
lk: Climate Refugia								

NB. Whilst biodiversity values associated with Criteria I may be present within the site (refer to tables 12 and 15), for the New England Tableland and Central Queensland Coast BPAs, area and % area figures associated with Criteria Ia through to Ij cannot be listed in the table above (due to slight variations in data formats between BPAs).

Criteria J. Corridors: areas identified under this criterion qualify either because they are existing vegetated corridors important for contiguity, or cleared areas that could serve this purpose if revegetated. Some examples of corridors include riparian habitats, transport corridors and "stepping stones".

Bioregional and subregional conservation corridors have been identified in the more developed bioregions of Queensland through the BPAs, using an intensive process involving expert panels. Map 3 displays the location of corridors as identified under the Statewide Corridor network. The Statewide Corridor network incorporates BPA derived corridors and for bioregions where no BPA has been assessed yet, corridors derived under other planning processes. *Note: as a result of updating and developing a statewide network, the alignment of corridors may differ slightly in some instances when compared to those used in individual BPAs.*

The functions of these corridors are:

- **Terrestrial** Bioregional corridors, in conjunction with large tracts of remnant vegetation, maintain ecological and evolutionary processes at a landscape scale, by:

- Maintaining long term evolutionary/genetic processes that allow the natural change in distributions of species and connectivity between populations of species over long periods of time;
- Maintaining landscape/ecosystems processes associated with geological, altitudinal and climatic gradients, to allow for ecological responses to climate change;
- Maintaining large scale seasonal/migratory species processes and movement of fauna;
- Maximising connectivity between large tracts/patches of remnant vegetation;
- Identifying key areas for rehabilitation and offsets; and

- **Riparian** Bioregional Corridors also maintain and encourage connectivity of riparian and associated ecosystems.

The location of the corridors is determined by the following principles:

- Terrestrial

- Complement riparian landscape corridors (i.e. minimise overlap and maximise connectivity);
- Follow major watershed/catchment and/or coastal boundaries;
- Incorporate major altitudinal/geological/climatic gradients;
- Include and maximise connectivity between large tracts/patches of remnant vegetation;
- Include and maximise connectivity between remnant vegetation in good condition; and

- Riparian

- Located on the major river or creek systems within the bioregion in question.

The total extent of remnant vegetation triggered as being of "State", "Regional" or "Local" significance due to the presence of an overlying BPA derived terrestrial or riparian corridor within the AOI, is provided in the following table. For further information on how remnant vegetation is triggered due to the presence of an overlying BPA derived corridor, refer to the relevant landscape BPA expert panel report(s).

Table 14: Extent of triggered remnant vegetation due to the presence of BPA derived corridors with respect to the AOI

Biodiversity Significance	Area (Ha)	% of AOI
State	0.0	0.0
Regional	0.0	0.0
Local	0.0	0.0

NB: area figures associated with the extent of corridor triggered remnant vegetation are only available for those bioregions where a BPA has been undertaken.

Refer to **Map 3** for further information.

Threatening process/condition (Criteria K) - areas identified by experts under this criterion may be used to amend (upgrade or downgrade) biodiversity significance arising from the "first-cut" analysis. The condition of remnant vegetation is affected by threatening processes such as weeds, ferals, grazing and burning regime, selective timber harvesting/removal, salinity, soil erosion, and climate change.

Assessment of Criteria K with respect to the AOI is not currently included in the "Biodiversity and Conservation Values" report, as it has not been applied to the majority of Queensland due to data/information limitations and availability.

Special Area Decisions

Expert panel derived "Special Area Decisions" are used to assign values to Other Essential Criteria. The specific decisions which relate to the AOI in question are listed in the table below.

Table 15: Expert panel decisions for assigning levels of biodiversity significance with respect to the AOI

Decision Number	Description	Panel Recommended Significance	Criteria Values
cyp_fa_06	Fish habitat	b: State a, c - h: Regional	lc (disjunct populations): HIGH ld (geographic range limits): HIGH le (high species richness): VERY HIGH lf (relictual populations): HIGH lj (breeding/roosting site): HIGH
cyp_fa_11	High precision records for priority taxa of State significance are contained within the remnant.	State	Criteria H: VERY HIGH
cyp_fa_12	High precision records for priority taxa of Regional significance are contained within the remnant.	Regional	Criteria H: HIGH
cyp_fa_13	Low precision records for priority taxa of State significance are contained within the remnant.	State	Criteria H: MEDIUM
cyp_fa_14	Low precision records for priority taxa of Regional significance are contained within the remnant.	Regional	Criteria H: MEDIUM
cyp_fl_02	Grassland RE's less than 10,000ha	State	lb (wildlife refugia): HIGH / VERY HIGH lg (distinct variation in species composition): VERY HIGH
cyp_fl_07	Heath	State	la (centre of endemism): VERY HIGH lb (topographic isolate and refuge from clearing): VERY HIGH lc (disjunct populations): VERY HIGH ld (geographic range limits): VERY HIGH le (high species richness): VERY HIGH lf (relictual populations): VERY HIGH lg (distinct variation in species composition): HIGH lj (breeding/roosting site): HIGH
cyp_fl_16	High precision records for priority taxa of State significance are contained within the remnant.	State	Criteria H: VERY HIGH
cyp_fl_17	High precision records for priority taxa of Regional significance are contained within the remnant.	Regional	Criteria H: HIGH

Decision Number	Description	Panel Recommended Significance	Criteria Values
cyp_fl_18	Low precision records for priority taxa of State significance are contained within the remnant.	State	Criteria H: MEDIUM
cyp_fl_19	Low precision records for priority taxa of Regional significance are contained within the remnant.	Regional	Criteria H: MEDIUM
cyp_l_07	Dunefields - east and west coast	State	lb (topographic isolate and refuge from clearing): VERY HIGH lc (disjunct populations): HIGH le (high species richness): VERY HIGH
cyp_l_29	Cape Bedford / Cape Flattery	State	la (centre of endemism): VERY HIGH lb (topographic isolate and refuge from clearing): VERY HIGH lc (disjunct populations): VERY HIGH lg (distinct variation in species composition): VERY HIGH lj (breeding/roosting site): VERY HIGH

Expert panel decision descriptions:

cyp_fa_06

Significant fish habitat areas identified by Abrahams **et al.** (1995) and Herbert **et al.** (1995). Rivers containing rare and uncommon fish taxa and fish communities include:

- a) Jardine River - rich fish fauna and restricted threatened turtle **Emydura subglobosa subglobosa**.
- b) Wenlock River - richest known fish fauna of any river in Australia.
- c) Jackson-Dulhunty Rivers.
- d) Olive River - southernmost distribution of Jardinean fish fauna on east coast.
- e) Claudie Lockhart Rivers - diverse fish fauna.
- f) Holroyd, Edward Coleman Rivers - area of transition between fish fauna assemblages of CYP and Gulf of Carpentaria.
- g) Three Quarter Lake/Scrubby Creek - disjunct populations of certain fish taxa.
- h) Sand-dune lakes between Shadd Point and Cooktown - unique fauna assemblages that vary across the lakes, including disjunct/relictual populations of certain fish taxa.

Also implemented as ACA decision - cl_r_fa_02; du_r_fa_04; ja_r_fa_04; lo_r_fa_03; op_r_fa_02.

cyp_fa_11

Remnant contains core habitat for priority taxa with high precision records

cyp_fa_12

Remnant contains habitat for priority taxa with high precision records

cyp_fa_13

Remnant contains core habitat for priority taxa with low precision records

cyp_fa_14

Remnant contains habitat for priority taxa with low precision records

cyp_fl_02

RE's including 3.3.57, 3.3.62, 3.5.30, 3.8.4, 3.9.8, 3.12.30, 3.12.31, 3.12.32, 3.12.29 and 3.11.19a.

Under threat from thickening. Many less than 1000ha.

Habitat for threatened bird species, general concern about the loss of grasslands on CYP (Crowley Garnett 1998).

cyp_fl_07

Heath communities are nationally restricted and uncommon. CYP contains the largest areas of heathland in Australia, and these examples are largely undisturbed (Abrahams **et al.** 1995).

cyp_fl_16

Remnant contains core habitat for priority taxa with high precision records

cyp_fl_17

Remnant contains habitat for priority taxa with high precision records

cyp_fl_18

Remnant contains core habitat for priority taxa with low precision records

cyp_fl_19

Remnant contains habitat for priority taxa with low precision records

cyp_l_07

Dunefield rise - prograding dune systems, associated vine scrubs and trapped wetlands. Bird rookeries. Threatened species present. Holocene on west coast, quaternary on east coast.

This decision, combined with cyp_fa_02, cyp_fa_05 and gup_l_03, encompasses all of the Gulf Plains Important Bird Area within CYP (Dutson **et al.** 2009). The IBA values include a significant breeding population of the Sarus Crane (**Grus anitgone**) and the coast is used by > 1% of the global population of a large number of wader species, e.g. Black-tailed Godwit (**Limosa limosa**), Great Knot (**Calidris tenuirostris**) and Eastern Curlew (**Numenius madagascariensis**).

Implemented in ACA as - ar_nr_ec_03; cl_nr_ec_02; du_nr_ec_05; em_nr_ec_02; en_nr_ec_01, ho_nr_ec_03; ic_nr_ec_01; ic_nr_ec_02; ja_nr_ec_04; je_nr_ec_02; jj_nr_ec_04; lo_nr_ec_02; mw_nr_ec_03; op_nr_ec_05; sw_nr_ec_02; we_nr_ec_05; wt_nr_ec_01.

cyp_l_29

Sand country, basalt, sandstone country

From Abrahams **et al.** (1995):

- gegenwalle (Counter-wall) dunes
- large elongate parabolic dunes;
- representative of dune landforms and dune vegetation found in North Queensland;
- high wilderness quality
- largest diversity of dune landforms of any of the dune systems in Northern Australia;
- some of the best examples of evergreen mesophyll/notophyll vine forest on the Peninsula, as well as some other rare vine thicket communities;
- only known habitat of two rare skink species (**Ctenotus rawlinsoni** and **Lerista ingrami**);
- habitat of several threatened plant species and regionally uncommon vegetation types;
- the dune lakes contain a unique faunal assemblage;
- the evergreen notophyll vine forests of the area support several plant species that have widely disjunct populations;
- large roosting populations of the endangered Little Tern (**Sterna albifrons**)

Encompasses ACA decision je_nr_ec_01.

Aquatic Conservation Assessments

Introduction

The Aquatic Biodiversity Assessment and Mapping Method or AquaBAMM (Clayton *et al.* 2006), was developed to assess conservation values of wetlands in Queensland, and may also have application in broader geographical contexts. It is a comprehensive method that uses available data, including data resulting from expert opinion, to identify relative wetland conservation/ecological values within a specified study area (usually a catchment). The product of applying this method is an Aquatic Conservation Assessment (ACA) for the study area.

An ACA using AquaBAMM is non-social, non-economic and identifies the conservation/ecological values of wetlands at a user-defined scale. It provides a robust and objective conservation assessment using criteria, indicators and measures that are founded upon a large body of national and international literature. The criteria, each of which may have variable numbers of indicators and measures, are naturalness (aquatic), naturalness (catchment), diversity and richness, threatened species and ecosystems, priority species and ecosystems, special features, connectivity and representativeness. An ACA using AquaBAMM is a powerful decision support tool that is easily updated and simply interrogated through a geographic information system (GIS).

Where they have been conducted, ACAs can provide a source of baseline wetland conservation/ecological information to support natural resource management and planning processes. They are useful as an independent product or as an important foundation upon which a variety of additional environmental and socio-economic elements can be added and considered (i.e. an early input to broader 'triple-bottom-line' decision-making processes). An ACA can have application in:

- determining priorities for protection, regulation or rehabilitation of wetlands and other aquatic ecosystems
- on-ground investment in wetlands and other aquatic ecosystems
- contributing to impact assessment of large-scale development (e.g. dams)
- water resource and strategic regional planning processes

For a detailed explanation of the methodology please refer to the summary and expert panel reports relevant to the ACA utilised in this assessment. These reports can be accessed at *Wetland Info*:

<http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca>

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

<http://qspatial.information.qld.gov.au/geoportal/>

Explanation of Criteria

Under the AquaBAMM, eight criteria are assessed to derive an overall conservation value. Similar to the Biodiversity Assessment and Mapping Methodology, the criteria may be primarily diagnostic (quantitative) or primarily expert opinion (qualitative) in nature. The following sections provide a brief description of each of the 8 criteria.

Criteria 1. Naturalness - Aquatic: This attribute reflects the extent to which a wetland's (riverine, non-riverine, estuarine) aquatic state of naturalness is affected through relevant influencing indicators which include: presence of exotic flora and fauna; presence of aquatic communities; degree of habitat modification and degree of hydrological modification.

Criteria 2. Naturalness - Catchment: The naturalness of the terrestrial systems of a catchment can have an influence on many wetland characteristics including: natural ecological processes e.g. nutrient cycling, riparian vegetation, water chemistry, and flow. The indicators utilised to assess this criterion include: presence of exotic flora and/or fauna; riparian, catchment and flow modification.

Criteria 3. Naturalness - Diversity and Richness: This criterion is common to many ecological assessment methods and can include both physical and biological features. It includes such indicators as species richness, riparian ecosystem richness and geomorphological diversity.

Criteria 4. Threatened Species and Ecosystems: This criterion evaluates ecological rarity characteristics of a wetland. This includes both species rarity and rarity of communities / assemblages. The communities and assemblages are best represented by regional ecosystems. Species rarity is determined by NCA and EPBC status with Endangered, Vulnerable or Near-threatened species being included in the evaluation. Ecosystem rarity is determined by regional ecosystem biodiversity status i.e. Endangered, Of Concern, or Not of Concern.

Criteria 5. Priority Species and Ecosystems: Priority flora and fauna species lists are expert panel derived. These are aquatic, semi-aquatic and riparian species which exhibit at least 1 particular trait in order to be eligible for consideration. For

flora species the traits included:

- It forms significant macrophyte beds (in shallow or deep water).
- It is an important food source.
- It is important/critical habitat.
- It is implicated in spawning or reproduction for other fauna and/or flora species.
- It is at its distributional limit or is a disjunct population.
- It provides stream bank or bed stabilisation or has soil binding properties.
- It is a small population and subject to threatening processes.

Fauna species are included if they meet at least one of the following traits:

- It is endemic to the study area (>75 per cent of its distribution is in the study area/catchment).
- It has experienced, or is suspected of experiencing, a serious population decline.
- It has experienced a significant reduction in its distribution and has a naturally restricted distribution in the study area/catchment.
- It is currently a small population and threatened by loss of habitat.
- It is a significant disjunct population.
- It is a migratory species (other than birds).
- A significant proportion of the breeding population (>one per cent for waterbirds, >75 per cent other species) occurs in the waterbody (see Ramsar criterion 6 for waterbirds).
- Limit of species range.

See the individual expert panel reports for the priority species traits specific to an ACA.

Criteria 6. Special Features: Special features are areas identified by flora, fauna and ecology expert panels which exhibit characteristics beyond those identified in other criteria and which the expert panels consider to be of the highest ecological importance. Special feature traits can relate to, but are not solely restricted to geomorphic features, unique ecological processes, presence of unique or distinct habitat, presence of unique or special hydrological regimes e.g. spring-fed streams. Special features are rated on a 1 - 4 scale (4 being the highest).

Criteria 7. Connectivity: This criterion is based on the concept that appropriately connected aquatic ecosystems are healthy and resilient, with maximum potential biodiversity and delivery of ecosystem services.

Criteria 8. Representativeness: This criterion applies primarily to non-riverine assessments, evaluates the rarity and uniqueness of a wetland type in relation to specific geographic areas. Rarity is determined by the degree of wetland protection within "protected Areas" estate or within an area subject to the *Fisheries Act 1994*, *Coastal Protection and Management Act 1995*, or *Marine Parks Act 2004*. Wetland uniqueness evaluates the relative abundance and size of a wetland or wetland management group within geographic areas such as catchment and subcatchment.

Riverine Wetlands

Riverine wetlands are all wetlands and deepwater habitats within a channel. The channels are naturally or artificially created, periodically or continuously contain moving water, or connecting two bodies of standing water. AquaBAMM, when applied to riverine wetlands uses a discrete spatial unit termed subsections. A subsection can be considered as an area which encompasses discrete homogeneous stream sections in terms of their natural attributes (i.e. physical, chemical, biological and utilitarian values) and natural resources. Thus in an ACA, an aquatic conservation significance score is calculated for each subsection and applies to all streams within a subsection, rather than individual streams as such.

Please note, the area figures provided in Tables 16 and 17, are derived using the extent of riverine subsections within the AOI. Refer to **Map 5** for further information. A summary of the conservation significance of riverine wetlands within the AOI is provided in the following table.

Table 16: Overall level/s of riverine aquatic conservation significance

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
Very High	576.31	93.91

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	37.35	6.09
Medium	0.0	0.0
Low	0.0	0.0
Very Low	0.0	0.0

The individual aquatic conservation criteria ratings for riverine wetlands within the AOI are listed below.

Table 17: Level/s of riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic			576.31	93.9			37.35	6.1
2. Naturalness catchment	613.66	100.0						
3. Diversity and richness	576.31	93.9	37.35	6.1				
4. Threatened species and ecosystems	37.35	6.1	576.31	93.9				
5. Priority species and ecosystems	613.66	100.0						
6. Special features	576.31	93.9	37.35	6.1				
7. Connectivity								
8. Representativeness								

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to riverine wetlands within the AOI.

Table 18: Expert panel decisions for assigning overall levels of riverine aquatic conservation significance

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
je_r_ec_02	Mangroves	Jeannie	6.3.1	4

4 is the highest rating/value

Expert panel decision descriptions:

je_r_ec_02

Significant marine vegetation - high species diversity (30 spp.). Important ecological role (eg fish nursery areas) that supports local and off-shore fisheries (Abrahams et al. 1995).

Also implemented as BPA decision(s): cyp_fl_08

Non-riverine Wetlands

Non-riverine wetlands include both lacustrine and palustrine wetlands, however, do not currently incorporate estuarine, marine or subterranean wetland types. A summary of the conservation significance of non-riverine wetlands within the AOI is provided in the following table. Refer to **Map 6** for further information.

Table 19: Overall level/s of non-riverine aquatic conservation significance

Aquatic conservation significance (non-riverine wetlands)	Area (Ha)	% of AOI
Very High	1.09	0.18
High	0.0	0.0
Medium	0.0	0.0
Low	0.0	0.0
Very Low	0.0	0.0

The following table provides an assessment of non-riverine wetlands within the AOI and associated aquatic conservation criteria values.

Table 20: Level/s of non-riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic	1.09	0.2						
2. Naturalness catchment	1.09	0.2						
3. Diversity and richness	1.09	0.2						
4. Threatened species and ecosystems	1.09	0.2						
5. Priority species and ecosystems	1.09	0.2						
6. Special features	1.09	0.2						
7. Connectivity								
8. Representative-ness			1.09	0.2				

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to non-riverine wetlands within the AOI.

Table 21: Expert panel decisions for assigning overall levels of non-riverine aquatic conservation significance.

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
je_nr_ec_01	Cape Flattery and Cape Bedford dune systems	Jeannie	6.1.1, 6.3.1	4, 4

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
je_nr_ec_02	East coast dunefields on Holocene surfaces	Jeannie	6.1.1, 6.3.1	4, 4
je_nr_fa_01	Fish habitat	Jeannie	6.3.1	4, 3

4 is the highest rating/value

Expert panel decision descriptions:

je_nr_ec_01

Wetlands within quaternary dunefields. Dune lakes contain unique fauna assemblages, occasionally Estuarine Crocodiles (**Crocodylus porosus**) (Abrahams **et al.** 1995).

Also implemented as BPA decision(s): cyp_fa_06 (h) and cyp_l_07 and cyp_l_29

je_nr_ec_02

Dunefield rise -prograding dune systems, associated vine scrubs and trapped wetlands. Threatened species.

Also implemented as BPA decision(s): cyp_l_07 and cyp_fa_06 (h)

je_nr_fa_01

Sand-dune lakes between Shadd Point and Cooktown -unique fauna assemblages that vary across the lakes, including disjunct/relictual populations of certain fish taxa (Herbert **et al.** 1995).

Also implemented as BPA decision(s): cyp_fa_06 (h)

Threatened and Priority Species

Introduction

This chapter contains a list of threatened and priority flora and/or fauna species that have been recorded on, or within 4km of the Assessment Area.

The information presented in this chapter with respect to species presence is derived from compiled databases developed primarily for the purpose of BPAs and ACAs. Data is collated from a number of sources and is updated periodically.

It is important to note that the list of species provided in this report, may differ when compared to other reports generated from other sources such as the State government's WildNet, HerbreCs or the federal government's EPBC database for a number of reasons.

Records for threatened and priority species are filtered and checked based on a number of rules including:

- Taxonomic nomenclature - current scientific names and status,
- Location - cross-check co-ordinates with location description,
- Taxon by location - requires good knowledge of the taxon and history of the record,
- Duplicate records - identify and remove,
- Expert panels - check records and provide new records,
- Flora cultivated records excluded,
- Use precise records less than or equal to 2000m,
- Use recent records greater than or equal to 1975 animals, greater than or equal to 1950 plants.

Threatened Species

Threatened species are those species classified as "Endangered" or "Vulnerable" under the *Environment Protection and Biodiversity Conservation Act 1999* or "Endangered", "Vulnerable" or "Near threatened" under the *Nature Conservation Act 1992*.

The following threatened species have been recorded on, or within approximately 4km of the AOI.

Table 22: Threatened species recorded on, or within 4km of the AOI

Species	Common name	NCA status	EPBC status	Back on Track rank	Migratory species*	Wetland species**	Identified flora/fauna
<i>Acacia solenota</i>		V		Low			FL
<i>Crocodylus porosus</i>	estuarine crocodile	V		Low	Y	I	FA
<i>Ctenotus rawlinsoni</i>	Cape heath ctenotus	V		Low			FA
<i>Dendrobium johannis</i>	brown antelope orchid	V	V	Low			FL
<i>Dermochelys coriacea</i>	leatherback turtle	E	E	Critical	Y		FA

NB. Please note that the threatened species listed in this section are based upon the most recently compiled DES internal state-wide threatened species dataset. This dataset may contain additional records that were not originally available for inclusion in the relevant individual BPAs and ACAs.

*JAMBA - Japan-Australia Migratory Bird Agreement; CAMBA - China-Australia Migratory Bird Agreement; ROKAMBA - Republic of Korea-Australia Migratory Bird Agreement; CMS - Convention on the Conservation of Migratory Species.

**I - wetland indicator species; D - wetland dependent species.

BPA Priority Species

A list of BPA priority species that have been recorded on, or within approximately 4km of the AOI is contained in the following table.

Table 23: Priority species recorded on, or within 4km of the AOI

Species	Common name	Back on Track rank	Identified flora/fauna
<i>Acacia legnosa</i>	None	None	FL
<i>Asteromyrtus angustifolia</i>	None	None	FL
<i>Boronia alulata</i>	None	None	FL
<i>Carlia dogare</i>	None	L	FA
<i>Cherax cartalacoolah</i>	None	H	FA
<i>Cyclophyllum maritimum</i>	None	None	FL
<i>Denariusa australis</i>	pennyfish	L	FA
<i>Dianella pavopennacea</i>	None	None	FL
<i>Dodonaea polyandra</i>	None	None	FL
<i>Eriachne insularis</i>	None	None	FL
<i>Eriostemon banksii</i>	None	None	FL
<i>Eucalyptus brassiana</i>	Cape York red gum	None	FL
<i>Eucalyptus pellita</i>	large-fruited red mahogany	None	FL
<i>Hibbertia banksii</i>	None	None	FL
<i>Jasminum longipetalum</i>	None	None	FL
<i>Kuhlia rupestris</i>	jungle perch	L	FA
<i>Labichea buettneriana</i>	None	L	FL
<i>Leucopogon lavarackii</i>	None	None	FL
<i>Leucopogon yorkensis</i>	None	None	FL
<i>Macarthuria neocambrica</i>	None	None	FL
<i>Melaleuca arcana</i>	None	None	FL
<i>Melanotaenia maccullochi</i>	McCulloch's rainbowfish	L	FA
<i>Neofabricia myrtifolia</i>	None	None	FL
<i>Neoroepera banksii</i>	None	None	FL
<i>Neosilurus ater</i>	black catfish	L	FA
<i>Numenius phaeopus</i>	whimbrel	L	FA
<i>Oxyeleotris nullipora</i>	poreless gudgeon	L	FA
<i>Porochilus obbesi</i>	Obbes' catfish	L	FA
<i>Pseudomugil gertrudae</i>	spotted blue eye	L	FA

NB. Please note that the list of priority species is based on those species identified in the BPAs, however records for these species may be more recent than the originals used. Furthermore, the BPA priority species databases are updated from time to time. At each update, the taxonomic details for all species are amended as necessary to reflect current taxonomic name and/or status changes.

ACA Priority Species

A list of ACA priority species used in riverine and non-riverine ACAs that have been recorded on, or within approximately 4km of the AOI are contained in the following tables.

Table 24: Priority species recorded on, or within 4 km of the AOI - riverine

Species	Common name	Back on Track rank	Identified flora/fauna
<i>Anguilla obscura</i>	Pacific Shortfin Eel	Low	FA

Species	Common name	Back on Track rank	Identified flora/fauna
<i>Cherax cartalacoolah</i>	None	High	FA
<i>Crocodylus porosus</i>	Estuarine Crocodile	Low	FA
<i>Denariusa australis</i>	Pennyfish	Low	FA
<i>Kuhlia rupestris</i>	Jungle Perch	Low	FA
<i>Melaleuca dealbata</i>	swamp tea-tree	None	FL
<i>Melaleuca leucadendra</i>	broad-leaved tea-tree	None	FL
<i>Melanotaenia maccullochi</i>	McCulloch's Rainbowfish	Low	FA
<i>Neosilurus ater</i>	Black Catfish	Low	FA
<i>Oxyeleotris nullipora</i>	Poreless Gudgeon	Low	FA
<i>Porochilus obbesi</i>	Obbe's Catfish	Low	FA
<i>Pseudomugil gertrudae</i>	Spotted Blue Eye	Low	FA

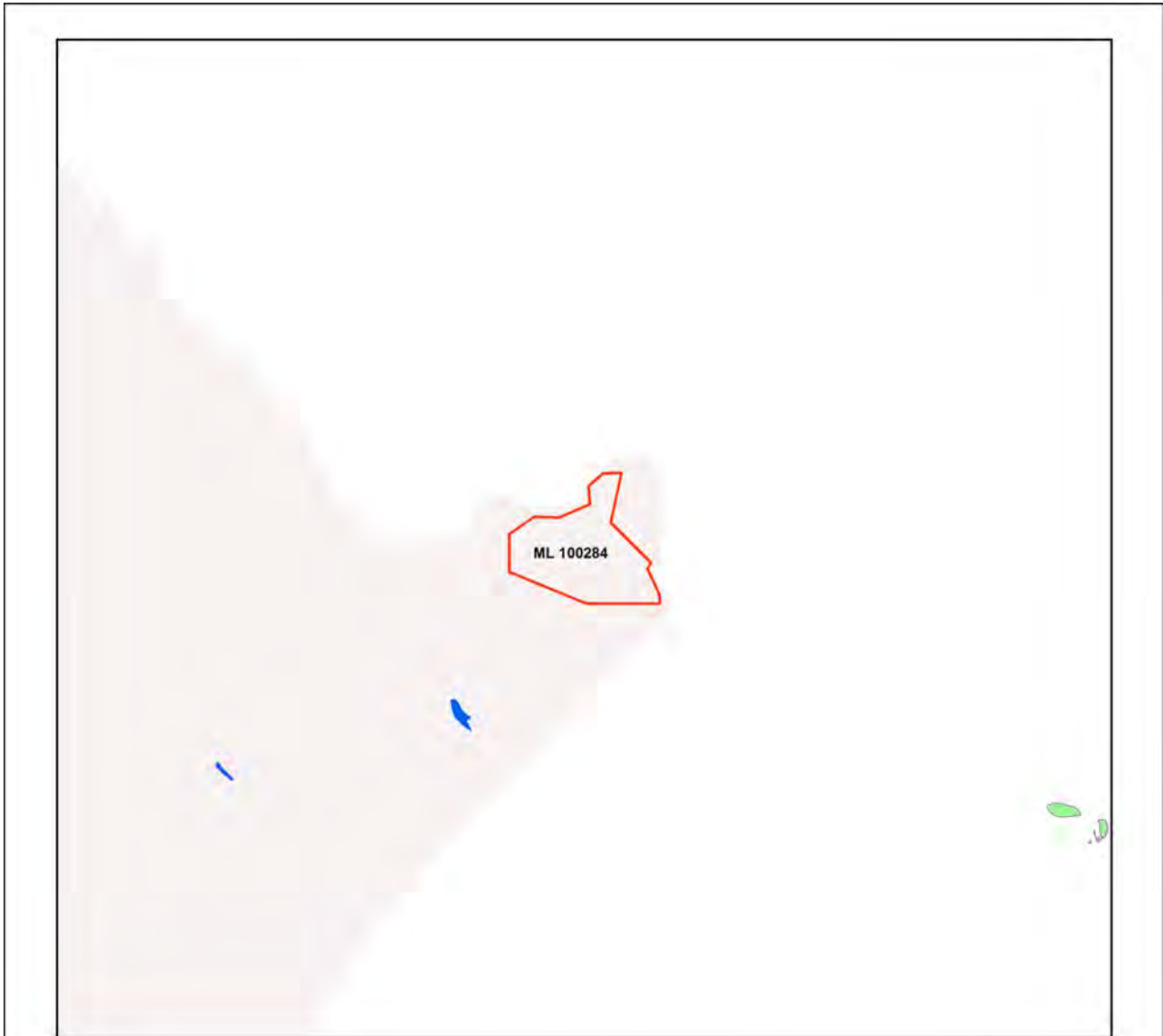
Table 25: Priority species recorded on, or within 4 km of the AOI - non-riverine

Species	Common name	Back on Track rank	Identified flora/fauna
<i>Anguilla obscura</i>	Pacific Shortfin Eel	Low	FA
<i>Baumea rubiginosa</i>	soft twigrush	None	FL
<i>Cherax cartalacoolah</i>	None	High	FA
<i>Crocodylus porosus</i>	Estuarine Crocodile	Low	FA
<i>Denariusa australis</i>	Pennyfish	Low	FA
<i>Gahnia sieberiana</i>	sword grass	None	FL
<i>Melaleuca dealbata</i>	swamp tea-tree	None	FL
<i>Melaleuca leucadendra</i>	broad-leaved tea-tree	None	FL
<i>Melaleuca viridiflora</i>	None	None	FL
<i>Melanotaenia maccullochi</i>	McCulloch's Rainbowfish	Low	FA
<i>Neosilurus ater</i>	Black Catfish	Low	FA
<i>Oxyeleotris nullipora</i>	Poreless Gudgeon	Low	FA
<i>Pseudomugil gertrudae</i>	Spotted Blue Eye	Low	FA

NB. Please note that the priority species records used in the above two tables are comprised of those adopted for the released individual ACAs. The ACA riverine and non-riverine priority species databases are updated from time to time to reflect new release of ACAs. At each update, the taxonomic details for all ACAs records are amended as necessary to reflect current taxonomic name and/or status changes.

Maps

Map 1 - Locality Map



Locality Map

Legend

- Selected Mining Lease (ML)
- Towns
- Highway
- Connector
- Street/Local Road
- Reservoirs
- Lakes
- National Park (Scientific)
- National Park
- National Park (CYPAL)
- Conservation Park
- Resources Reserve
- Forest Reserve
- State Forest
- Timber Reserve
- Nature Refuges
- Coordinated Conservation Areas
- Major rivers/creeks
- Queensland



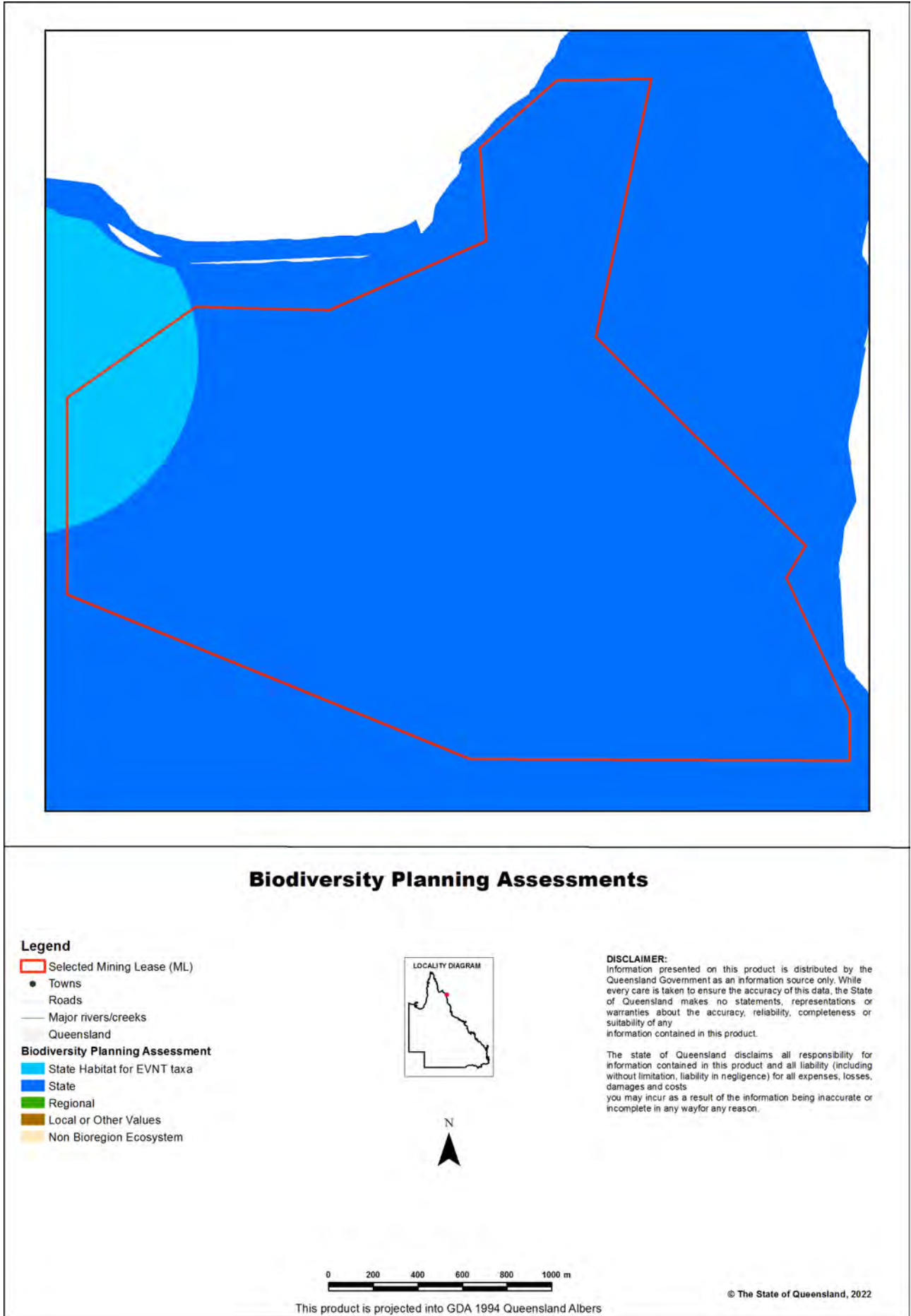
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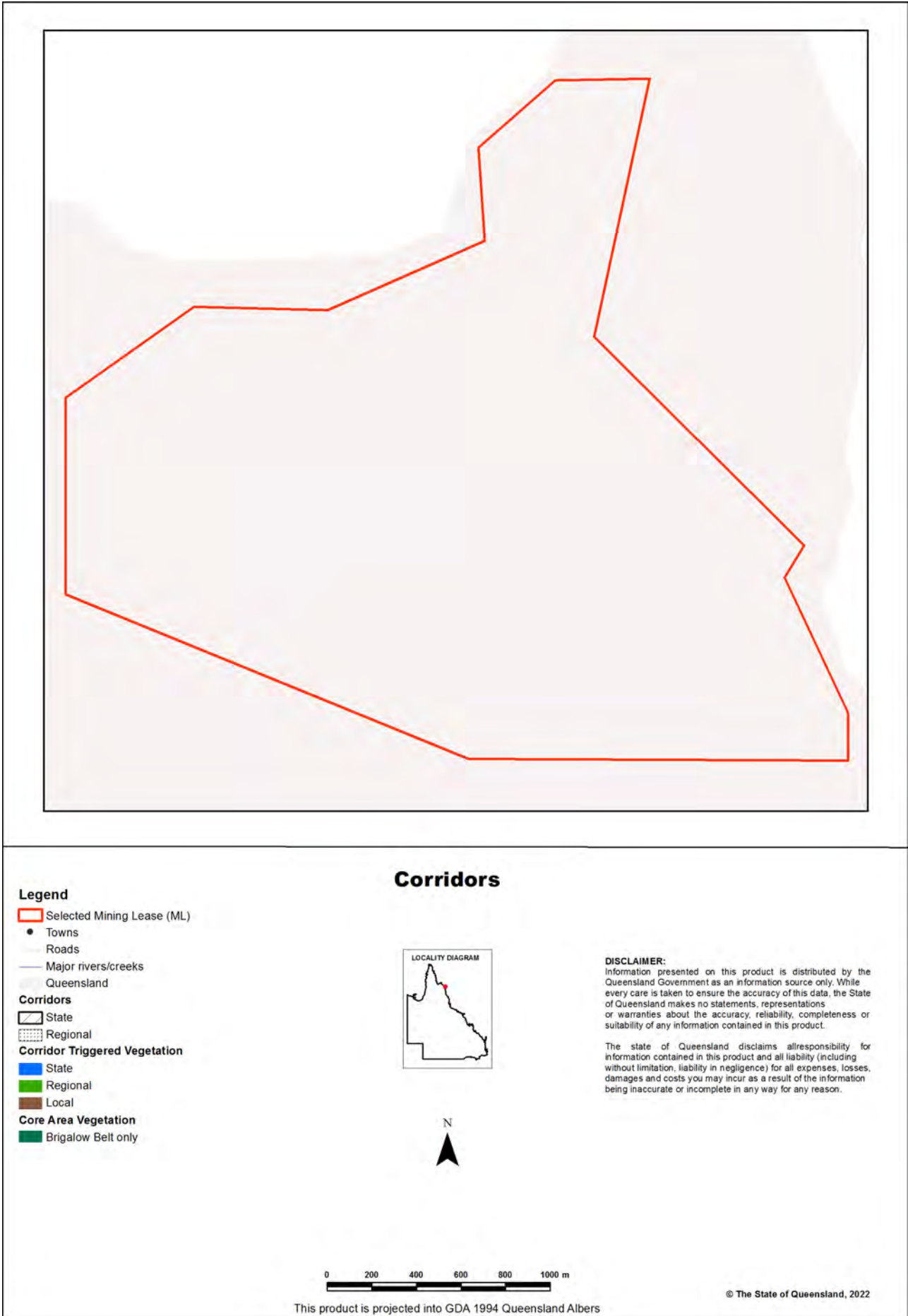
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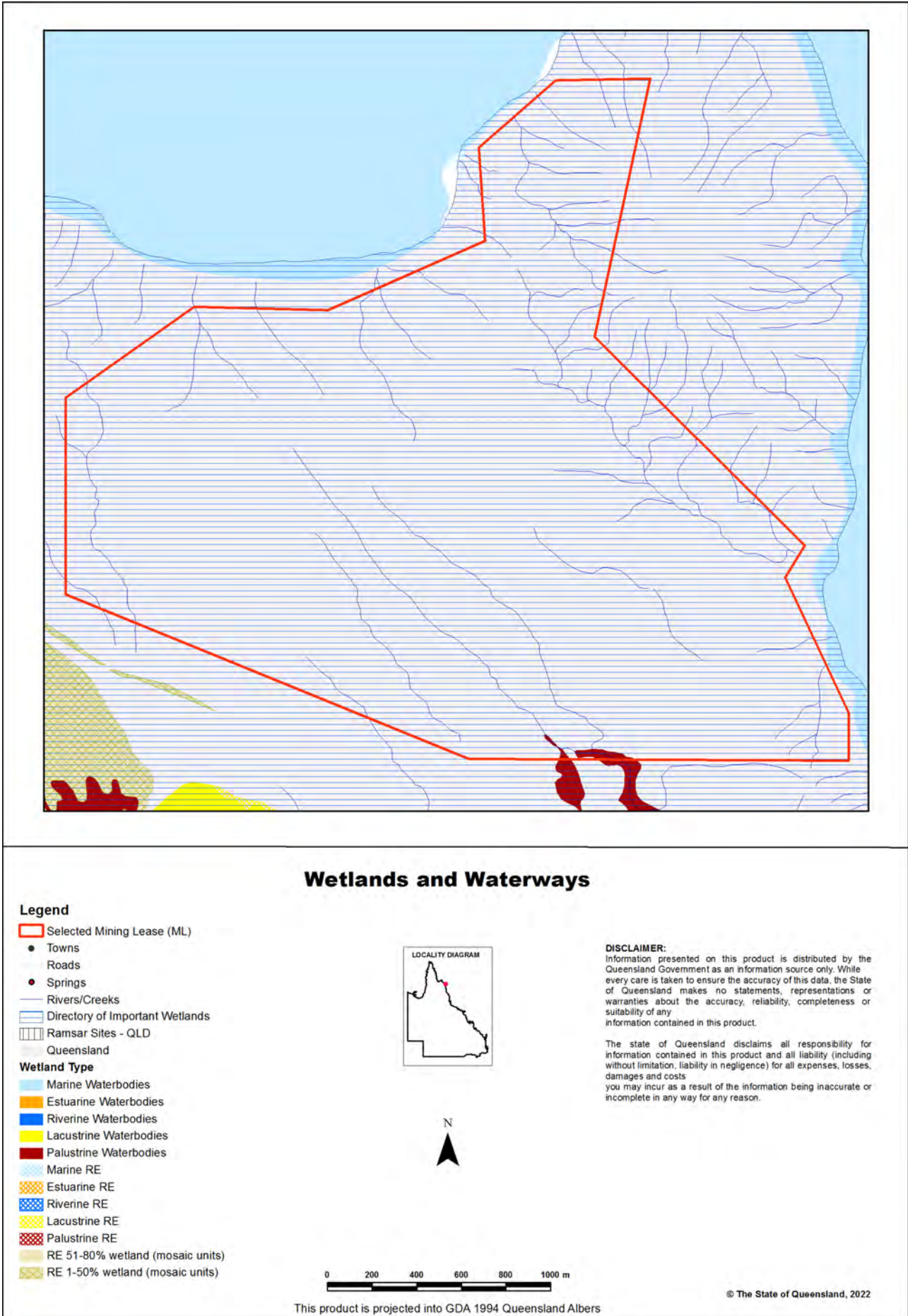
Map 2 - Biodiversity Planning Assessment (BPA)



Map 3 - Corridors



Map 4 - Wetlands and waterways



Map 5 - Aquatic Conservation Assessment (ACA) - riverine



Aquatic Conservation Assessment (ACA) - riverine

Legend

- Selected Mining Lease (ML)
- Towns
- Roads
- Rivers/Creeks
- Queensland

ACA Riverine - Subcatchment Significance

- Very High
- High
- Medium
- Low
- Very Low



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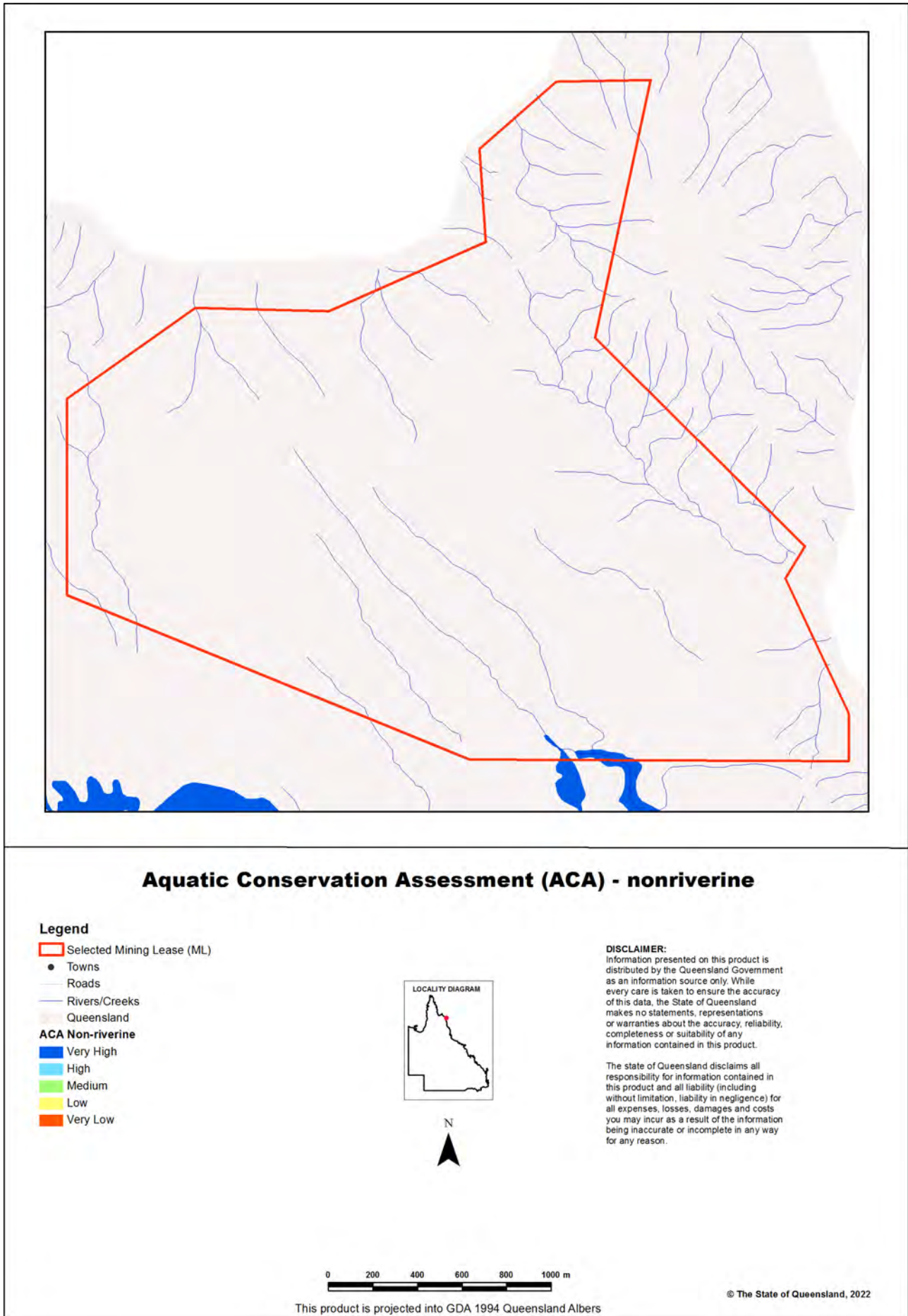
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Map 6 - Aquatic Conservation Assessment (ACA) - non-riverine



References

Clayton, P.D., Fielder, D.F., Howell, S. and Hill, C.J. (2006) *Aquatic biodiversity assessment and mapping method (AquaBAMM): a conservation values assessment tool for wetlands with trial application in the Burnett River catchment*. Published by the Environmental Protection Agency, Brisbane. ISBN 1-90928-07-3. Available at

<http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca/>

Environmental Protection Agency (2002) *Biodiversity Assessment and Mapping Methodology. Version 2.1, July 2002*. (Environmental Protection Agency, Brisbane).

Morton, S. R., Short, J. and Barker, R. D. with an Appendix by G.F. Griffin and G. Pearce (1995). *Refugia for Biological Diversity in Arid and Semi-arid Australia. Biodiversity Series*, Paper No. 4, Biodiversity Unit, Environment Australia.

Sattler, P.S. and Williams, R.D. (eds) (1999). *The Conservation Status of Queensland's Bioregional Ecosystems*. Environmental Protection Agency, Brisbane.

Appendices

Appendix 1 - Source Data

Theme	Datasets
Aquatic Conservation Assessments Non-riverine*	Combination of the following datasets: Cape York Peninsula Non-riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Non-riverine v1.3 Lake Eyre and Bulloo Basins v1.1 QMDB Non-riverine ACA v1.4 Southeast Queensland ACA v1.1 WBB Non-riverine ACA v1.1 Southern Gulf Catchments Non-riverine ACA v1.1
Aquatic Conservation Assessments Riverine*	Combination of the following datasets: Cape York Peninsula Riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Riverine v1.1 Lake Eyre and Bulloo Basins v1.1 QMDB Riverine ACA v1.4 Southeast Queensland ACA v1.1 WBB Riverine ACA v1.1 Southern Gulf Catchments Riverine ACA v1.1
Biodiversity Planning Assessments*	Combination of the following datasets: Brigalow Belt BPA v2.1 Cape York Peninsula BPA v1.1 Central Queensland Coast BPA v1.3 Channel Country BPA v1.1 Desert Uplands BPA v1.3 Einasleigh Uplands BPA v1.1 Gulf Plains BPA v1.1 Mitchell Grass Downs BPA v1.1 Mulga Lands BPA v1.4 New England Tableland v2.3 Northwest Highlands v1.1 Southeast Queensland v4.1 Wet Tropics v1.1
Statewide BPA Corridors*	Statewide corridors v1.6
Threatened Species	An internal DES database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.
BPA Priority Species	An internal DES database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.
ACA Priority Species	An internal DES database compiled from Wildnet, Herbrecks, Corveg, the QLD Museum, as well as other incidental sources.

*These datasets are available at:

<http://dds.information.qld.gov.au/DDS>

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
ACA	- Aquatic Conservation Assessment
AQUABAMM	- Aquatic Biodiversity Assessment and Mapping Methodology
BAMM	- Biodiversity Assessment and Mapping Methodology
BoT	- Back on Track
BPA	- Biodiversity Planning Assessment
CAMBA	- China-Australia Migratory Bird Agreement
DES	- Department of Environment and Science
EPBC	- <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EVNT	- Endangered, Vulnerable, Near Threatened
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
JAMBA	- Japan-Australia Migratory Bird Agreement
NCA	- <i>Nature Conservation Act 1992</i>
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
ROKAMBA	- Republic of Korea-Australia Migratory Bird Agreement

APPENDIX B FAUNA SURVEY EFFORT

Trapping and remote survey methods were conducted at four sites as provided in Table 29. Three sites were trapped in February 2021 (wet season) and four sites were trapped in June 2021 (dry season), with three sites corresponding to those of February. The wet season survey was delayed by a day due to adverse weather which precluded access by helicopter and was abandoned a day early due to an impending cyclone which was situated to the north-east of the Study area. As a result, the survey was conducted over a three night period, with one night of trapping. The dry season survey was conducted over a seven day period, with trapping conducted over a four day/five night period.

Table 29. Fauna survey methods and effort (trap nights)

Site	Box trap (size A)	Funnel trap	Camera trap	Anabat
Wet season				
Trap site 1	25	6		
Trap site 2	25	8		
Trap site 3	25	8		
Target site 1	-	-	-	1
Dry season				
Trap site 1	200	24	8	1
Trap site 2	100	24	4	1
Trap site 3	100	24	4	1
Trap site 4	100	24	4	2
Target site 2	-	-	3	2
Target site 3	-	-	3	-
Target site 4	-	-	-	2
Total trap nights	575	118		

Also conducted were bird surveys, at trap and target sites and opportunistically throughout the survey, spotlighting (10 person-hours), and searches for scats, tracks and other signs of animal activity (six person hours). Active searching was limited by a paucity of large fallen timber, exfoliating bark and other micro-habitats that provide shelter for fauna. The density of the heath constrained the searching to tracks, their edges and a short distance into the heath. Leaf litter was common and litter raking was conducted, targeting *Lerista ingrami*.

Photos of the trap sites are provided hereunder.



Plate 13. Trap site 1



Plate 14. Trap site 2



Plate 15. Trap site 3



Plate 16. Trap site 4

APPENDIX C LIKELIHOOD OF OCCURRENCE OF THREATENED FLORA AND FAUNA

Those flora and terrestrial vertebrate fauna species listed as Critically Endangered, Endangered, Vulnerable and/or Migratory under the EPBC Act and/or NC Act identified by desktop assessment but considered not, or unlikely, to occur are listed in **Table 30**. The assessments are based on known distribution and habitat requirements.

Table 30. Threatened flora and fauna species considered unlikely or not expected to occur

Species	Status ¹		Source ²	Likelihood of Occurrence Assessment
	EPBC Act	NC Act		
Threatened flora species				
Pale Chandelier Orchid (<i>Acriopsis emarginata</i>)	V	V	PMR	Unlikely. Epiphytic orchid with dense round bulbs, long dark green leaves and a mass of aerial white roots. Abundant flowers borne on branched panicles, are small (5 mm across) and short-lived (2-4 days). Flowering may occur from June to November. Occurs from the Daintree area north to the tip of Cape York Peninsula. Occurs in humid lowland rainforest and rainforest edge. In the south of its range it occurs in near-coastal lowland swamps where it grows on Melaleuca and Pandanus species, and palms (DEWHA 2008a). Study area is mapped to the east of (i.e. outside) the species mapped occurrence (likely or may occur) (CCEEW 2022g). This species was not recorded during site surveys which included effort to identify epiphytic orchids (two species identified). Single 1962 record (ALA 2022) located 17 km north of Study area although location has a 10 km spatial error applied to protect the species from collectors. The presence of suitable habitat for the species in the Study area is debatable. Low closed forest including rainforest and heath species occurs in patches (RE 3.2.12) but it is uncertain the species would utilise this habitat.
Haine's Orange Mangrove (<i>Bruguiera x hainesii</i>)	CE	CR	PMR	Unlikely. Mangrove species that grows up to 18 m in height with well-developed triangular buttresses. Considered a hybrid of <i>B. cylindrica</i> and <i>B. gymnorhiza</i> . In Australia only known from Trinity Inlet in Cairns but may occur further north (TSSC 2019). Study area is mapped as at least 11 km to the south-east of the nearest mapped potential occurrence (CCEEW 2022h). The only mangrove recorded during the surveys was Grey Mangrove (<i>Avicennia marina</i>). No other mangrove species occur within or near the Study area.
<i>Cyclophyllum costatum</i>	V	V	PMR	Unlikely. Small tree growing up to 8 m in height. Known to occur from the Daintree River area, Mount Windsor Tableland and around Mossman. Grows in rainforest and notophyll vine forest along waterways on stony clay soils (DEWHA 2008b). Mapped as potentially occurring approximately 20 km west of the Study area in the Starke National Park area (CCEEW 2022i) although no database records from this region. Not recorded during site surveys and no suitable habitat is considered present within or close to the Study area.
<i>Eremochloa muricata</i>	E	-	PMR	Unlikely. Grass species which occurs in south-east Asia but is apparently known from a single verified locality in Australia: collected on grassy exposed rocky headland from Cape Flattery. Identified in 1976 and 2001 from same location (DEWHA 2008e). Little other information available. Three database records from southern Queensland (ALA 2022) may be questionable in origin given the species description. Species can be confused with <i>E. bimaclata</i> if no reproductive structures are present. It is noted under the State species profile (QG 2022) the taxonomic name <i>E. muricata</i> has been superseded by the more common and widespread <i>E. bimaclata</i> as of

Species	Status ¹		Source ²	Likelihood of Occurrence Assessment
	EPBC Act	NC Act		
				2019. No species from the genus identified during site surveys and no grassy headland habitat observed. Unknown where verified site location is with regard to the Project. Exposed rocky headlands may occur along the eastern edge of and the rocky northern sections of the Study area.
<i>Phaius pictus</i>	V	V	PMR	Unlikely. Multi-stemmed ground orchid growing up to 1.5 m in height with long leaves. Flowers are 40-50 mm in size and occur from April to June. Identified as occurring from the Mcllwraith Range (north of the Study area) south to the Kirrama Range (east of Cardwell) (DEWHA 2008h), although available records are all south of Cooktown (ALA 2022) and species habitat mapping notes the species as may occur only north of Cooktown (CCEEW 2022j). Occurs in rainforests in sheltered sites near creeks and in leaf litter among seepage areas on boulders (DEWHA 2008h). Not recorded during site surveys and no suitable habitat is considered present within or close to the Study area.
Blue Tassel-fern (<i>Phlegmariurus dalhousieanus</i>)	E	CR	PMR	Unlikely. Attractive epiphytic plant of the Family Lycopodiaceae. Growth form is fern-like in appearance with tufted hanging (or pendulous) tassels that are blue-green in appearance. Occurs on trees, rocks and recorded in staghorn ferns (<i>Platyserium</i> species). Verified from only two locations in coastal swamps but thought to still occur elsewhere from Cairns to the Daintree area and the Mcllwraith Range (north of the Study area) (DEWHA 2008f). Not recorded during site surveys and no suitable habitat is considered present within or close to the Study area.
<i>Stackhousia</i> species (Mclvor River J.R. Clarkson 5201)	-	E	WN	Unlikely. Small herbaceous plant with fleshy leaves. Only known to occur on dune fields located adjacent to the Mclvor River. Little other information available. Only four records (all from the 1980s but identified to species much later) all of which are located approximately 20 km south-west of the Study area. Not recorded during surveys and Study area considered outside of species range.
Threatened fauna species				
Northern Quoll (<i>Dasyurus hallucatus</i>)	E	LC	PMR	Unlikely. The closest known record is from approximately 33 km west of the Study area in Juunju Daarrba Nhirrpan National Park (NP) in 2019 (QG 2022). Northern Quoll is most common around rocky escarpments but are also found in eucalypt forest and woodland and around human settlements. The species was once widely distributed across northern Australia (Oakwood 2008). It has undergone an Australia-wide decline, probably due to pastoral practices, mortality through attempted eating of Cane Toads (<i>Rhinella marina</i>) and introduction of exotic diseases (Pollock 1999). Declines have also been recorded in protected, intact areas prior to the arrival of Cane Toad (Woinarski et al. 2001). It is now absent from much of its former range (Oakwood 2008) and in Queensland the species is now only known from the most rugged and remote parts of its range (Burnett 2012), mostly confined to rocky outcrops that provide protection from Cats (<i>Felis catus</i>) and too-frequent fires (Baker & Dickman 2018). Its range is now highly fragmented (Woinarski et al. 2014) and may be as little as 10 % of its potential range (Baker & Dickman 2018). There is rocky habitat adjacent to the Study area which could provide suitable refugial habitat but this is small and isolated from other suitable habitat. Habitat within the proposed mine site does not appear suitable.

Species	Status ¹		Source ²	Likelihood of Occurrence Assessment
	EPBC Act	NC Act		
Koala (Phascolarctos cinereus)	V	V	PMR	Not expected. The closest known record is from Mount Molloy, approximately 185 km south of the Study area in 2012 (ALA 2022). Koala occurs in forests and woodland along the east coast of Australia from north-eastern Queensland to South Australia, with some introduced sub-populations (Woinarski et al. 2014). The species feeds almost entirely on the leaves of eucalypts and its distribution is linked to the presence and abundance of food species. They are most abundant on coastal plains and in foothills but do extend inland along watercourses with Eucalyptus camaldulensis. In Queensland, clearing of habitat has decreased their range by about 30% (Martin et al. 2008; Krockenberger et al. 2012).
Spectacled Flying-fox (Pteropus conspicillatus)	E	E	PMR	Unlikely. The closest known record since the 19 th century is from approximately 81 km south of the Study area in 2015 (QG 2022). Spectacled Flying-fox is essentially a rainforest specialist (Richards et al. 2008b; Westcott et al. 2015), though it also occurs in eucalypt forest, melaleuca swamps, littoral forests, mangroves, farmlands and urban areas. This social species lives in camps of varying size and permanence, with individuals moving between apparently permanent camps (Dennis 2012b). Richards (1990) reported that camps are never more than 6.5 km from rainforest and are in areas with a mean annual rainfall of 1,400 mm or more. Some permanent camps are in city parks or small remnant blocks of forest (Fox 2011). There is no known camp close enough to the Study area to provide individuals that may forage in the general area. The habitats within the Study area are largely unsuitable for the species.
Greater Large-eared Horseshoe Bat (Rhinolophus robertsi philippinensis))	V	E	PMR	Unlikely. The closest known record is from approximately 78 km south of the Study area. It is a 1975 QM specimen from Annan Falls (OZCAM 2022). It is one of a cluster of 7 records, the most recent of which is from 1993 (ALA 2022). Greater Large-eared Horseshoe Bat occurs only in north Queensland, from Iron Range on Cape York Peninsula south to near Townsville and west to the karst regions of Chillagoe. The species is mostly coastal in distribution (Pavey & Kutt 2008). It is found in a wide variety of habitats including open forest and woodland. Although the species does roost and breed in caves and mines it also roosts in tree hollows and in dense foliage (Thomson et al. 2001; Pavey & Kutt 2008). The biology of the species is largely unknown (Pavey & Kutt 2008). It forages in rainforest, riparian gallery forest within open eucalypt forest, melaleuca forest and open woodland (Churchill 2008). There is very limited habitat present for the species.
Semon's Leaf-nosed Bat (Hipposideros semoni)	V	E	PMR	Unlikely. The closest known record since 1948 is from approximately 75 km south of the Study area in 2016 (QG 2022). In Australia, Semon's Leaf-nosed Bat occurs in along eastern Cape York Peninsula south to Townsville, with a possible isolated population at Kroombit Tops south of Gladstone. The species occurs in rainforest, tall eucalypt forest and open woodland. It usually roosts alone, though small groups have been recorded. Roost sites are mostly tree hollows, caves and rock fissures (Dennis 2012a). Thomson et al. (2001) and Hall (2008) considered that it roosted mostly in caves but Churchill (2008) considered it primarily a tree-roosting species. There is no suitable habitat present for the species.
Bare-rumped Sheath-tailed Bat (Saccolaimus)	V	E	PMR	Unlikely. The closest known record is from approximately 56 km south of the Study area. It is an un-dated Museums Victoria specimen (OZCAM 2022). The next closest record is one of a cluster of 4 records

Species	Status ¹		Source ²	Likelihood of Occurrence Assessment
	EPBC Act	NC Act		
saccolaimus nudicluniatus)				from approximately 76 km south on Alkoomie Station and Kings Plains Station in 2015 and 2016 (QG 2022). In Australia, is found in the Northern Territory and north-eastern Queensland. The Queensland subspecies of Bare-rumped Sheath-tailed Bat is restricted to coastal eucalypt woodland from Bowen to the tip of Cape York Peninsula (Hall et al. 2008). Outside Australia, the species is known to roost in caves but no such occurrence is known in Australia. A survey conducted of about 1000 coastal caves in the Wet Tropics region failed to locate this species (Coles et al. 1999). All confirmed Australian roosting records are from deep tree hollows (Churchill 2008; Hall et al. 2008), which are also used as maternity roosts (Murphy 2002; Churchill 2008). There is very limited habitat present for the species and no evidence or expectation of potential roost sites.
Black-footed Tree-rat (north Queensland) (Mesembriomys gouldii rattoides)	V	LC	PMR	Not expected. The closest known record since the 19 th century is from near Laura, approximately 115 km south-west of the Study area in 1975 (QG 2022). The distribution of this subspecies of Black-footed Tree-rat is poorly known. It has been recorded from eucalypt forest and woodland around Mareeba and there are sparse records across Cape York Peninsula (Woinarski et al. 2014). It occurs in tall E. tetrodonta open forest on deep loamy soils with a moderately dense midstorey of shrubs and small trees including Pandanus and Terminalia. Such areas are typically protected from fire or have stable moisture levels and food resources (Rankmore & Friend 2008). The species is most common in areas of older trees with more tree hollows (Denys et al. 2017). There is no suitable habitat for the species.
Water Mouse (Xeromys myoides)	V	V	PMR	Unlikely. The closest known records are from Cairns, approximately 212 km to the south of the Study area in 2017 (QG 2022). Water Mouse is patchily distributed in the Northern Territory, and from the Gold Coast to Proserpine in Queensland (Ball 2004; Van Dyck & Gynther 2012). The species has also been recorded from New Guinea (Hitchcock 1998) and, very recently, in Cairns (WTMA 2017; Ball & Mitchell 2018). Water Mouse is nocturnal and lives in mangroves, saltmarsh, sedges, lakes near foredunes and coastal freshwater swamps (Van Dyck & Gynther 2012). There is very little possible habitat present.
Australian Painted Snipe (Rostratula australis)	E	E	PMR	Not expected. The closest known records are from Mount Carbine, approximately 174 km to the south of the Study area. All are from 1994 (ALA 2022; QG 2022) and are presumably multiple observations of the same bird or birds. Australian Painted Snipe is typically recorded singly or in small groups in freshwater marshes. They are extremely nomadic, moving in response to local rainfall and flooding. Although its occurrence in a location is often erratic, with the bird absent some years and common in others (Marchant & Higgins 1993) there is indication of some regular seasonal migration, e.g. to central and north coastal Queensland in autumn and winter (Black et al. 2010). Breeding only occurs in swamps with temporary water regimes and complex shorelines forming islands, shallow water, exposed wet mud and dense low fringing vegetation (Rogers et al. 2005; Geering et al. 2007). During non-breeding periods they may be found in a wider range of habitats including dams, rice paddocks, waterlogged grasslands, roadside drains and even brackish waterways (Marchant & Higgins 1993). The freshwater waterbody in the proposed mine

Species	Status ¹		Source ²	Likelihood of Occurrence Assessment
	EPBC Act	NC Act		
				area was not accessed during either survey due to time constraints and localised flooding in the wet season and safety concerns raised by a Traditional Owner in regard to presence of Estuarine Crocodile in the dry season. It was viewed from above from a helicopter in the wet season and did not look suitable due to high water levels which would preclude suitable edges for foraging. However, such microhabitat may be present prior to the commencement of the wet season and the waterbody needs to be assessed. However, the Study area is outside of the known area of even irregular occurrence for the species (Menkhorst et al. 2017).
Red Knot (<i>Calidris canutus</i>)	E, M	E	WN, PMR	Unlikely. The closest known record is from Low Wooded Island, approximately 13 km to the south of the Study area, in 1996 (QG 2022). In Australia, Red Knot mostly occurs on intertidal mudflats, sandflats and sheltered sandy beaches. It occasionally occurs on sandy ocean beaches, rock platforms and coral reefs and roosts on sandy beaches and mudflats (Higgins & Davies 1996). In the Torres Strait the species is only an irregular migrant. It is uncommon on the east coast of Australia (Blakers et al. 1984). The species is not expected to occur within the proposed mine area.
Buff-breasted Button-quail (<i>Turnix olivii</i>)	E	E	PMR	Not expected. There is no known record within 100 km of the Study area within the past 40 years (ALA 2022). Buff-breasted Button-quail is endemic to north-eastern Queensland, occurring from around Coen south to Chillagoe. There are unconfirmed records from Karumba and Charters Towers (Mathieson & Smith 2009). The first specimen was collected in Cooktown but it has not been recorded there since (Garnett et al. 2011). Buff-breasted Button-quail is one of the least known bird in Australia and is very rarely recorded. It is most frequently recorded from stony and/or grassy woodlands and forests. Sparsely wooded, well-drained, slightly sloping bases of hills appear to be critical for breeding (Mathieson & Smith 2012). There is no suitable habitat. The most recent assessment of the species considers it could be extinct (Webster et al. 2021).
Masked Owl (northern) (<i>Tyto novaehollandiae kimberli</i>)	V	V	PMR	Not expected. The closest known record is from approximately 120 km west of the Study area. The record is from 1979 and has a spatial error of 54 km (QG 2022). The validity of the record is unknown. In Queensland, subspecies <i>kimberli</i> of the Masked Owl occurs from near Townsville and the upper reaches of the Burdekin River (Higgins 1999) and north and west to the Northern Territory border. It is found mostly in coastal and upland areas (Debus 2012). Distribution mapping by the Queensland Government (Butler & Laidlaw 2012) shows all Queensland records of this subspecies to be coastal or subcoastal, and restricted to the Townsville area and further north around Cairns. The subspecies lives in sclerophyll forest and woodland, often near ecotones with open areas such as grassland, canefields and heath (Higgins 1999; Debus 2012). There is no suitable habitat.
Red Goshawk (<i>Erythrotriorchis radiatus</i>)	V	E	PMR	Not expected. The closest known record is a 2012 eBird record from Hope Vale, approximately 44 km south-west of the Study area (ALA 2022). The closest recent record available through the Queensland Government's species profile is from 2016, approximately 110 km south-west of the Study area. Closer records from this source are from 1899 (QG 2022). Although eastern Cape York Peninsula is thought to be a stronghold for the species in eastern Australia (DERM 2009), the habitat within the Study area is not suitable for the

Species	Status ¹		Source ²	Likelihood of Occurrence Assessment
	EPBC Act	NC Act		
				species. Red Goshawk occurs in woodlands and forests, particularly tall forests in areas of high rainfall (Woinarski 2007), and ideally with intact forest or woodland, a mosaic of vegetation types and permanent water, particularly riverine forests, and a large and diverse bird population (its prey species). The species avoids both very dense and very open habitats (Marchant & Higgins 1993; DERM 2009; Czechura et al. 2010). There is no suitable habitat.
Grey Falcon (<i>Falco hypoleucos</i>)	V	V	PMR	Not expected. The closest known record is a historical Bird Atlas record (pre-1977) from approximately 92 km south of the Study area. There are 4 records from approximately 180 km to the south in 2013. At least 3 of these refer to the same individual (ALA 2022). Grey Falcon occurs in semi-arid and arid woodlands, shrublands, grasslands and wooded watercourses, typically in areas of less than 500 mm annual rainfall (Olsen 1995; Debus 1998; Aumann 2001). The species occurs sparsely in the interior and the north of the Australian mainland. Its breeding range has contracted since the 1950s and is now confined to the arid parts of its range (<250 mm annual rainfall) (Marchant & Higgins 1993; Debus 1998). There is no known breeding record for Cape York Peninsula (Schoenjahn 2018). Individuals moving towards the east coast are most probably immatures (Garnett et al. 2011) and reports outside the species' main inland range are typically intermittent and years apart (Blakers et al. 1984). The entire population of Grey Falcon is confined exclusively to a hot arid environment and verified records outside of the arid zone are rare (Schoenjahn 2018).
Palm Cockatoo (<i>Probosciger aterrimus</i>)	V	V	PMR	Not expected. The closest known record is from approximately 176 km west of the Study area in 2009 (QG 2022). In Australia, Palm Cockatoo occurs in northern Cape York Peninsula, from north of Pormpuraaw on the west coast and from Princess Charlotte Bay on the east coast (Garnett et al. 2011). Palm Cockatoo is recorded in woodland, open forest and closed habitats and is often in the ecotone between open savanna woodland and rainforest (Higgins 1999). In rainforest they are usually found only on edges (Wood 1988) and in woodland they are usually within one km of rainforest (Higgins 1999). There is no suitable habitat.
Yakka Skink (<i>Egernia rugosa</i>)	V	V	PMR	Unlikely. The closest known record is a 1997 Queensland Museum specimen from Hope Vale, approximately 43 km to the south of the Study area (OZCAM 2022). Yakka Skink is endemic to eastern Queensland and is patchily distributed in sub-humid to semi-arid dry open forest, woodland and rocky areas. It usually occurs on well-drained, coarse, gritty soils in the vicinity of low ranges, foothills and undulating terrain (Ehmann 1992; Richardson 2008; Cogger 2014) but are also found on loam and clay soils (Eddie 2012). There is no suitable habitat.
Endeavour River Litter-skink (<i>Lygisaurus tanneri</i>)	-	V	WN	Not expected. There is a record from approximately 22 km west of the Study area on Starcke Station. The date is unknown other than that it is pre 1994 (QG 2022). The Endeavour River Litter-skink occurs from the Endeavour River north to the Starcke Wilderness (Wilson 2015). It occurs in riverine rainforest and monsoon forest, living in leaf litter (Chapple et al. 2019). More specifically, the species lives on the upper, more gentle slopes of watercourses with loam soils where edges and canopy openings allow sunlight to the ground (Ehmann 1992). Hoskin and Couper (2014) consider it a rainforest species. The

Species	Status ¹		Source ²	Likelihood of Occurrence Assessment
	EPBC Act	NC Act		
				Study area is outside the known distribution for the species and there is no suitable habitat.
Australian Lace-lid (Litoria dayi)	V	V	PMR	Not expected. The closest known record is from Big Tableland, approximately 81 km to the south of the Study area in 1991 (QG 2022). Australian Lace-lid is a Wet Tropics endemic, occurring from Paluma north to near Cooktown (Sanders 2021). It is mostly found on permanent flowing streams in rainforest and on its margins and is associated with fast-flowing rocky and sometimes sandy watercourses in rainforest (Anstis 2013; Hoskin 2015). There is no suitable habitat.

¹Status abbreviations: CE= Critically Endangered, E= Endangered, LC = Least Concern (Common), M= Migratory, V=Vulnerable,

²Source: PMR = Protected Matters Report, WN = WildNet (*Wildlife Online*) Extract

APPENDIX D FLORA SPECIES LIST

Family	Species
Acanthaceae	<i>Avicennia marina</i>
Acanthaceae	<i>Rostellularia adscendens</i>
Anacardiaceae	<i>Euroschinus falcatus var. falcatus</i>
Apiaceae	<i>Platysace valida</i>
Apocynaceae	<i>Alyxia spicata</i>
Apocynaceae	<i>Hoya australis subsp. australis</i>
Apocynaceae	<i>Parsonsia velutina</i>
Asteraceae	<i>Cyanthillium cinereum</i>
Asteraceae	<i>Emilia sonchifolia</i>
Burseraceae	<i>Canarium australianum var. australianum</i>
Casuarinaceae	<i>Allocasuarina sp.</i>
Casuarinaceae	<i>Casuarina equisetifolia</i>
Chrysobalanaceae	<i>Parinari nonda</i>
Colchicaceae	<i>Schelhammera multiflora</i>
Combretaceae	<i>Terminalia muelleri</i>
Commelinaceae	<i>Commelina diffusa</i>
Convolvulaceae	<i>Ipomoea pes-caprae subsp. brasiliensis</i>
Cyperaceae	<i>Cyperus eragrostis</i>
Cyperaceae	<i>Gahnia aspera</i>
Dilleniaceae	<i>Dillenia alata</i>
Dilleniaceae	<i>Hibbertia aspera</i>
Dilleniaceae	<i>Hibbertia banksii</i>
Droseraceae	<i>Drosera sp.</i>
Ericaceae	<i>Leucopogon leptospermoides</i>
Ericaceae	<i>Leucopogon ruscifolius</i>
Ericaceae	<i>Leucopogon yorkensis</i>
Ericaceae	<i>Styphelia triflora</i>
Euphorbiaceae	<i>Euphorbia drummondii</i>
Euphorbiaceae	<i>Shonia tristigma subsp. tristigma</i>
Haemodoraceae	<i>Haemodorum coccineum</i>
Hemerocallidaceae	<i>Dianella sp.</i>
Lamiaceae	<i>Clerodendrum inerme</i>
Lamiaceae	<i>Mesosphaerum suaveolens</i>
Lamiaceae	<i>Vitex acuminata</i>
Laxmanniaceae	<i>Lomandra banksii</i>
Laxmanniaceae	<i>Lomandra glauca</i>

Leguminosae (Caesalpiniaceae)	<i>Labichea buettneriana</i>
Leguminosae (Fabaceae)	<i>Gompholobium nitidum</i>
Leguminosae (Fabaceae)	<i>Jacksonia thesioides</i>
Leguminosae (Fabaceae)	<i>Lamprolobium fruticosum</i>
Leguminosae (Fabaceae)	<i>Vigna marina</i>
Leguminosae (Mimosaceae)	<i>Acacia crassicarpa</i>
Leguminosae (Mimosaceae)	<i>Acacia humifusa</i>
Leguminosae (Mimosaceae)	<i>Acacia leptoloba</i>
Leguminosae (Mimosaceae)	<i>Acacia platycarpa</i>
Leguminosae (Mimosaceae)	<i>Acacia pubirhachis</i>
Leguminosae (Mimosaceae)	<i>Acacia racospermoides</i>
Leguminosae (Mimosaceae)	<i>Acacia simsii</i>
Leguminosae (Mimosaceae)	<i>Acacia solenota</i>
Leguminosae (Mimosaceae)	<i>Acacia torulosa</i>
Malvaceae	<i>Hibiscus tiliaceus</i>
Malvaceae	<i>Thespesia populnea</i>
Moraceae	<i>Ficus opposita</i>
Myrsinaceae	<i>Myrsine sp.</i>
Myrtaceae	<i>Asteromyrtus angustifolia</i>
Myrtaceae	<i>Asteromyrtus lysicephala</i>
Myrtaceae	<i>Asteromyrtus sp.</i>
Myrtaceae	<i>Corymbia clarksoniana</i>
Myrtaceae	<i>Corymbia stockeri</i>
Myrtaceae	<i>Corymbia stockeri subsp. stockeri</i>
Myrtaceae	<i>Corymbia tessellaris</i>
Myrtaceae	<i>Eucalyptus brassiana</i>
Myrtaceae	<i>Eucalyptus crebra</i>
Myrtaceae	<i>Eucalyptus exserta</i>
Myrtaceae	<i>Eucalyptus platyphylla</i>
Myrtaceae	<i>Lithomyrtus obtusa</i>
Myrtaceae	<i>Lophostemon suaveolens</i>
Myrtaceae	<i>Melaleuca foliolosa</i>
Myrtaceae	<i>Melaleuca leucadendra</i>
Myrtaceae	<i>Melaleuca sp. (arcana or saligna)</i>
Myrtaceae	<i>Melaleuca viridiflora</i>
Myrtaceae	<i>Neofabricia myrtifolia</i>
Myrtaceae	<i>Syzygium banksii</i>
Myrtaceae	<i>Syzygium suborbiculare</i>

Myrtaceae	<i>Thryptomene oligandra</i>
Oleaceae	<i>Jasminum simplicifolium subsp. australiense</i>
Orchidaceae	<i>Orchidaceae sp.</i>
Pandanaceae	<i>Pandanus tectorius</i>
Phyllanthaceae	<i>Breynia oblongifolia</i>
Picrodendraceae	<i>Choriceras tricorne</i>
Picrodendraceae	<i>Neoroepora banksii</i>
Picrodendraceae	<i>Petalostigma pubescens</i>
Pittosporaceae	<i>Pittosporum ferrugineum</i>
Poaceae	<i>Alloteropsis semialata</i>
Poaceae	<i>Cenchrus echinatus</i>
Poaceae	<i>Dactyloctenium radulans</i>
Poaceae	<i>Digitaria sp.</i>
Poaceae	<i>Ectrosia sp.</i>
Poaceae	<i>Eriachne pallescens</i>
Poaceae	<i>Heteropogon triticeus</i>
Poaceae	<i>Paspalum distichum</i>
Poaceae	<i>Paspalum vaginatum</i>
Poaceae	<i>Sarga sp.</i>
Poaceae	<i>Themeda triandra</i>
Proteaceae	<i>Banksia dentata</i>
Proteaceae	<i>Grevillea glauca</i>
Proteaceae	<i>Grevillea pteridifolia</i>
Proteaceae	<i>Persoonia falcata</i>
Pteridaceae	<i>Cheilanthes sp.</i>
Rhamnaceae	<i>Alphitonia excelsa</i>
Rubiaceae	<i>Atractocarpus sp.</i>
Rubiaceae	<i>Coelospermum decipiens</i>
Rubiaceae	<i>Cyclophyllum maritimum</i>
Rubiaceae	<i>Myrmecodia beccarii</i>
Rutaceae	<i>Boronia alulata</i>
Rutaceae	<i>Eriostemon banksii</i>
Santalaceae	<i>Exocarpos latifolius</i>
Sapindaceae	<i>Dodonaea lanceolata</i>
Sapindaceae	<i>Dodonaea malvacea</i>
Sapindaceae	<i>Dodonaea polyandra</i>
Sapindaceae	<i>Guioa acutifolia</i>
Sapindaceae	<i>Sapindaceae sp.</i>

Sapotaceae	<i>Manilkara kauki</i>
Sapotaceae	<i>Sersalisia sericea</i>
Sparrmanniaceae	<i>Grewia retusifolia</i>
Taccaceae	<i>Tacca leontopetaloides</i>
Ulmaceae	<i>Celtis paniculata</i>
Verbenaceae	<i>Stachytarpheta cayennensis</i>
Violaceae	<i>Afrohybanthus enneaspermus</i>
Xanthorrhoeaceae	<i>Xanthorrhoea johnsonii</i>
Xyridaceae	<i>Xyris complanata</i>

¹ * = Introduced species, V = Vulnerable under NC Act

APPENDIX E FLORISTIC DATA



Project name Cape Flattery **Start GPS point** -14.975212 145.334731
Site No. T1 **End GPS point** -14.975261 145.335129
Site type Biocondition/Secondary
Date 27/02/2021 **Geology** sand
Observers P.W, D.H **Altitude** -
 3.2.21a/3.2.26/3.
Mapped RE 2.22 **Aspect** -
Confirmed RE 3.2.14 **Slope (°)** 0
Landzone drainage line ***Soil colour** white sand
***Soil texture** Fine
***Soil type** sand
Transect length 50 m

Structural summary			
Strata	Height range (m)	Average height (m)	Crown cover (m)
E	-	-	-
T1	5 to 7.5	7	81.4
T2	-	-	-
T3	-	-	-
S1	1 to 4	2.5	4
S2	.1 to 1	0.7	9.2

Trees and shrubs	Counts between 25 m and 75 m				Crown cover over 100m			
	T1	T2	S1	S2	T1	T2	S1	S2
<i>Melaleuca arcana</i>	24			2	40.7			
<i>Neoroepa banksii</i>				9				2.8
<i>Boronia aluata</i>				7				1.8
<i>Alyxia spicata</i>				3				
<i>Asteromyrtus lysicephala</i>			2					
<i>Styphelia leptospermoides</i>			1				0.7	
<i>Dodonaea polyandra</i>			1	1			1.3	
<i>Jacksonian thesioides</i>			1					

Large trees	Threshold	Count	Euc species
Large eucs	>30 dbh (cm)	0	-
Large non eucs	>30 dbh (cm)	7	Species <i>Melaleuca arcana</i>

Timber/CWD 0

Groundlayer forbs and grasses recorded in transect

Species richness	
Tree spp	1
Shrub spp	7
Forb spp	6
Native grasses	1


Eriachne sp.
Lomandra banksii
Lomandra sp.
Laxmannia gracilis
Schoenus calostachys
Resistionaceae sp.
Vigna marina

Tree recruitment	100%
Weedcover	0%

Ground layer quadrats						
Species	1	2	3	4	5	Av
% Perennial grass						
<i>Eriachne sp.</i>	0	0	0	20	0	4
% Forbs						
<i>Resistionaceae sp.</i>	10	0	0	0	0	2
<i>Lomandra sp.</i>	0	0	10	0	0	2
% Shrubs						
<i>Neoroepa banksii</i>	0	0	0	3	15	3.6
<i>Styphelia leptospermo</i>	0	0	0	2	0	0.4
% Bare ground	0	0	0	0	0	0
% leaf litter	90	100	90	75	85	88
% Timber	0	0	0	0	0	0
% Rock	0	0	0	0	0	0
Total	100	100	100	100	100	100

T1 Directional photographs taken from centre point of transect (25m)



 Secondary Survey Transect Data	
Project:	Cape Flattery Silica Sands
Project Number:	BE210008.01
Site:	T2
Date:	08-16-2021
Mapped RE:	3.2.21a/3.2.10
Ground-truthed RE/Landtype:	3.2.18
Observers:	Dan Hede & Dare Lawrence
Landzone:	2 - fine grained, white sand
Site Description & Location:	Exposed sand dune ridge. Veg height stunted. <i>Thryptomene oligandra</i> dominated dwarf open heath
Plot Start:	319754.49042475, 8345089.20522977
Plot End:	319728.15250238, 8345129.83354215
50 x 20m area Large trees	
Eucalypt large tree DBH (cm):	threshold 30 Canopy (EDL) mean height (m): 1.3
Number of large eucalypt trees:	0 Subcanopy mean height: -
Non-Eucalypt large tree DBH (cm):	threshold 20 Groundlayer mean height: 0.1
Number of large non-eucalypt trees:	0 EDL recruitment (%): 100
Total large trees (ha):	0 Total tree species richness: 1 - <i>Syzygium banksii</i>
50x10m area Species richness & non-native plant cover	
Non-native % plant cover:	0% Groundlayer, 0% Shrub layer, 0% Tree layer
Shrub species richness:	(Native) 19 - refer to Additional information section for species
Grass species richness:	(Native) 0
Forbs and others species richness:	(Native) 4 - refer to Additional information section for species
50 x 20m area CWD	
Coarse woody Debris (m):	0
Five 1 x 1m Quadrats Groundlayer	
Ground cover %	Q1 Q2 Q3 Q4 Q5 Mean
Native perennial grass	0 0 0 0 0 0
Native other grass cover %	0 0 0 0 0 0
Native forbs and other non-grass cover %	0 0 0 0 10 2
Native shrubs (<1 m in height) %	40 50 90 60 85 65
Non-native grasses %	0 0 0 0 0 0
Non-native forbs and shrubs %	0 0 0 0 0 0
Litter %	40 20 10 38 5 22.6
Rock %	0 0 0 0 0 0
Bare ground %	20 30 0 2 0 10.4
Cryptogams %	0 0 0 0 0 0
Total	100% 100% 100% 100% 100% 100%

50m transect

Tree and shrub crown canopy cover





Species	Strata	Cover (m)	Total native crown cover	Cover (%)
<i>Thryptomene oligandra</i>	T1	10.2	Emergent (E)	-
<i>Neofabricia myrtifolia</i>	T1	7.3	Canopy (T1)	21.3
<i>Alyxia spicata</i>	T1	1.5	Canopy Exotic (T1*)	-
<i>Neoroepera banksii</i>	T1	1.0	Subcanopy (T2)	-
<i>Shonia tristigma subsp. trist</i>	T1	0.8	Shrub (S1)	25.8
<i>Dodonaea polyandra</i>	T1	0.5		
<i>Neofabricia myrtifolia</i>	S1	9.1		
<i>Styphelia ruscifolia</i>	S1	7.4		
<i>Thryptomene oligandra</i>	S1	3		
<i>Hibbertia banksii</i>	S1	2.5		
<i>Shonia tristigma subsp. trist</i>	S1	1.5		
<i>Boronia alulata</i>	S1	0.9		
<i>Jacksonia thesioides</i>	S1	0.5		
<i>Neofabricia myrtifolia</i>	S1	0.3		
<i>Alyxia spicata</i>	S1	0.3		
<i>Labichea buettneriana</i>	S1	0.3		

Directional Photographs taken from centre point of transect



Additional information					
Structural summary					
Strata	Height range (m)	Mean height (m)			
Emergent	-	-			
T1	1.0 - 2.5	1.3			
T2	-	-			
S1	0.2 - 0.7	0.5			
G	0 - 0.2	0.1			
Groundlayer quadrats % cover per species					
Ground cover %	Q1	Q2	Q3	Q4	Q5
<i>Hibbertia banksii</i>	-	-	-	-	15
<i>Neofabricia myrtifolia</i>	-	40	35	30	60
<i>Gompholobium nitidum</i>	-	-	-	-	5
<i>Arthrostylis aphylla</i>	-	-	-	-	10
<i>Alyxia spicata</i>	1	10	-	-	-
<i>Styphelia ruscifolia</i>	30	-	-	20	-
<i>Lithomyrtus obtusa</i>	-	-	-	10	-
<i>Thryptomene oligandra</i>	9	-	45	-	-
<i>Jacksonia thesioides</i>	-	-	10	-	-
Species Richness (50 x 10m Area)					
Tree species recorded					
<i>Syzygium banksii</i>					
Shrub species recorded					
<i>Acacia solenota, Allocasuarina littoralis, Alyxia spicata, Boronia alulata, Dodonaea polyandra, Gompholobium nitidum, Grevillea pteridifolia, Hibbertia banksii, Jacksonia thesioides, Labichea buettneriana, Styphelia yorkensis, Lithomyrtus obtusa, Lomandra banksii, Neofabricia myrtifolia, Neuroepera banksii, Hibbertia eciliata, Shonia tristigma subsp. tristigma, Styphelia ruscifolia, Thryptomene oligandra</i>					
Grass species recorded					
-					
Native forbs and other species recorded					
<i>Gahnia aspera, Labichea buettneriana, Schoenus sparteus, Arthrostylis aphylla</i>					
Exotic species recorded					
-					
25 x 10m Tree and shrub counts					
Species	Number of stems in T1 layer	Number of stems in S1 layer	Species	Total stems counted	
<i>Neofabricia myrtifolia</i>	-	44	<i>Neofabricia myrtifolia</i>	44	
<i>Thryptomene oligandra</i>	-	31	<i>Thryptomene oligandra</i>	31	
<i>Labichea buettneriana</i>	-	17	<i>Labichea buettneriana</i>	17	
<i>Alyxia spicata</i>	-	8	<i>Alyxia spicata</i>	8	
<i>Jacksonia thesioides</i>	-	10	<i>Jacksonia thesioides</i>	10	
<i>Shonia tristigma subsp. trist</i>	-	11	<i>Shonia tristigma subsp. tr</i>	11	
<i>Hibbertia banksii</i>	-	12	<i>Hibbertia banksii</i>	12	
<i>Acacia solenota</i> (NC Act status: V)	18	-	<i>Acacia solenota</i>	18	
<i>Styphelia yorkensis</i>	1	-	<i>Styphelia yorkensis</i>	1	
<i>Allocasuarina littoralis</i>	2	-	<i>Allocasuarina littoralis</i>	2	
<i>Grevillea pteridifolia</i>	1	-	<i>Grevillea pteridifolia</i>	1	
<i>Boronia alulata</i>	-	11	<i>Boronia alulata</i>	11	
<i>Syzygium banksii</i>	1	-	<i>Syzygium banksii</i>	1	
<i>Lomandra banksii</i>	-	2	<i>Lomandra banksii</i>	2	
<i>Lithomyrtus obtusa</i>	-	7	<i>Lithomyrtus obtusa</i>	7	
<i>Neuroepera banksii</i>	-	15	<i>Neuroepera banksii</i>	15	
<i>Labichea buettneriana</i>	-	1	<i>Labichea buettneriana</i>	1	
Total				58	





50m transect				
Tree and shrub crown canopy cover				
Species	Strata	Cover (m)	Total native crown cover	Cover (%)
<i>Neofabricia myrtifolia</i>	S1	11.8	Emergent (E)	-
<i>Allocasuarina sp. Shaw islei</i>	S1	4.6	Canopy (T1)	-
<i>Styphelia ruscifolia</i>	S1	3.1	Subcanopy (T2)	-
<i>Choriceras tricornis</i>	S1	2.2	Shrub (S1)	51.8
<i>Labichea buettneriana</i>	S1	1	Shrub Exotic (S1*)	-
<i>Boronia alulata</i>	S1	0.8		
<i>Jacksonia thesioides</i>	S1	0.6		
<i>Asteromyrtus lysicephala</i>	S1	0.5		
Myrtaceae shrub	S1	0.4		
<i>Hibbertia banksii</i>	S1	0.4		
<i>Gompholobium nitidum</i>	S1	0.3		

Directional Photographs taken from centre point of transect	
	
	

Additional information		
Structural summary		
Strata	Height range (m)	Mean height (m)
Emergent	-	-
T1	-	-
T2	-	-
S1	0.05 - 0.5	0.3
G	-	-


Goundlayer quadrats % cover per species					
Ground cover %	Q1	Q2	Q3	Q4	Q5
<i>Shoenus sp.</i>	13	-	10	22	20
<i>Styphelia ruscifolia</i>	12	10	20	-	-
<i>Allocasuarina littoralis</i>	-	68	-	2	-
<i>Asteromyrtus lysicephala</i>	-	12	-	-	-
<i>Gahnia aspera</i>	-	10	-	-	-
<i>Neofabricia myrtifolia</i>	-	-	50	49	10
<i>Hibbertia eciliata</i>	-	-	20	1	2
<i>Labichea buettneriana</i>	-	-	-	18	-
<i>Boronia alulata</i>	-	-	-	-	8
Species Richness (50 x 10m Area)					
Tree species recorded					
-					
Shrub species recorded					
<i>Acacia solenota, Allocasuarina littoralis, Asteromyrtus lysicephala, Boronia alulata, Choriceras tricornis, Grevillea pteridifolia, Hibbertia banksii, Jacksonia thesioides, Hibbertia eciliata, Neofabricia myrtifolia, Neoroepora banksii, Shonia tristigma subsp. tristigma, Styphelia ruscifolia, Gompholobium nitidum</i>					
Grass species recorded					
-					
Native forbs and other species recorded					
<i>Gahnia aspera, Labichea buettneriana, Schoenus sparteus</i>					
Exotic species recorded					
-					
50 x 20m Tree and shrub counts					
The majority of shrubs were <15cm high with a spreading habit due to the site's exposed location. Due to the difficulty in discerning individual plants, stem counts were taken for shrubs > 30cm in 5x5m grid between the 45 - 50m (left hand side of tape) and 5-10m point (on right hand side of tape) along the transect line					
Species	T1 (45-50m)	T2 (5-10)	Species	Total stems counted (50m2)	
<i>Neofabricia myrtifolia</i>	4	8	<i>Neofabricia myrtifolia</i>	12	
<i>Allocasuarina shaw island</i>	2	5	<i>Allocasuarina shaw island</i>	7	
<i>Styphelia ruscifolia</i>	16	8	<i>Styphelia ruscifolia</i>	24	
<i>Boronia alulata</i>	4	7	<i>Boronia alulata</i>	11	
<i>Hibbertia eciliata</i>	11	7	<i>Hibbertia eciliata</i>	18	
<i>Acacia solenota</i>	-	4	<i>Acacia solenota</i>	4	
<i>Grevillea pteridifolia</i>	-	1	<i>Grevillea pteridifolia</i>	1	
<i>Hibbertia banksii</i>	-	4	<i>Hibbertia banksii</i>	4	
<i>Choriceras tricornis</i>	-	6	<i>Choriceras tricornis</i>	6	
Total				87	
Total <i>Acacia solenota</i> (NC Act status: V) counted within transect: 11					





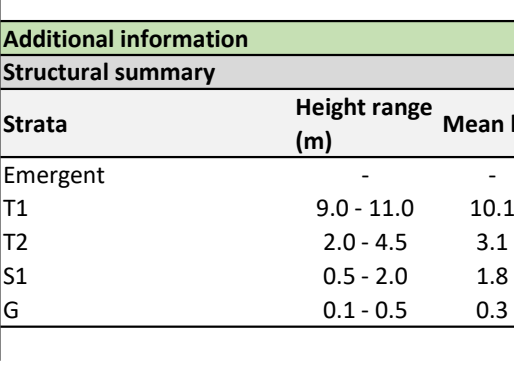
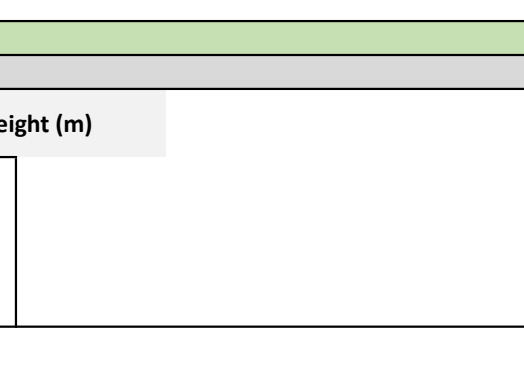
50m transect				
Tree and shrub crown canopy cover				
Species	Strata	Cover (m)	Total native crown cover	Cover (%)
<i>Corymbia stockeri</i>	T1	20	Emergent (E)	-
<i>Melaleuca viridiflora</i>	T2	1	Canopy (T1)	40
<i>Jacksonia thesioides</i>	S1	12.1	Subcanopy (T2)	2
<i>Asteromyrtus lysicephala</i>	S1	10.6	Shrub (S1)	48.6
<i>Neofabricia myrtifolia</i>	S1	1.3	Shrub Exotic (S1*)	-
<i>Persoonia falcata</i>	S1	0.3		

Directional Photographs taken from centre point of transect	
	
	


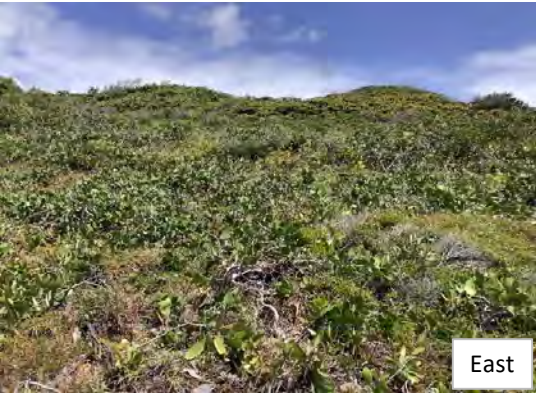


Additional information		
Structural summary		
Strata	Height range (m)	Mean height (m)
Emergent	-	-
T1	5.0 - 10.0	7.5
T2	-	-
S1	0.5 - 1.8	1.2
G	0.1 - 0.5	0.4

Groundlayer quadrats % cover per species					
Ground cover %	Q1	Q2	Q3	Q4	Q5
<i>Shoenus sp.</i>	9	-	-	5	4
<i>Asteromyrtus lysicephala</i>	20	5	10	-	-
<i>Neoroepera banksii</i>	10	-	-	2	-
<i>Hibbertia eciliata</i>	5	-	-	-	-
<i>Xanthorrhoea johnsonii</i>	-	85	15	10	-
<i>Styphelia ruscifolia</i>	-	-	-	3	5
Species Richness (50 x 10m Area)					
Tree species recorded					
<i>Corymbia stockeri</i> , <i>Melaleuca viridiflora</i>					
Shrub species recorded					
<i>Asteromyrtus lysicephala</i> , <i>Choriceras tricornis</i> , <i>Coelospermum reticulatum</i> , <i>Dodonaea physocarpa</i> , <i>Grevillea pteridifolia</i> , <i>Jacksonia thesioides</i> , <i>Melaleuca viridiflora</i> , <i>Hibbertia eciliata</i> , <i>Neofabricia myrtifolia</i> , <i>Persoonia falcata</i> , <i>Petalostigma banksii</i> , <i>Styphelia ruscifolia</i> , <i>Xanthorrhoea johnsonii</i>					
Grass species recorded					
-					
Native forbs and other species recorded					
<i>Cassutha filiformis</i> , <i>Lomandra multiflora</i> , <i>Schoenus sparteus</i>					
Exotic species recorded					
-					
25 x 10m Tree and shrub counts					
Species	Number of stems in T1 layer	Number of stems in S1 layer	Species	Total stems counted	
<i>Corymbia stockeri</i>	7		<i>Corymbia stockeri</i>	7	
<i>Melaleuca viridiflora</i>	1 (in T2)		<i>Melaleuca viridiflora</i>	1	
<i>Grevillea pteridifolia</i>	-	10	<i>Grevillea pteridifolia</i>	10	
<i>Allocasuarina littoralis</i>	-	24	<i>Allocasuarina littoralis</i>	24	
<i>Jacksonia thesioides</i>	-	30	<i>Jacksonia thesioides</i>	30	
<i>Neofabricia myrtifolia</i>	-	9	<i>Neofabricia myrtifolia</i>	9	
*Note: <i>Neoroepera banksii</i> and <i>Styphelia ruscifolia</i> stems not recorded. For indicative coverage at site, refer to quadrat data.			Total	81	
Total <i>Acacia solenota</i> (NC Act status: V) counted within transect: 0					

 BioCondition/Secondary Survey Transect Data	
Project:	Cape Flattery Silica Sands
Project Number:	BE210008.01
Site:	T5
Date:	08-17-2021
Mapped RE:	3.2.21a/3.2.10
Ground-truthed RE/Landtype:	3.2.10
Observers:	Dan Hede & Dare Lawrence
Landzone:	2 - Sand
Site Description & Location:	<i>Corymbia clarksoniana</i> woodland with a mix of rainforest and heath understorey. Dense shrub layer. Sheltered from prevailing SE winds. Undertorey here was less thick than many sites observed. Tree heights are taller than more exposed spots.
Plot Start:	321933.01057604, 8344588.60651849 (easting, northing)
Plot End:	321893.57559584, 8344625.71662847
50 x 40m area Large trees	
Eucalypt large tree DBH (cm):	threshold 30 Canopy (EDL) mean height (m): 10.1
Number of large eucalypt trees:	14 Subcanopy mean height: 3.1
Non-Eucalypt large tree DBH (cm):	threshold 20 Shrub mean height: 1.8
Number of large non-eucalypt trees:	0 EDL recruitment (%): 100
Total large trees (ha):	70 Total tree species richness: 6 - refer to Additional information section
50 x 10m area Species richness & non-native plant cover	
Non-native % plant cover:	0% Groundlayer, 0% Shrub layer, 0% Tree layer
Shrub species richness:	(Native) 11 - refer to Additional information section for species
Grass species richness:	(Native) 1 - refer to Additional information section for species
Forbs and others species richness:	(Native) 6 - refer to Additional information section for species
50 x 20m area CWD	
Coarse woody Debris (m):	23.5
Five 1 x 1m Quadrats Groundlayer	
Ground cover %	Q1 Q2 Q3 Q4 Q5 Mean
Native perennial grass	0 0 0 0 2 0.4
Native other grass cover %	0 0 0 0 0 0
Native forbs and other non-grass cover %	5 0 30 32 1 13.6
Native shrubs (<1 m in height) %	15 50 2 5 45 23.4
Non-native grasses %	0 0 0 0 0 0
Non-native forbs and shrubs %	0 0 0 0 0 0
Litter %	80 50 68 63 4 53
Rock %	0 0 0 0 0 0
Bare ground %	0 0 0 0 48 9.6
Cryptogams %	0 0 0 0 0 0
Total	100% 100% 100% 100% 100% 100%

50m transect					
Tree and shrub crown canopy cover					
Species	Strata	Cover (m)	Total native crown cover	Cover (%)	
<i>Corymbia clarksoniana</i>	T1	24.2	Emergent (E)	-	
<i>Asteromyrtus angustifolia</i>	T2	0.3	Canopy (T1)	48.4	
<i>Alyxia spicata</i>	S1	7.4	Subcanopy (T2)	0.6	
<i>Hibbertia banksii</i>	S1	5.7	Shrub (S1)	39.8	
<i>Labichea buettneriana</i>	S1	1.4	Shrub Exotic (S1*)	-	
<i>Eriostemon banksii</i>	S1	1.3			
<i>Styphelia ruscifolia</i>	S1	1.3			
<i>Exocarpos latifolius</i>	S1	1.2			
<i>Neoroepera banksii</i>	S1	1			
<i>Dodonaea physocarpa</i>	S1	0.3			
<i>Lithomyrtus obtusa</i>	S1	0.3			
Directional Photographs taken from centre point of transect					
				North	
				South	
				East	
				West	
Additional information					
Structural summary					
Strata	Height range (m)	Mean height (m)			
Emergent	-	-			
T1	9.0 - 11.0	10.1			
T2	2.0 - 4.5	3.1			
S1	0.5 - 2.0	1.8			
G	0.1 - 0.5	0.3			

Groundlayer quadrats % cover per species					
Ground cover %	Q1	Q2	Q3	Q4	Q5
<i>Schizachyrium fragile</i>	-	-	-	-	2
<i>Arthrostylis aphylla</i>	5	-	-	-	1
<i>Neoroepera banksii</i>	-	-	-	-	43
<i>Acacia sp.</i>	-	-	-	5	2
<i>Dianella sp.</i>	-	-	20	32	-
<i>Trachystylis stradbokensis</i>	-	-	10	-	-
<i>Alyxia spicata</i>	15	25	2	-	-
<i>Eriostemon banksii</i>	-	25	-	-	-
Species Richness (50 x 10m Area)					
Tree species recorded					
<i>Corymbia clarksoniana, Syzygium suborbiculare, Atractocarpus sessilis, Asteromyrtus angustifolia, Exocarpos latifolius, Acacia legnota</i>					
Shrub species recorded					
<i>Acacia solenota, Alyxia spicata, Dodonaea polyandra, Eriostemon banksii, Hibbertia banksii, Labichea buettneriana, Lamprolobium fruticosum, Lithomyrtus obtusa, Neoroepera banksii, Myrsine urceolata, Styphelia ruscifolia</i>					
Grass species recorded					
<i>Schizachyrium fragile</i>					
Native forbs and other species recorded					
<i>Trachystylis stradbokensis, Arthrostylis aphylla, Dendrobium discolor, Dianella sp., Lomandra banksii, Vigna marina</i>					
Exotic species recorded					
-					
25 x 10m Tree and shrub counts					
Species	Number of stems in T1 layer	Number of stems in S1 layer	Species	Total stems counted	
<i>Woody stem counts not recorded</i>					
<i>Total Acacia solenota (NC Act status: V) counted within transect: 3</i>					

50m transect				
Tree and shrub crown canopy cover				
Species	Strata	Cover (m)	Total native crown cover	Cover (%)
<i>Melaleuca viridiflora</i>	S1	27.2	Emergent (E)	-
			Canopy (T1)	-
			Subcanopy (T2)	-
			Shrub (S1)	54.4
			Shrub Exotic (S1*)	-
Directional Photographs taken from centre point of transect				
				
				
Additional information				
Structural summary				
Strata	Height range (m)	Mean height (m)		
Emergent	-	-		
T1	-	-		
T2	-	-		
S1	0.1 - 1.0	0.2		
G	0.0 - 0.1	0.1		

Groundlayer quadrats % cover per species					
Ground cover %	Q1	Q2	Q3	Q4	Q5
<i>Melaleuca viridiflora</i>	50	40	8	20	100
<i>Grevillea pteridifolia</i>	10	47	10	10	-
<i>Hibbertia eciliata</i>	10	5	12	10	-
<i>Haemodorum coccineum</i>	5	-	-	10	-
<i>Themeda triandra</i>	15	3	56	-	-
<i>Cassytha filiformis</i>	5	-	-	-	-
Species Richness (50 x 10m Area)					
Tree species recorded					
-					
Shrub species recorded					
<i>Acacia brassii, Grevillea pteridifolia, Hibbertia banksii, Jacksonia thesioides, Labichea buettneriana, Melaleuca viridiflora, Hibbertia eciliata, Neuroopera banksii</i>					
Grass species recorded					
<i>Themeda triandra</i>					
Native forbs and other species recorded					
<i>Atractocarpus sessilis, Cassytha filiformis, Gahnia aspera, Haemodorum coccineum, Platysace valida</i>					
Exotic species recorded					
-					
25 x 10m Tree and shrub counts					
Species	Number of stems in S1 layer	Species	Total stems counted		
<i>Melaleuca viridiflora</i>	303	<i>Melaleuca viridiflora</i>	303		
<i>Total Acacia solenota (NC Act status: V) counted within transect: 0</i>					
			Total	303	

50m transect				
Tree and shrub crown canopy cover				
Species	Strata	Cover (m)	Total native crown cover	Cover (%)
<i>Eucalyptus brassiana</i>	T1	26	Emergent (E)	-
<i>Grevillea glauca</i>	T1	4.3	Canopy (T1)	60.6
<i>Atractocarpus sessilis</i>	T2	10.3	Subcanopy (T2)	50
<i>Diospyros hebecarpa</i>	T2	6	Shrub (S1)	8.4
<i>Cyclophyllum maritimum</i>	T2	4	Shrub Exotic (S1*)	-
<i>Endiandra glauca</i>	T2	2.2		
<i>Dodonaea polyandra</i>	T2	1.9		
<i>Psychotria polioSTEMMA</i>	T2	0.6		
<i>Atractocarpus sessilis</i>	S1	1.9		
<i>Alyxia spicata</i>	S1	0.9		
<i>Dodonaea polyandra</i>	S1	0.7		
<i>Eucalyptus brassiana</i>	S1	0.5		
<i>Neoroepera banksii</i>	S1	0.2		





Directional Photographs taken from centre point of transect



Additional information





Structural summary		
Strata	Height range (m)	Mean height (m)
Emergent	-	-
T1	5.0 - 10.0	7.5
T2	2.0 - 5.0	4.5
S1	1.0 - 4.0	3.0
G	0.0 - 0.5	0.3

Groundlayer quadrats % cover per species					
Ground cover %	Q1	Q2	Q3	Q4	Q5
<i>Schelhammera multiflora</i>	2	-	-	-	-
<i>Gahnia aspera</i>	-	28	-	-	-
<i>Alyxia spicata</i>	-	2	1	1	-
<i>Atractocarpus sessilis</i>	-	2	1	1	-
Species Richness (50 x 10m Area)					
Tree species recorded					
<i>Eucalyptus brassiana, Atractocarpus sessilis, Melaleuca foliolosa, Exocarpos latifolius, Cyclophyllum maritimum, Drypetes deplanchei, Tristaniopsis exiliflora, Sersalisia sericea, Grevillea glauca, Neofabricia myrtifolia, Diospyros hebecarpa, Endiandra glauca, Cryptocarya triplinervis</i>					
Shrub species recorded					
<i>Alyxia spicata, Clerodendrum inerme, Dodonaea polyandra, Ficus coronata, Leucopogon leptospermoides, Neuroepera banksii, Neuroepera banksii, Pittosporum ferrugineum, Psychotria polioSTEMMA, Styphelia leptospermoides, Xanthorrhoea johnsonii</i>					
Grass species recorded					
-					
Native forbs and other species recorded					
<i>Clematis sp., Gahnia aspera, Marsdenia sp., Asteraceae sp, Schelhammera multiflora, Smilax australis</i>					
Exotic species recorded					
-					
25 x 10m Tree and shrub counts					
Species	Number of stems in T1 layer	Number of stems in T2 layer	Number of stems in S1 layer	Species	Total stems counted
<i>Exocarpos latifolius</i>	-	-	3	<i>Exocarpos latifolius</i>	3
<i>Neofabricia myrtifolia</i>	-	-	1	<i>Neofabricia myrtifolia</i>	1
<i>Dodonaea polyandra</i>	-	-	19	<i>Dodonaea polyandra</i>	19
<i>Eriostemon banksii</i>	-	-	1	<i>Eriostemon banksii</i>	1
<i>Grevillea pteridifolia</i>	1	-	-	<i>Grevillea pteridifolia</i>	1
<i>Drypetes deplanchei</i>	-	7	2	<i>Drypetes deplanchei</i>	9
<i>Atractocarpus sessilis</i>	-	4	19	<i>Atractocarpus sessilis</i>	23
<i>Styphelia leptospermoides</i>	-	-	1	<i>Styphelia leptospermoic</i>	1
<i>Eucalyptus brassiana</i>	7	1	1	<i>Eucalyptus brassiana</i>	9
<i>Neuroepera banksii</i>	-	-	1	<i>Neuroepera banksii</i>	1
<i>Psychotria polioSTEMMA</i>	-	-	2	<i>Psychotria polioSTEMMA</i>	2
<i>Diospyros hebecarpa</i>	-	-	1	<i>Diospyros hebecarpa</i>	1
<i>Melaleuca foliolosa</i>	-	-	1	<i>Melaleuca foliolosa</i>	1
				Total	72
Total <i>Acacia solenota</i> (NC Act status: V) counted within transect: 0					

50m transect				
Tree and shrub crown canopy cover				
Species	Strata	Cover (m)	Total native crown cover	Cover (%)
<i>Asteromyrtus angustifolia</i>	T1	14	Emergent (E)	-
<i>Syzygium banksii</i>	T1	12.3	Canopy (T1)	82.2
<i>Neofabricia myrtifolia</i>	T1	7.7	Subcanopy (T2)	43.4
<i>Terminalia muelleri</i>	T1	3.8	Shrub (S1)	18.4
<i>Acacia solenota</i>	T1	2.3	Shrub Exotic (S1*)	-
<i>Planchonella pubescens</i>	T1	1		
<i>Myrsine urceolata</i>	T2	11		
<i>Syzygium banksii</i>	T2	5.2		
<i>Dodonaea polyandra</i>	T2	3.3		
<i>Exocarpos latifolius</i>	T2	1.2		
<i>Neofabricia myrtifolia</i>	T2	1		
<i>Neoroepera banksii</i>	S1	4.8		
<i>Myrsine urceolata</i>	S1	1.7		
<i>Dodonaea polyandra</i>	S1	1		
<i>Hibbertia banksii</i>	S1	0.6		
<i>Shonia tristigma subsp. trist</i>	S1	0.5		
<i>Terminalia muelleri</i>	S1	0.3		
<i>Styphelia ruscifolia</i>	S1	0.3		
Directional Photographs taken from centre point of transect				
				
				
Additional information				
Structural summary				
Strata	Height range (m)	Mean height (m)		
Emergent	-	-		
T1	6.0 - 10.0	7.5		
T2	1.5 - 4.5	2.5		
S1	0.5 - 1.5	1.0		
G	0.0 - 0.5	0.2		

Groundlayer quadrats % cover per species					
Ground cover %	Q1	Q2	Q3	Q4	Q5
<i>Lomandra banksii</i>	-	-	-	5	3
<i>Neoroepera banksii</i>	-	-	1	-	10
<i>Dodonaea polyandra</i>	-	-	1	5	-
<i>Parsonsia velutina</i>	1	-	1	-	-
<i>Syzygium banksii</i>	2	2	-	-	-
Species Richness (50 x 10m Area)					
Tree species recorded					
<i>Psychotria polioSTEMMA, Syzygium banksii, Asteromyrtus angustifolia, Myrsine urceolata, Sersalisia sericea, Acacia solenota, Syzygium suborbiculare, Neofabricia myrtifolia, Atractocarpus sessilis, Terminalia muelleri, Exocarpos latifolius</i>					
Shrub species recorded					
<i>Alyxia spicata, Choriceras tricornis, Dodonaea polyandra, Eriostemon banksii, Eugenia reinwardtiana, Exocarpos latifolius, Hibbertia banksii, Labichea buettneriana, Styphelia leptospermoides, Neoroepera banksii, Shonia tristigma subsp. tristigma, Styphelia ruscifolia</i>					
Grass species recorded					
-					
Native forbs and other species recorded					
<i>Clematis sp., Dianella sp., Lomandra banksii, Lomandra longifolia, Marsdenia sp., Parsonsia velutina</i>					
Exotic species recorded					
-					
25 x 10m Tree and shrub counts					
Species	Number of stems in T1 layer	Number of stems in T2 layer	Number of stems in S1 layer	Species	Total stems counted
<i>Myrsine urceolata</i>	2	9	7	<i>Myrsine urceolata</i>	18
<i>Syzygium banksii</i>	2	-	2	<i>Syzygium banksii</i>	4
<i>Dodonaea polyandra</i>	-	2	7	<i>Dodonaea polyandra</i>	9
<i>Sersalisia sericea</i>	2	-	1	<i>Sersalisia sericea</i>	3
<i>Atractocarpus sessilis</i>	7	-	-	<i>Atractocarpus sessilis</i>	7
<i>Neofabricia myrtifolia</i>	1	-	-	<i>Neofabricia myrtifolia</i>	1
<i>Psychotria polioSTEMMA</i>	-	-	1	<i>Psychotria polioSTEMMA</i>	1
<i>Neoroepera banksii</i>	-	-	4	<i>Neoroepera banksii</i>	4
<i>Choriceras tricornis</i>	-	-	2	<i>Choriceras tricornis</i>	2
<i>Alyxia spicata</i>	-	-	1	<i>Alyxia spicata</i>	1
<i>Shonia tristigma subsp. trist</i>	-	-	1	<i>Shonia tristigma subsp.</i>	1
<i>Acacia solenota</i>	1	-	-	<i>Acacia solenota</i>	1
<i>Atractocarpus sessilis</i>	-	-	6	<i>Atractocarpus sessilis</i>	6
<i>Terminalia muelleri</i>	1	-	-	<i>Terminalia muelleri</i>	1
<i>Eugenia reinwardtiana</i>	-	-	1	<i>Eugenia reinwardtiana</i>	1
<i>Styphelia ruscifolia</i>	-	-	1	<i>Styphelia ruscifolia</i>	1
<i>Styphelia leptospermoides</i>	-	-	3	<i>Styphelia leptospermoides</i>	3
<i>Hibbertia banksii</i>	-	-	1	<i>Hibbertia banksii</i>	1
<i>Eriostemon banksii</i>	-	1	-	<i>Eriostemon banksii</i>	1
				Total	66
<i>Total Acacia solenota (NC Act status: V) counted within transect: 1</i>					

50m transect				
Tree and shrub crown canopy cover				
Species	Strata	Cover (m)	Total native crown cover	Cover (%)
<i>Neofabricia myrtifolia</i>	T1	2.3	Emergent (E)	-
<i>Acacia solenota</i>	T1	2.2	Canopy (T1)	10.4
<i>Choriceras tricorne</i>	T1	0.7	Subcanopy (T2)	-
<i>Boronia alulata</i>	S1	3.9	Shrub (S1)	36
<i>Neofabricia myrtifolia</i>	S1	2.1	Shrub Exotic (S1*)	-
<i>Choriceras tricorne</i>	S1	2		
<i>Hibbertia banksii</i>	S1	2.7		
<i>Jacksonia thesioides</i>	S1	1.4		
<i>Neoroepera banksii</i>	S1	1.3		
<i>Shonia tristigma subsp. trist</i>	S1	1.1		
<i>Styphelia ruscifolia</i>	S1	1		
<i>Labichea buettneriana</i>	S1	0.8		
<i>Styphelia yorkensis</i>	S1	0.8		
<i>Acacia solenota</i>	S1	0.3		
<i>Hibbertia eciliata</i>	S1	0.2		
<i>Lithomyrtus obtusa</i>	S1	0.4		

Directional Photographs taken from centre point of transect	
 North	 East
 South	 West

Additional information		
Structural summary		
Strata	Height range (m)	Mean height (m)
Emergent	-	-
T1	2.0 - 3.5	2.5
T2	-	-
S1	0.5 - 1.5	1.0
G	0.0 - 0.5	0.2

Groundlayer quadrats % cover per species					
Ground cover %	Q1	Q2	Q3	Q4	Q5
<i>Boronia alulata</i>	10	11	-	-	-
<i>Jacksonia thesioides</i>	12	-	20	-	-
<i>Neofabricia myrtifolia</i>	5	-	-	-	-
<i>Shoenus sp.</i>	5	8	25	9	4
<i>Hibbertia eciliata</i>	5	-	5	7	-
<i>Labichea buettneriana</i>	8	-	5	-	7
<i>Styphelia ruscifolia</i>	-	12	-	-	40
<i>Lithomyrtus obtusa</i>	-	8	-	4	-
<i>Hibbertia banksii</i>	-	10	-	-	-
<i>Shonia tristigma subsp. trist</i>	-	29	-	-	-
<i>Persoonia falcata</i>	-	-	-	-	3
Species Richness (50 x 10m Area)					
Tree species recorded					
-					
Shrub species recorded					
<i>Acacia solenota, Boronia alulata, Choriceras tricornis, Dodonaea polyandra, Gompholobium nitidum, Grevillea pteridifolia, Hibbertia banksii, Jacksonia thesioides, Labichea buettneriana, Lomandra banksii, Hibbertia eciliata, Neofabricia myrtifolia, Persoonia falcata, Shoenus sp., Shonia tristigma subsp. tristigma, Styphelia ruscifolia, Styphelia yorkensis, Lithomyrtus obtusa, Neuroepera banksii</i>					
Grass species recorded					
-					
Native forbs and other species recorded					
<i>Shoenus sp., Cassytha filiformis</i>					
Exotic species recorded					
-					
25 x 10m Tree and shrub counts					
Species	Number of stems in T1 layer	Stems in S1 layer	Species	Total stems counted	
<i>Neofabricia myrtifolia</i>	11	22	<i>Neofabricia myrtifolia</i>	33	
<i>Hibbertia banksii</i>	-	16	<i>Hibbertia banksii</i>	16	
<i>Acacia solenota</i>	16	4	<i>Acacia solenota</i>	20	
<i>Boronia alulata</i>	-	29	<i>Boronia alulata</i>	29	
<i>Labichea buettneriana</i>	1	17	<i>Labichea buettneriana</i>	18	
<i>Shonia tristigma subsp. trist</i>	-	12	<i>Shonia tristigma subsp. trist</i>	12	
<i>Hibbertia eciliata</i>	-	10	<i>Hibbertia eciliata</i>	10	
<i>Jacksonia thesioides</i>	-	7	<i>Jacksonia thesioides</i>	7	
<i>Styphelia leptospermoides</i>	-	2	<i>Styphelia leptospermoia</i>	2	
<i>Styphelia ruscifolia</i>	-	12	<i>Styphelia ruscifolia</i>	12	
<i>Choriceras tricornis</i>	-	6	<i>Choriceras tricornis</i>	6	
<i>Grevillea pteridifolia</i>	3	2	<i>Grevillea pteridifolia</i>	5	
<i>Neuroepera banksii</i>	-	10	<i>Neuroepera banksii</i>	10	
<i>Lithomyrtus obtusa</i>	-	5	<i>Lithomyrtus obtusa</i>	5	
<i>Gompholobium nitidum</i>	-	4	<i>Gompholobium nitidum</i>	4	
<i>Styphelia yorkensis</i>	-	1	<i>Styphelia yorkensis</i>	1	
Total				190	
<i>Total Acacia solenota (NC Act status: V) counted within transect: 25</i>					

Quaternary survey data - Cape Flattery wet and dry season survey 2021																			
Vegetation Structure						Plant species relative dominance								Additional information					
Site	Latitude	Longitude	Ground-truthed RE	T1 height (m)	% Crown cover	T1 dominant	T1 co-dominant	T1 associate	T2 small tree	S1 shrub	S1 shrub	S2 small shrub	S2 small shrub	G dominant	Other species	Incidental <i>A.solenota</i> counts	Site notes	Date	
DQ1	-14.959	145.339	3.12.47a	3	60	<i>Melaleuca viridiflora</i>	<i>Neofabricia myrtifolia</i>	<i>Asteromyrtus lysicphala</i>	-	-	-	-	-	-	-	-	54 water sample recorded here. s1 contains de-ionised water	1/08/2021	
Q1	-14.97	145.343	3.2.21	5	75	<i>Asteromyrtus angustifolia</i>	-	<i>Acacia solenota</i>	-	<i>Neofabricia myrtifolia</i>	-	-	-	-	<i>Cassytha filiformis</i>	-	-	1/08/2021	
Q2	-14.966	145.336	3.2.21	4.5	70	<i>Thyrtomene oligandra</i>	<i>Dodonaea polyandra</i>	<i>Syzygium banksii</i>	-	-	-	-	-	<i>Lomandra banksii</i>	-	-	-	1/08/2021	
Q3	-14.965	145.334	3.2.18	1.2	60	<i>Thyrtomene oligandra</i>	<i>Jacksonia thesioides</i>	-	-	<i>Leucopogon affinis</i>	-	-	-	-	-	-	Not sure of leucopogon sp.	1/08/2021	
Q4	-14.97	145.337	3.2.10	8	70	<i>Corymbia clarksoniana</i>	<i>Syzygium subarbutulare</i>	-	-	<i>Neofabricia myrtifolia</i>	-	-	-	<i>Lomandra banksii</i>	-	-	-	1/08/2021	
Q5	-14.973	145.33	3.2.21	6.5	80	<i>Syzygium banksii</i>	<i>Asteromyrtus angustifolia</i>	<i>Acacia crassicaarpa</i>	-	<i>Choriceras tricarne</i>	-	-	-	<i>Lomandra banksii</i>	-	-	Last time was previously mapped as 3.2.10a. Though no c. <i>Clarksoniana</i> present. Halla closed scrub sheltered from se winds	1/08/2021	
Q6	-14.971	145.325	3.2.10a	8	25	<i>Corymbia clarksoniana</i>	<i>Acacia crassicaarpa</i>	<i>Grevillea pteridifolia</i>	-	<i>Dodonaea polyandra</i>	-	-	-	-	-	-	Seems to continue north as mapped to site boundary	1/08/2021	
Q9	-14.973	145.347	3.2.21	5.5	80	<i>Neofabricia myrtifolia</i>	<i>Asteromyrtus angustifolia</i>	<i>Acacia solenota</i>	-	<i>Dodonaea polyandra</i>	-	-	-	<i>Lomandra banksii</i>	-	-	Small, dense patches of <i>S. banksii</i> with heathy and rainforest understorey however not considered in great enough coverage to constitute its own community	1/08/2021	
Q10	-14.971	145.349	3.12.7	0	60	<i>Eucalyptus brassiana</i>	<i>Melaleuca foliolosa</i>	<i>Melaleuca viridiflora</i>	-	-	-	-	-	-	-	-	Recorded in edge of patch. Seems to hug coastline through same extent as gre map 3.2.10 maybe match re boundaries with boundaries of granite country, the Cory clarksoniana further to west on sand	1/08/2021	
Q11	-14.958843	145.326623	3.2.10	7	30	<i>Corymbia clarksoniana</i>	<i>Acacia crassicaarpa</i>	-	<i>Acacia racospermoides</i>	<i>Acacia solenota</i>	<i>Lamprolabium fruticosum</i>	<i>Jacksonia thesioides</i>	<i>Hibbertia banksii</i>	<i>Lomandra banksii</i>	-	4 <i>Acacia solenota</i>	-	2021-02-26T23:27:57Z	
Q12	-14.960625	145.327309	3.2.10	6	15	<i>Corymbia clarksoniana</i>	-	-	-	<i>Acacia solenota</i>	-	-	-	-	-	5 <i>Acacia solenota</i> in 10 X 5 m	-	2021-02-27T00:12:52Z	
Q13	-14.961594	145.326561	3.2.10	5	5	<i>Corymbia clarksoniana</i>	-	-	-	<i>Acacia solenota</i>	-	<i>Choriceras tricarne</i>	-	-	-	2 <i>Acacia solenota</i>	-	2021-02-27T00:21:31Z	
Q14	-14.961992	145.326121	3.2.21	4	2	<i>Corymbia clarksoniana</i>	-	-	<i>Parinari nonda</i>	<i>Acacia solenota</i>	<i>Grevillea pteridifolia</i>	<i>Labichea buettneriana</i>	<i>Thyrtomene oligandra</i>	-	-	45 <i>Acacia solenota</i> (also recorded by Dan so hasn't been	-	2021-02-27T00:23:52Z	
Q15	-14.962483	145.325548	3.2.21	4	90	<i>Neofabricia myrtifolia</i>	<i>Grevillea pteridifolia</i>	-	<i>Dodonaea polyandra</i>	<i>Acacia solenota</i>	<i>Asteromyrtus lysicphala</i>	-	-	-	-	-	-	2021-02-27T00:39:20Z	
Q16	-14.963301	145.325144	3.2.21	3	90	<i>Acacia solenota</i>	<i>Grevillea pteridifolia</i>	-	<i>Dodonaea polyandra</i>	<i>Corymbia clarksoniana</i>	<i>Neofabricia myrtifolia</i>	<i>Neoroepera banksii</i>	<i>Hibbertia banksii</i>	<i>Leucopogon</i>	-	-	-	2021-02-27T00:53:10Z	
Q17	-14.964539	145.324934	3.2.18/3.2.22	1.5	80	<i>Thyrtomene oligandra</i>	<i>Neofabricia myrtifolia</i>	-	<i>Leucopogon yorkensis</i>	<i>Acacia crassicaarpa</i>	<i>Acacia solenota</i>	<i>Alyxia spicata</i>	<i>Phyllanthus like yellow flower</i>	<i>Lomandra banksii</i>	-	5 <i>Acacia solenota</i>	Photos to SE 5 over mine	2021-02-27T01:34:09Z	
Q18	-14.964968	145.323791	3.2.21	4	80	<i>Neofabricia myrtifolia</i>	<i>l</i>	-	-	-	-	<i>Acacia solenota</i>	-	-	-	2 <i>Acacia solenota</i>	-	2021-02-27T03:34:20Z	
Q19	-14.965899	145.32621	3.2.21	1.5	80	<i>Neofabricia myrtifolia</i>	<i>Thyrtomene oligandra</i>	-	-	-	-	<i>Acacia solenota</i>	-	-	-	1 <i>Acacia solenota</i>	-	2021-02-27T03:52:56Z	
Q20	-14.966793	145.327052	3.2.21	1.5	80	<i>Neofabricia myrtifolia</i>	<i>Acacia crassicaarpa</i>	-	-	-	-	<i>Acacia solenota</i>	<i>Hibbertia banksii</i>	-	-	2 <i>Acacia solenota</i>	-	2021-02-27T03:54:44Z	
Q21	-14.96723	145.327536	3.2.21	2	80	<i>Neofabricia myrtifolia</i>	<i>Acacia crassicaarpa</i>	-	-	<i>Dodonaea polyandra</i>	<i>Alyxia spicata</i>	<i>Acacia solenota</i>	<i>Hibbertia banksii</i>	<i>Vigna marina</i>	-	-	-	2021-02-27T03:56:47Z	
Q22	-14.968281	145.328511	3.2.21	3	80	<i>Neofabricia myrtifolia</i>	<i>Acacia crassicaarpa</i>	-	<i>Asteromyrtus angustifolia</i>	<i>Dodonaea polyandra</i>	<i>Eriostemon banksii</i>	<i>Acacia solenota</i>	-	-	-	-	-	2021-02-27T04:00:26Z	
Q23	-14.968692	145.328933	3.2.21	3	80	<i>Neofabricia myrtifolia</i>	<i>Acacia crassicaarpa</i>	-	<i>Asteromyrtus angustifolia</i>	<i>Dodonaea polyandra</i>	<i>Eriostemon banksii</i>	<i>Acacia solenota</i>	-	-	-	-	-	2021-02-27T04:04:19Z	
Q24	-14.969848	145.329457	3.2.21	3	80	<i>Neofabricia myrtifolia</i>	<i>Asteromyrtus angustifolia</i>	-	<i>Terminalia muelleri</i>	<i>Sersalisia sericea</i>	<i>Lamprolabium fruticosum</i>	<i>Acacia solenota</i>	<i>Cyclophyllum maritimum</i>	-	-	-	-	2021-02-27T04:22:32Z	

epic		Quaternary survey data - Cape Flattery wet and dry season survey 2021															epic	
Site	Latitude	Longitude	Vegetation Structure			Plant species relative dominance										Acacia solenota counts	Site notes	Date
			Ground-truthed RE	T1 height (m)	% Crown cover	T1 dominant	T1 co-dominant	T1 associate	T2 small tree	S1 shrub	S1 shrub	S2 small shrub	S2 small shrub	G dominant	Other species			
Q25	-14.970829	145.330073	3.2.21	3	80	Neofabricia myrtifolia	Dodonaea polyandra								Acacia solenota			2021-02-27T04:32:01Z
Q26	-14.97182	145.330775	3.2.21	3	80	Neofabricia myrtifolia	Dodonaea polyandra		Asteromyrtus angustifolia						Acacia solenota	Neoroepera banksii		2021-02-27T04:33:48Z
Q27	-14.972176	145.33094	3.2.21	3	80	Asteromyrtus angustifolia	Dodonaea polyandra		Acacia racospermoides	Terminalia muelleri	Neoroepera banksii				Acacia solenota			2021-02-27T04:38:19Z
Q28	-14.973504	145.332301	3.2.21	3	80	Neofabricia myrtifolia	Dodonaea polyandra								Acacia solenota	Choricerus tricornis		2021-02-27T04:44:00Z
Q29	-14.95263	145.334898	3.12.47	1	35	Neofabricia myrtifolia	Jacksonian thesiades		Melaleuca viridiflora	Neoroepera banksii	Labichea buettneriana	Clerodendrum inerme			Acacia solenota	Xanthorrhoea johnsonii	Creek entering beach area	2021-02-27T06:46:10Z
Q30	-14.951924	145.334958	3.12.39a	4	35	Corymbia stockeri				Acacia solenota								2021-02-27T07:07:14Z
Q31	-14.966058	145.327014	3.2.21	3	60	Neofabricia myrtifolia	Acacia crassicaarpa		Labichea buettneriana	Hibbertia banksii					Acacia solenota			2021-02-27T21:54:15Z
Q32	-14.961815	145.334056	3.2.21	3	60	Neofabricia myrtifolia									Acacia solenota			2021-02-27T22:57:50Z
Q33	-14.958384	145.3368	3.2.18/3.2.22	1	0	Thryptomene oligandra					Acacia solenota							2021-02-27T23:12:04Z
Q34	-14.957703	145.336723	3.2.18/3.2.22	1	0	Thryptomene oligandra	Neofabricia myrtifolia		Jacksonia thesiades		Acacia solenota							2021-02-27T23:16:09Z
Q35	-14.955859	145.33716	3.12.39a	0	0	Corymbia stockeri									Acacia solenota		Bloodwood smooth branches heads north to beach	2021-02-27T23:20:21Z
Q36	-14.957481	145.3417	3.12.47	0.5	50	Neofabricia myrtifolia	Silvery Acacia				Acacia solenota							2021-02-27T23:51:09Z
Q37	-14.957173	145.342729	3.12.47	0.5	50	Neofabricia myrtifolia	Corymbia stockeri				Acacia solenota	Pultenaea						2021-02-28T00:12:15Z
Q38	-14.957277	145.343024	3.12.47	0.5	50	Neofabricia myrtifolia	Jacksonian thesiades		Phyllanthus yellow flower		Acacia solenota							2021-02-28T00:17:54Z
Q39	-14.957298	145.342426	3.12.47	0.5	50	Neofabricia myrtifolia	Jacksonian thesiades				Acacia solenota						Photos to Ne e and S	2021-02-28T00:29:16Z
Q40	-14.962595	145.331087	3.2.21	3	75	Neofabricia myrtifolia	Hibbertia banksii				Acacia solenota							2021-02-28T01:35:03Z
Q41	-14.96331	145.331247	3.2.21	3	75	Neofabricia myrtifolia	Thryptomene oligandra			Alyxia	Acacia solenota						Ctenotus	2021-02-28T01:36:21Z
Q42	-14.962529	145.328364	3.2.21	1.5	0	Neofabricia myrtifolia	Thryptomene oligandra				Acacia solenota							2021-02-28T01:47:37Z
Q43	-14.964616	145.338704	3.2.21	3	75	Neofabricia myrtifolia	Thryptomene oligandra			Acacia solenota								2021-02-28T05:16:25Z
Q44	-14.966657	145.341261	3.2.10	5	20	Corymbia clarksoniana				Acacia solenota								2021-02-28T05:17:32Z
Q45	-14.965868	145.34943	3.12.7	8	55	Eucalyptus exserta	Laphostemon suaveolens		Eucalyptus platyphylla	Dodonaea polyandra					Acacia solenota			2021-02-28T06:25:57Z

APPENDIX F FAUNA SPECIES LIST

Common Name	Scientific Name	EPBC Act	NC Act	Feb_Mar 2021	June 2021	Comments
dunnart species	<i>Sminthopsis</i> sp.	-	C		x	One recorded by camera trap, probably Common Dunnart <i>S. murina</i> but possibly a juvenile Red-cheeked Dunnart <i>S. virginiae</i> . Both are Common under the NC Act and not listed under the EPBC Act.
Pale Field-rat	<i>Rattus tunneyi</i>	-	C	x	x	One trapped in wet season, three trapped in dry season.
Black Flying-fox	<i>Pteropus alecto</i>	-	C		x	Several present in coastal scrub.
Eastern Horseshoe-bat	<i>Rhinolophus megaphyllus</i>	-	C	x		Identified by call.
Northern Bentwing-bat	<i>Miniopterus orianae</i>	-	C		x	Identified by call.
long-eared bat species	<i>Nyctophilus</i> sp.	-	C		x	Identified by call. <i>Nyctophilus</i> cannot be reliably identified to species based on call. All possible species are Least Concern under the NC Act and not listed under the EPBC Act.
Domestic Dog and Dingo	<i>Canis familiaris (dingo)</i>	-	-	x	x	Recorded by camera trap in wet season. Tracks seen in dry season.
Cat	<i>Felis catus</i>	-	-	x		Recorded by camera trap in wet season.
Pig	<i>Sus scrofa</i>	-	-		x	Tracks and diggings seen near beach.
Australian Brush-turkey	<i>Alectura lathami</i>	-	C	x	x	Common.
Bar-shouldered Dove	<i>Geopelia humeralis</i>	-	C	x	x	Very common.
Pied Imperial-Pigeon	<i>Ducula bicolor</i>	-	C	x		One seen on Connies Beach.
Rose-crowned Fruit-Dove	<i>Ptilinopus regina</i>	-	C	x	x	Uncommon, though possibly under-recorded.
Papuan Frogmouth	<i>Podargus papuensis</i>	-	C		x	Several seen during spotlighting.
Large-tailed Nightjar	<i>Caprimulgus macrurus</i>	-	C	x	x	Heard in the wet season. Several seen during spotlighting in dry season.
Pheasant Coucal	<i>Centropus phasianinus</i>	-	C	x	x	Uncommon.
Brush Cuckoo	<i>Cacomantis variolosus</i>	-	C		x	One heard in coastal scrub.
Wilson's Storm-Petrel	<i>Oceanites oceanicus</i>	Ma, M	SL		x	Pair seen over inshore waters off Connies Beach.
petrel species	<i>Pterodroma</i> sp.				x	A single <i>Pterodroma</i> was seen in onshore waters but was not identified to species, though the Critically Endangered Herald Petrel <i>P. heraldica</i> is considered most likely.
Black-necked Stork	<i>Epphipiorhynchus asiaticus</i>	-	C			One observed during flora survey on Connies Beach.
Eastern Reef Egret	<i>Egretta sacra</i>	Ma	SL	x	x	Several present along Connies Beach and adjacent rocky areas.
Lesser Frigatebird	<i>Fregata ariel</i>	Ma, M	SL		x	Singletons seen occasionally over inshore waters.
Brown Booby	<i>Sula leucogaster</i>	Ma, M	SL		x	Common over inshore waters, mostly associated with trawlers.
Beach Stone-curlew	<i>Esacus magnirostris</i>	-	V	x	x	Pair present on Connies Beach.
Sooty Oystercatcher	<i>Haematopus fuliginosus</i>	-	C	x		Pair seen on rocks at western end of Connies Beach.

Lesser Sand Plover	<i>Charadrius mongolus</i>	E, M	E	x		Seventeen birds roosting at high tide at western end of Connies Beach.
Greater Sand Plover	<i>Charadrius leschenaultii</i>	V, M	V	x		Two birds roosting at high tide at western end of Connies Beach.
Masked Lapwing	<i>Vanellus miles</i>	-	C		x	Pair present on Connies Beach.
Whimbrel	<i>Numenius phaeopus</i>	M	SL		x	Singletons seen on Connies Beach, probably the same individual on each occasion.
Silver Gull	<i>Chroicocephalus novaehollandiae</i>	-	C	x	x	Present in small numbers.
Bridled Tern	<i>Onychoprion anaethetus</i>	Ma, M	SL		x	One seen over inshore waters off Connies Beach.
Little Tern	<i>Sternula albifrons</i>	M	SL		x	Singletons seen along Connies Beach, possibly just one individual present.
Caspian Tern	<i>Hydroprogne caspia</i>	M	SL		x	Singletons seen along Connies Beach, possibly just one individual present.
Lesser Crested Tern	<i>Thalasseus bengalensis</i>	Ma	C	x		Two seen on rocks west of Connies Beach.
Greater Crested Tern	<i>Thalasseus bergii</i>	M	SL	x	x	Common along Connies Beach.
Brown Goshawk	<i>Accipiter fasciatus</i>	-	C		x	One seen.
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	-	C	x	x	Two birds present along Connies Beach and adjacent rocky areas.
Rainbow Bee-eater	<i>Merops ornatus</i>	-	C	x	x	Very common.
Sacred Kingfisher	<i>Todiramphus sanctus</i>	-	C	x	x	Common along Connies Beach.
Nankeen Kestrel	<i>Falco cenchroides</i>	-	C		x	One seen.
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>	-	C	x	x	Small flocks recorded once in each survey.
Lovely Fairy-wren	<i>Malurus amabilis</i>	-	C	x	x	Four birds seen in wet season, camera trap record in dry season. Apparently uncommon.
White-streaked Honeyeater	<i>Trichdere cockerelli</i>	-	C	x	x	Reasonably common in areas of heath.
Helmeted Friarbird	<i>Philemon buceroides</i>	-	C		x	Only recorded in coastal scrub.
Silver-crowned Friarbird	<i>Philemon argenticeps</i>	-	C	x	x	Uncommon in coastal scrub and heath.
Dusky Honeyeater	<i>Myzomela obscura</i>	-	C	x		Common in the wet season. Apparently absent in the dry season.
Yellow-spotted Honeyeater	<i>Meliphaga notata</i>	-	C	x	x	Common throughout.
Varied Honeyeater	<i>Gavicalis versicolor</i>	-	C		x	Pair seen once on Connies Beach.
Fairy Gerygone	<i>Gerygone palpebrosa</i>	-	C	x		Small flock seen once in coastal scrub.
Olive-backed Oriole	<i>Oriolus sagittatus</i>	-	C		x	Singletons seen occasionally.
Little Shrike-thrush	<i>Colluricincla megarhyncha</i>	-	C	x	x	Seen and/or heard occasionally, mostly where trees were present.
White-bellied Cuckoo-shrike	<i>Coracina papuensis</i>	-	C		x	Seen occasionally in coastal scrub.
Varied Triller	<i>Lalage leucomela</i>	-	C	x	x	Common throughout.
Pied Butcherbird	<i>Cracticus nigrogularis</i>	-	C	x		Heard once.
White-breasted Woodswallow	<i>Artamus leucorhynchus</i>	-	C	x	x	Common.

Rufous Fantail	<i>Rhipidura rufifrons</i>	M	SL		x	One seen in coastal scrub.
Spangled Drongo	<i>Dicrurus bracteatus</i>	-	C	x	x	Common.
Welcome Swallow	<i>Hirundo neoxena</i>	-	C	x		Uncommon.
Mistletoebird	<i>Dicaeum hirundinaceum</i>	-	C	x	x	Common.
Olive-backed Sunbird	<i>Nectarinia jugularis</i>	-	C	x	x	Common.
Estuarine Crocodile	<i>Crocodylus porosus</i>	Ma, M	V		x	One seen in inshore waters and tracks of a larger individual seen on shoreline.
Zigzag Velvet Gecko	<i>Amalosia rhombifer</i>	-	C	x		One caught by hand.
House Gecko	<i>Hemidactylus frenatus</i>	-	-	x	x	Heard occasionally in coastal scrub and around infrastructure.
Mourning Gecko	<i>Lepidodactylus lugubris</i>	-	C	x		One caught by hand.
Chevert Gecko	<i>Nactus cheverti</i>	-	C		x	One trapped.
Burton's Snake-lizard	<i>Lialis burtonis</i>	-	C		x	Caught caught by hand in coastal scrub.
Sandy Rainbow-skink	<i>Carlia dogare</i>	-	C	x		Several caught or seen in coastal scrub.
Closed-litter Rainbow-skink	<i>Carlia longipes</i>	-	C	x	x	Common.
Brown Bicarinate Rainbow-skink	<i>Carlia storri</i>	-	C		x	Common, possibly over-looked in wet season.
Lively Rainbow Skink	<i>Carlia vivax</i>	-	C		x	One caught by hand.
Coastal Snake-eyed Skink	<i>Cryptoblepharus litoralis</i>	-	C		x	Two seen on rocks east of Connies Beach.
Cape Heath Ctenotus	<i>Ctenotus rawlinsoni</i>	-	V	x	x	Common in heath.
Straight-browed Ctenotus	<i>Ctenotus spaldingi</i>	-	C	x	x	Uncommon.
Black-throated Two-pored Dragon	<i>Diporiphora jugularis</i>	-	C		x	Two caught, but many dragons were seen but not caught and this species is probably very common.
Nobbi Dragon	<i>Diporiphora nobbi</i>	-	C	x		One seen, probably over-looked.
Yellow-spotted Monitor	<i>Varanus panoptes</i>	-	C	x		One seen. No track was observed in the dry season and the local population is probably affected by the presence of Cane Toads.
Black-headed Python	<i>Aspidites melanocephalus</i>	-	C		x	One seen during spotlighting in heath.
Northern Tree Snake	<i>Dendrelaphis calligastra</i>	-	C		x	One found dead in heath.
Orange-naped Snake	<i>Furina ornata</i>	-	C		x	One seen during spotlighting in heath.
Taipan	<i>Oxyuranus scutellatus</i>	-	C		x	One seen.
Cane Toad	<i>Rhinella marina</i>	-	-	x	x	Common.
Northern Banjo Frog	<i>Limnodynastes terraereginae</i>	-	C		x	Common.
Ornate Burrowing Frog	<i>Platyplectrum ornatum</i>	-	C		x	Two caught in pitfall traps.

Status abbreviations: C = Common (Least Concern), V = Vulnerable, Ma = Marine, M = Migratory, SL = Special Least Concern

APPENDIX G RESULTS FOR LANDSCAPE FRAGMENTATION AND CONNECTIVITY

Department of Environment and Heritage Protection (DEHP)
Landscape Fragmentation and Connectivity (LFC) Tool version 1.4 LOGFILE
Process started at 14-12-2021 10:22:59 AM
Python version: 2.7.14 (v2.7.14:84471935ed, Sep 16 2017, 20:19:30) [MSC v.1500 32
bit (Intel)]
Arcpy version: 10.6.1
Username: YanSuen

INPUT PARAMETERS

Output Workspace: G:\RuthWork\Epic Environmental\Projects\BE2021\BE210151.01 CFS
Cape Flattery Silica Sand Project\Output\BE210151.02 Technical Studies\Landscape
Connectivity Tool
Threshold lookup table: G:\RuthWork\Data\LCT -
CF\LFC_data.gdb\tbl_Regional_frag_local_threshold
Remnant cover layer: G:\RuthWork\Data\Vegetation Management\Regulated Vegetation
Management Map v5.03 (GDA2020)\Regulated_vegetation_management_map.shp
Remnant cover layer edited: True
Regional buffer extent: 20 kilometres
Local buffer extent: 5 kilometres
Impact layer: MLA100284_GDA20_MGA Zone 55
layer projection: GDA2020_MGA_Zone_55
Raster cell resolution for analysis: 10 metres
Edge Width: 50 metres
(The distance from non-remnant landscapes through to the core ecosystem - the edge
of remnant ecosystems)
Default projection: G:\RuthWork\Data\LCT - CF\scripts\QLD Albers Equal Area
Conic.prj

10:22:59 Checking out the spatial analyst tool - required for LFC

10:22:59 _____BEGINNING LANDSCAPE FRAGMENTATION AND CONNECTIVITY
ANALYSIS_____

10:22:59 This tool will categorise the landscape into:
{0: 'non-rem', 1: 'patch', 2: 'edge', 3: 'perforated', 4: 'core (< 100 hectares)',
5: 'core (100-500 hectares)', 6: 'core (> 500 hectares)', 7: 'water'}

10:23:09 G:\RuthWork\Epic Environmental\Projects\BE2021\BE210151.01 CFS
Cape Flattery Silica Sand Project\Output\BE210151.02 Technical Studies\Landscape
Connectivity Tool\lyr_file does not exist, creating it now.

10:23:10 Copying across impact site feature(s) and calculating area in
hectares (AreaHA)

10:23:13 Making a local copy of the impact site

10:23:16 Preparing remnant cover layer for analysis

10:23:18 Created regional scale buffer of 20 kilometres

10:23:21 Created local scale buffer of 5 kilometres

10:23:27 Clipped the remnant cover to the regional buffer extent

10:23:29 Unioned the pre impact remnant layer with the impact site

10:23:32 Attributed the impact area as not RVM Cat B

10:23:32 Area of RVM Cat B clearing is 613.67 hectares
10:23:32 SQL selection used is "RVM_CAT" = 'B' and "Cover" = 'Not RVM Cat B' on shapefile

G:\RuthWork\Epic Environmental\Projects\BE2021\BE210151.01 CFS Cape Flattery Silica Sand Project\Output\BE210151.02 Technical Studies\Landscape Connectivity Tool\main_output\clip_remcover_post.shp

10:23:34 Categorised the cover attributes in clip_remcover_pre.shp ready for raster conversion

10:24:14 Converted clip_remcover_pre.shp to raster

10:24:16 Categorised the cover attributes in clip_remcover_post.shp ready for raster conversion

10:24:54 Converted clip_remcover_post.shp to raster

10:24:54 Run Landscape fragmentation analysis on the pre impact regional landscape

REGULATED VEGETATION TYPES BEING EXTRACTED FROM LAND COVER
IDENTIFICATION OF CORE, PATCH, EDGE AND PERFORATIONS
COMBINING FRAGMENTATION CLASSES
CLASSIFYING CORE FOREST PATCHES BY AREA
COMPOSING FINAL FRAGMENTATION MAP
COMPOSING FINAL FRAGMENTATION MAP
(FRAGMENTATION CALCULATION TIME WAS 15.1 MINUTES)

10:40:12 Run Landscape fragmentation analysis on the post impact regional landscape

REGULATED VEGETATION TYPES BEING EXTRACTED FROM LAND COVER
IDENTIFICATION OF CORE, PATCH, EDGE AND PERFORATIONS
COMBINING FRAGMENTATION CLASSES
CLASSIFYING CORE FOREST PATCHES BY AREA
COMPOSING FINAL FRAGMENTATION MAP
COMPOSING FINAL FRAGMENTATION MAP
(FRAGMENTATION CALCULATION TIME WAS 14.3 MINUTES)

Extracting a local subset of lfc_regional_pre_impact
Extracting a local subset of lfc_regional_post_impact

Collating pre and post impact statistics and trigger assessment

10:57:22 Summarising area statistics for: lfc_localmsk_pre_impact

10:57:25 Summarising area statistics for: lfc_localmsk_post_impact

10:57:26 Summarising area statistics for: lfc_regional_pre_impact

10:57:35 Summarising patch count for lfc_localmsk_pre_impact

10:58:27 Summarising patch count for lfc_localmsk_post_impact

Analysing impact on Connectivity Areas

SIGNIFICANCE TEST ONE

The regional total area is 42152.04
The regional extent of core remnant is 40605.24
The regional extent of core remnant is 96.33 percent
This level of regional fragmentation sets a local impact threshold of: 50.0 percent

The table below lists the local impact thresholds for categories of regional core remnant extent:

REGIONAL CORE CATEGORY	LOCAL IMPACT THRESHOLD
< 10	2.0
10 - 30	5.0
30 - 50	10.0
50 - 70	20.0
70 - 90	30.0
>90	50.0

Area of core at the local scale (pre impact): 3537.38
Area of core at the local scale (post impact): 2871.55
Percent change of core at the local scale (post impact): 18.82 percent

SIGNIFICANCE TEST TWO

The number of core remnant areas occurring on the site: 1
The number of core remnant areas remaining on the site post impact: 1
(Only core polygons greater than or equal to 1 hectare are included)

RESULT

11:01:35 This analysis has determined any impact on connectivity areas is NOT significant
(A significant reduction in core remnant at the local scale is False OR a change from core to non-core remnant at the site scale is False)

The significance table has been written to:

..\main_output\lfc_significance_assessment.csv

The local scale summary table has been written to:

..\main_output\lfc_local_scale_summary.csv

The site scale summary table has been written to:

..\main_output\lfc_site_scale_summary.csv

GIS layer files copied into folder \lyr_file within the project folder.

View layers in ArcMAP using.. \G:\RuthWork\Epic

Environmental\Projects\BE2021\BE210151.01 CFS Cape Flattery Silica Sand

Project\Output\BE210151.02 Technical Studies\Landscape Connectivity

Tool\lyr_file\lyr_file\Connectivity Area Impact Assessment.lyr

Please scrutinise the output tables and spatial layers to confirm the desktop modelling of connectivity area impact

This analysis used an edited version of the Regulated Vegetation layer.

11:35:37 _____COMPLETED LANDSCAPE FRAGMENTATION AND CONNECTIVITY
ANALYSIS_____

APPENDIX H IMPACT ASSESSMENT OF MNES SPECIES POSSIBLY OCCURRING

Seven threatened flora and fauna species listed under the EPBC Act (and NC Act) could possibly occur in the Study area, comprised of the following species:

- Eastern Curlew (*Numenius madagascariensis*) Critically Endangered and Migratory (EPBC Act)
- Great Knot (*Calidris tenuirostris*) Critically Endangered and Migratory
- Curlew Sandpiper (*C. ferruginea*) Critically Endangered and Migratory
- *Dendrobium johannis* Vulnerable
- *Dendrobium bigibbum* Vulnerable
- Ghost Bat (*Macroderma gigas*) Vulnerable
- Western Alaskan Bar-tailed Godwit (*Limosa lapponica baueri*) Vulnerable and Migratory.

Twenty-seven bird species listed as Migratory under the EPBC Act could possibly occur in the Study area, comprised of the following species:

- Oriental Cuckoo (*Cuculus optatus*)
- Grey Plover (*Pluvialis squatarola*)
- Pacific Golden Plover (*Pluvialis fulva*)
- Oriental Plover (*Charadrius veredus*)
- Little Curlew (*Numenius minutus*)
- Ruddy Turnstone (*Arenaria interpres*)
- Sharp-tailed Sandpiper (*Calidris acuminata*)
- Red-necked Stint (*Calidris ruficollis*)
- Sanderling (*Calidris alba*)
- Pectoral Sandpiper (*Calidris melanotos*)
- Latham's Snipe (*Gallinago hardwickii*)
- Terek Sandpiper (*Xenus cinereus*)
- Common Sandpiper (*Actitis hypoleucos*)
- Grey-tailed Tattler (*Tringa brevipes*)
- Wandering Tattler (*Tringa incana*)
- Common Greenshank (*Tringa nebularia*)
- Wood Sandpiper (*Tringa glareola*)
- Common Noddy (*Anous stolidus*)
- Gull-billed Tern (*Gelochelidon nilotica*)
- Roseate Tern (*Sterna dougallii*)
- Black-naped Tern (*Sterna sumatrana*)
- Common Tern (*Sterna hirundo*)
- Eastern Osprey (*Pandion cristatus*)
- Satin Flycatcher (*Myiagra cyanoleuca*)
- Spectacled Monarch (*Symposiarchus trivirgatus*)
- Black-winged Monarch (*Monarcha frater*)
- Black-faced Monarch (*Monarcha melanopsis*)

Species listed as Critically Endangered and Endangered under the EPBC Act

The endangered species assessment must evaluate the significance of impacts on a population, as defined within the significant impact criteria for critically endangered and endangered species. DE (2013) describes a 'population of a species' as an occurrence of the species in a particular area. This includes, but is not limited to:

- A geographically distinct regional population, or collection of local populations, or
- A population, or collection of local populations, that occurs within a particular bioregion.

The impact criteria include critical habitat. DE (2013) describes 'habitat critical to the survival of a species or ecological community' as areas that are necessary:

- For activities such as foraging, breeding, roosting, or dispersal

- For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- To maintain genetic diversity and long term evolutionary development, or
- For the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the minister under the EPBC Act (DE 2013).

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of a population
- reduce the area of occupancy of the species
- fragment an existing population into two or more populations
- adversely affect habitat critical to the survival of a species
- disrupt the breeding cycle of a population
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat
- introduce disease that may cause the species to decline, or
- interfere with the recovery of the species.

Eastern Curlew, Great Knot and Curlew Sandpiper

These species are mostly confined to coastal habitats, such as intertidal mudflats and ocean beaches, though Curlew Sandpiper may also occur in freshwater habitats, such as swamps (Higgins & Davies 1996). They are all migratory species that do not breed in Australia. Their populations are distributed sparsely around much of coastal Australia. There is no possibly suitable coastal habitat for these species in the area of proposed disturbance. Possible coastal habitat, such as Connies Beach, will be buffered from Project activities. The nearest mining disturbance to Connies Beach will be approximately 170 m away (in year 14). Mining infrastructure (such as the port area and MIA) will be located over 300 m from the beach. Based on field surveys, Connies Beach appears to provide very limited resources for these species. The suitability of the freshwater wetlands in the south of the Study area for Curlew Sandpiper is uncertain. Nevertheless, the wetlands are outside the area of proposed disturbance. Weed and pest control measures will be incorporated into the Project Weed Management Strategy to control the introduction and spread of weed, pest animal species and diseases across the Project site. The proposed activities are not expected to result in a significant impact for any of these three species, should they occur, for any of the nine criteria listed above.

Species listed as Vulnerable under the EPBC Act

The vulnerable species assessment must include an evaluation of the likely importance of the population, as defined within the significant impact criteria for Vulnerable species. DE (2013) describes an 'important population' as a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- Key source populations either for breeding or dispersal
- Populations that are necessary for maintaining genetic diversity and/or
- Populations that are near the limit of the species range.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of an important population of a species
- reduce the area of occupancy of an important population
- fragment an existing important population into two or more populations
- adversely affect habitat critical to the survival of a species
- disrupt the breeding cycle of an important population

- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
- introduce disease that may cause the species to decline, or
- interfere substantially with the recovery of the species.

Dendrobium johannis* and *Dendrobium bigibbum

The nearest records for these species are 14 km west and 40 km north-west of the Study area, respectively. *Dendrobium johannis* grows in a variety of open humid habitats including woodlands on slopes, monsoon forest, vine thickets on dunes and *Melaleuca* woodlands (DEWHA 2008b). *Dendrobium bigibbum* occurs on small trees in vine forests and semi-evergreen vine thickets, particularly behind beaches and on rocky hillsides. It also grows on rocks (Barker 1997). There is no preferred habitat for *D. bigibbum* within the disturbance footprint. Although not defined, habitat critical to the survival of *D. bigibbum* is considered unlikely to be present. The rainforest community (RE 3.2.12a) occurring within the Project area has been avoided and a 50 m buffer applied regarding the mine layout.

The dense heath dominating the Project is not preferred habitat for *D. johannis*. There is 62 ha of potentially suitable habitat for *D. johannis* in the area of disturbance. Should either or both these species be present it is unlikely that they are part of an important population based on the definition above. Although not defined in any literature, habitat critical to the survival of either species is considered unlikely to be present.

Weed control measures will be incorporated into the Project CEMP and OEMP to control the introduction and spread of weed species across the Study area. Pre-clearance surveys will be carried out by personnel trained in the identification of the species prior to clearing activities. Inspection of felled trees will be carried out following clearing to search for epiphytic orchid species. Where threatened orchid species are found these will be subject to a translocation program which will be detailed in the Project CEMP and OEMP.

Given the lack of any records within or near the Study area, the general lack of preferred habitat and the provision and implementation of relocation activities (should either species be found) it is not expected that a significant impact will possibly result for either species due to the Project.

Ghost Bat

The distribution of Ghost Bat is influenced by availability of suitable roost sites. Ghost Bats will roost in shallow caves and under boulders (Churchill 2008) but prefer deep caves, abandoned mines and deep rock fissures (Armstrong & Anstee 2000; Richards et al. 2008a). The closest known record is from approximately 56 km south-west of the Study area. It is an un-dated Queensland Museum specimen (OZCAM 2022). There is no apparent suitable roost site for the species within the proposed disturbance area, which included only 0.057 ha of potential rocky habitat (RE 3.12.39a). It is possible a suitable roost site is present in adjacent habitat.

Ghost Bat is a carnivore that preys on a wide variety of animals including reptiles, frogs, small mammals (including bats) birds and large insects. Preferred food items vary between sites and local availability. The species forages in two ways: perching in vegetation and ambushing passing prey; and gleaning surfaces (such as the ground) in flight (TSSC 2016). The dense heath which dominates the Project area would appear unsuitable for these foraging strategies given the low dense canopy and lack of emergent trees. The majority of the area to be disturbed is dense heath and does not appear to provide suitable foraging habitat for vertebrate prey.

Weed and pest control measures will be incorporated into the Project Weed Management Strategy to control the introduction and spread of weed, pest animal species and diseases across the Project site. The proposed activities are not expected to result in a significant impact for Ghost Bat, for any of the nine criteria listed above.

Western Alaskan Bar-tailed Godwit

Western Alaskan Bar-tailed Godwit occurs in coastal habitats, including mudflats, estuaries, inlets, mangrove-lined lagoons and sheltered bays (Garnett et al. 2011). There is no suitable habitat for this species in the area

of proposed disturbance. Possible coastal habitat, such as Connies Beach, will be buffered from Project activities. The nearest mining disturbance to Connies Beach will be approximately 170 m away (in year 14). Mining infrastructure (such as the port area and MIA) will be located over 300 m from the beach. Based on field surveys, Connies Beach appears to provide very limited resources for this species. Weed and pest control measures will be incorporated into the Project Weed Management Strategy to control the introduction and spread of weed, pest animal species and diseases across the Project site. The proposed activities are not expected to result in a significant impact for Western Alaskan Bar-tailed Godwit, for any of the nine criteria listed above.

Species listed as Migratory under the EPBC Act

Two of the three significant impact criteria for Migratory species (DE 2013) refer to ‘important habitat’. An area of ‘important habitat’ for a migratory species is:

- habitat utilised occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
- habitat that is of critical importance to the species at particular life-cycle stages, and/or
- habitat utilised which is at the limit of the species range, and/or
- habitat within an area where the species is declining.

The third criterion refers to an ‘ecologically significant proportion of the population’. This varies with species but included consideration of population status, genetic distinctiveness and behaviours such as site fidelity and dispersal rates.

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 a 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, or

seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

Oriental Cuckoo

Oriental Cuckoo occurs in rainforest, vine thicket and open forest and woodland. The species is sometimes found in mangroves and is often recorded in gardens and plantations (Blakers et al. 1984; Higgins 1999). The closest available WildNet record is from Rocky Islet in 1995, approximately 19 km from the Study area (QG 2022). Oriental Cuckoo could occur in the Study area, including in the disturbance area. However, based on the definitions above, the heath dominated habitat within the Study area is not considered an area of ‘important habitat’. Weed and pest control measures will be incorporated into the Project Weed Management Strategy to control the introduction and spread of weed and pest animal species across the Project site. Oriental Cuckoo does not breed in Australia. The Project is not expected to seriously disrupt its lifecycle and it is not expected that there will be a significant impact to the species for the three impact criteria listed above should it occur.

Grey Plover, Pacific Golden Plover, Oriental Plover, Little Curlew, Ruddy Turnstone, Sharp-tailed Sandpiper, Red-necked Stint, Sanderling, Pectoral Sandpiper, Terek Sandpiper, Common Sandpiper, Grey-tailed Tattler, Wandering Tattler, Common Greenshank, Wood Sandpiper, Common Noddy, Gull-billed Tern, Roseate Tern, Black-naped Tern, Common Tern

These 20 species all occur in coastal areas. Some, such as Sharp-tailed Sandpiper, Pectoral Sandpiper, Wood Sandpiper and Gull-billed Tern may also occur around freshwater habitats. Oriental Plover and Little Curlew are more typically found away from coastal habitats, on grasslands and around the fringes of shallow freshwater waterbodies (Marchant & Higgins 1993; Higgins & Davies 1996), but in the Study area would be confined to coastal areas. The freshwater wetlands are not in the disturbance area. Possible coastal habitat, such as Connies Beach, will be buffered from Project activities. The nearest mining disturbance to Connies Beach will be approximately 170 m away (in year 14). Mining infrastructure (such as the port area and MIA)

will be located over 300 m from the beach. Based on field surveys, Connies Beach appears to provide very limited resources for these species. Some of the species, such as Grey Plover, Pacific Golden Plover, Common Tern may rest of the rocky areas to the west and east of Connies Beach and Wandering Tattler and Ruddy Turnstone may forage in the rocky areas. There will be some short-term disturbance to a small area of rocky coastal habitat during the construction of the proposed jetty. The presence of a jetty is not expected to affect the use of the area once the jetty is constructed. The effects of activities on and around the jetty are not expected to be significant to these species.

Based on the definitions above, the Study area is not an area of 'important habitat' for any of these species. Weed and pest control measures will be incorporated into the Project Weed Management Strategy to control the introduction and spread of weed and pest animal species across the Project site. None of the plover and sandpiper species breeds in Australia. None of the tern species will breed on Connies Beach or on the coastal rocky areas. The Project is not expected to seriously disrupt their lifecycles and it is not expected that there will be a significant impact to any of the species for the three impact criteria listed above.

Latham's Snipe

Latham's Snipe occurs in a wide variety of permanent and ephemeral wetlands, preferring open freshwater wetlands with fringing vegetation. The species is also recorded from swamps, marshes behind coastal sand dunes and some artificial waterbodies (Higgins & Davies 1996). The closest available WildNet record is from pre-1976 and, although the coordinates place it 21 km from the Study area, it has a 54 km spatial error. The next closest record is from 1985, near Cooktown, approximately 54 km from the Study area (QG 2022).

The freshwater wetlands are the only suitable habitat in the Study area and are not in the disturbance area. Based on the definitions above, the Study area is not an area of 'important habitat' for any of this species. Weed and pest control measures will be incorporated into the Project Weed Management Strategy to control the introduction and spread of weed and pest animal species across the Project site. Latham's Snipe does not breed in Australia. The Project is not expected to seriously disrupt its lifecycle and it is not expected that there will be a significant impact to the species for the three impact criteria listed above, should it occur.

Eastern Osprey


Eastern Osprey may be found around almost the entire coastline and offshore islands. It mostly breeds on the coast and islands. It is tolerant of human activity and its nests are often placed in urban areas, nesting readily on artificial structures (Marchant & Higgins 1993). It is possible the species would forage from the freshwater wetland, though it is likely that this habitat doesn't hold prey species of sufficient size. The wetland is not within the disturbance area. Possible coastal habitat, such as Connies Beach, will be buffered from Project activities. There will be some short-term disturbance to a rocky coastal area during the construction of the proposed jetty. The presence of a jetty is not expected to affect the use of the area once the jetty is constructed. The effects of activities on and around the jetty are not expected to be significant to this species.


Based on the definitions above, the Study area is not an area of 'important habitat' for any of this species. Weed and pest control measures will be incorporated into the Project Weed Management Strategy to control the introduction and spread of weed and pest animal species across the Project site. The Project is not expected to seriously disrupt its lifecycle and it is not expected that there will be a significant impact to the species for the three impact criteria listed above, should it occur.

Satin Flycatcher, Spectacled Monarch, Black-winged Monarch, Black-faced Monarch


These species variously occur in rainforest, wet sclerophyll forest, coastal scrub, open forest and mangroves (Higgins et al. 2006; Menkhorst et al. 2017). The four species are known from WildNet records and all could occur on passage and some could breed in the area. None would be expected to occur in more than low numbers. The Study area contains 256 ha of potentially suitable habitat for these species. The disturbance area contains 52 ha of potentially suitable habitat. Based on the definitions above, the Study area is not an area of 'important habitat'. Weed and pest control measures will be incorporated into the Project Weed Management Strategy to control the introduction and spread of weed and pest animal species across the Project site. The Project is not expected to seriously disrupt the lifecycle of any of the four species and it is not expected that there will be a significant impact to the species for the three impact criteria listed above should any or all of the species occur.

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