

GEMINI PROJECT  
AQUATIC ECOLOGY ASSESSMENT

PREPARED FOR  
MAGNETIC SOUTH PTY LTD

SEPTEMBER 2019



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AQUATIC ECOLOGY  
ASSESSMENT

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## LIST OF ABBREVIATIONS

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%	percent
>	greater than
<	less than
°C	degrees Celsius
µS	micro Siemens
µg	microgram(s)
AARC	AARC Environmental Solutions Pty Ltd
ALA	Atlas of Living Australia
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZECC Guidelines	ANZECC Guidelines for Fresh and Marine Water Quality
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AusRivAS	Australian River Assessment System
AquaBAMM	Aquatic Biodiversity Assessment and Mapping Method
Biosecurity Act	<i>Biosecurity Act 2014</i>
BoM	Bureau of Meteorology
CIM	Criteria, Indicators and Measures
cm	centimetre(s)
CHPP	Coal Handling Preparation Plant
DAF	Department of Agriculture and Fisheries
DES	Department of Environment and Science
DO	dissolved oxygen
DoEE	Department of the Environment and Energy
DNRME	Department of Natural Resources, Mining and Energy
EA	Environmental Authority
EC	electrical conductivity

EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPC	Exploration Permit Coal
EPP (Water and Wetland Biodiversity)	Environmental Protection (Water and Wetland Biodiversity) Policy 2019
ESA	Environmentally Sensitive Area(s)
Ext	Extensive
EV	environmental values
Fisheries Act	<i>Fisheries Act 1994</i>
g	gram(s)
ha	hectare(s)
kg	kilogram(s)
kV	kilovolt(s)
km	kilometre(s)
km <sup>2</sup>	square kilometre(s)
m	metre(s)
Magnetic South	Magnetic South Pty Ltd
Mtpa	Million tonnes per annum
Mod	Moderate
mg	milligram(s)
MLES	Matter of Local Environmental Significance
MIA	Mine Infrastructure Area
mm	millimetre(s)
MNES	Matter of National Environmental Significance
MSES	Matter of State Environmental Significance
ND	No Data
NATA	National Association of Testing Authorities
NC Act	<i>Nature Conservation Act 1992</i>
NCWR	<i>Nature Conservation (Wildlife) Regulation 2006</i>



NTU	Nephelometric Turbidity Unit
N	Nitrogen
O/E	Observed versus Expected Macroinvertebrate Taxa
PCI	Pulverised Coal Injection
PET	Plecoptera, Ephemeroptera and Trichoptera
PMST	Protected Matters Search Tool
PIA	Potential Impact Area
the Project	Gemini Project
RE	Regional Ecosystem(s)
ROM	Run-of-Mine
REMP	Receiving Environment Monitoring Program
SILO	Scientific Information for Land Owners
SQG	ANZECC/ARMCANZ Sediment Quality Guidelines
TLO	Train Load Out
WoNS	Weeds of National Significance
WQO	Water Quality Objective(s)
Taunton National Park	Taunton National Park (Scientific)

## 1.0 INTRODUCTION

---

AARC Environmental Solutions Pty Ltd (AARC) was commissioned by Magnetic South Pty Ltd (Magnetic South) to prepare an Aquatic Ecology Assessment for the Gemini Project (the Project), located approximately 110 kilometres (km) east of Emerald and 125 km west of Rockhampton in the Bowen Basin of Central Queensland (Figure 1). The small rural townships of Bluff and Dingo are located approximately 15 km east and 3 km west of the Project, respectively (Figure 1). The Project is a proposed metallurgical open-cut coal mine and associated infrastructure, producing Pulverised Coal Injection (PCI) coal and Coking Coal products for export for steel production.

An assessment of aquatic ecological values was conducted within Exploration Permit Coal (EPC) 881 (herein referred to as the study area). This assessment forms part of the supporting studies required for the Project's approval processes.

### 1.1 SCOPE OF STUDY

To assess the ecological values of aquatic ecosystems within the study area, the following scope of works was undertaken:

- Database searches to identify aquatic species of conservation significance known or with potential to occur in the region (Appendix A);
- Field surveys employing standard methodologies derived from the *Terrestrial Vertebrate Fauna Survey Guidelines of Queensland* (Eyre et al. 2018) and *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland Version 4.0* (Neldner et al. 2017) to identify aquatic flora and fauna species inhabiting the study area, particularly species of conservation significance<sup>1</sup>;
- Surface water quality, stream sediment sampling, macroinvertebrate sampling, fish and crustacean sampling and analyses in accordance to the *Australian River Assessment System (AusRivAS) Physical Assessment Protocol* (Parsons et al. 2002b), the *Queensland AusRivAS Sampling and Processing Manual* (DNRM 2001) and the *Monitoring and Sampling Manual: Environmental Protection (Water) Policy 2009* (DES 2018b); and
- Preparation of an assessment report describing the aquatic ecological values identified on site, potential impacts of the Project, management strategies to minimise the impacts associated with the proposed mining activities, and offset requirements.

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<sup>1</sup> 'Species of conservation significance' or 'threatened species' when referred to within this document are references to species listed as Near Threatened, Vulnerable or Endangered under the Queensland *Nature Conservation Wildlife Regulation 2006* or Vulnerable, Endangered, Critically Endangered, migratory under the *Environmental Protection and Biodiversity Conservation Act 1999*.

## 1.2 PROJECT OVERVIEW

The main activities associated with the Project include:

- Exploration activities continuing in order to support mine planning;
- Development of a Mine Infrastructure Area (MIA) including mine offices, bathhouse, crib rooms, warehouse/stores, workshop, fuel storage, refuelling facilities, explosives magazine and sewage, effluent and liquid waste storage;
- Construction and operation of a Coal Handling Preparation Plant (CHPP) and coal handling facilities adjacent to the MIA (including Run-of-Mine (ROM) coal and, product stockpiles and rejects bin/overflow [coarse and fine rejects]);
- Construction and operation of a surface conveyor from the product stockpiles to a Train Load Out (TLO) facility and rail loop connecting to the Blackwater-Gladstone Branch Rail to transport product coal to coal terminals at Gladstone for export;
- Construction of access roads from the Capricorn Highway to the MIA, and to the TLO facility;
- Installation of a raw water supply pipeline to connect to the Blackwater Pipeline network;
- Construction of a 66 kilovolt (kV) transmission line and switching/substation to connect to the existing regional network;
- Other associated minor infrastructure, plant, equipment and activities;
- Development of mine areas (open cut pits) and out-of-pit waste rock emplacements;
- Drilling and blasting of competent waste material;
- Mine operations using conventional surface mining equipment (excavators, front end loaders, rear dump trucks, dozers);
- Mining up to 1.9 Million tonnes per annum (Mtpa) ROM Coal – average 1.8 Mtpa for a construction/production period of approximately 20 years;
- Progressive placement of waste rock in:
  - Emplacements, adjacent to and near the open cut voids;
  - Mine voids, behind the advancing open cut mining operations;
- Progressive rehabilitation of waste rock emplacement areas and mined voids;
- Progressive establishment of soil stockpiles, laydown area and borrow pits (for road base and civil works). Material will be sourced from local quarries where required;
- Disposal of CHPP rejects (coarse and fine rejects) in out of pit spoil dumps, and in-pit behind the mining void;
- Progressive development of internal roads and haul roads including a causeway over Charlevue Creek to enable coal haulage and pit access; and

- Development of water storage dams and sediment dams, and the installation of pumps, pipelines, and other water management equipment and structures including temporary levees, and drains.

Existing local and regional infrastructure, facilities and services would be used to support Project activities. These include the SunWater water distribution network, the Aurizon rail network, Ergon's electricity network, the Capricorn Highway, and Gladstone export coal terminals.

### 1.3 CURRENT LAND USE

The land within the study area is currently used for low intensity cattle grazing and resource exploration activities. The Capricorn Highway and a number of publicly gazetted roads including Charlevue, Cooinda, Red Hill, Normanby, and Ellesmere roads dissect the study area.

Located directly north of the study area is the Taunton National Park (Scientific), (Taunton Nation Park), a scientific reserve under the *Land Act 1994 (Queensland)*, with the aim of protecting a population of Bridled nail-tail wallabies. A small section of the Taunton National Park of around 2.5 hectares (ha) occurs within the study area.

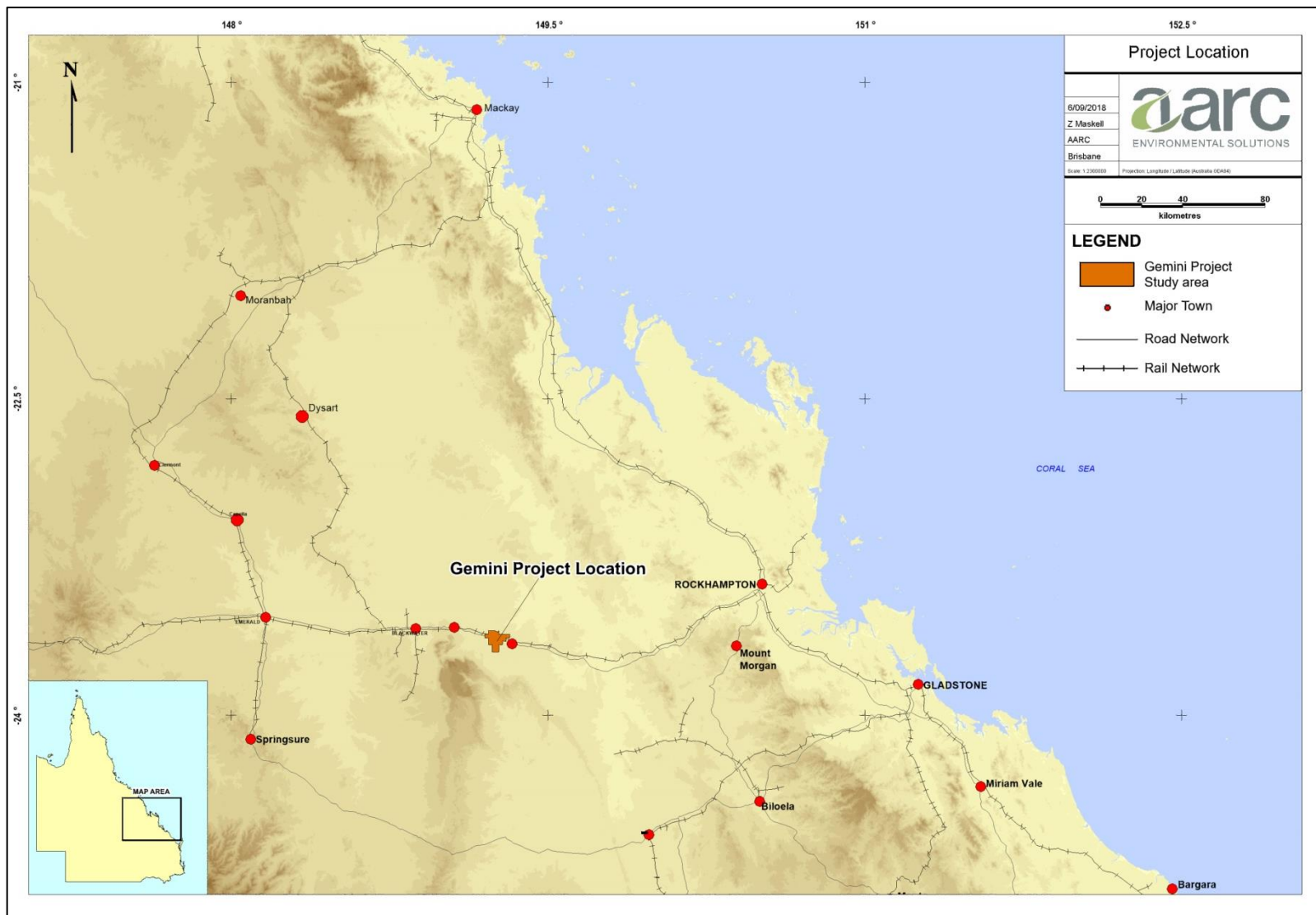
### 1.4 LOCAL WATERWAYS AND TOPOGRAPHY

The study area lies within the Fitzroy River Basin, which encompasses an area of 142,545 square kilometres (km<sup>2</sup>) and contains the Comet, Connors, Dawson, Don, Nogoia and Mackenzie Rivers, which make up its six sub-catchment areas (BoM 2018; DES 2018a). The study area lies within the Mackenzie River sub-catchment, which covers a total area of 12,985 km<sup>2</sup>, and is situated in the centre of the Fitzroy River catchment.

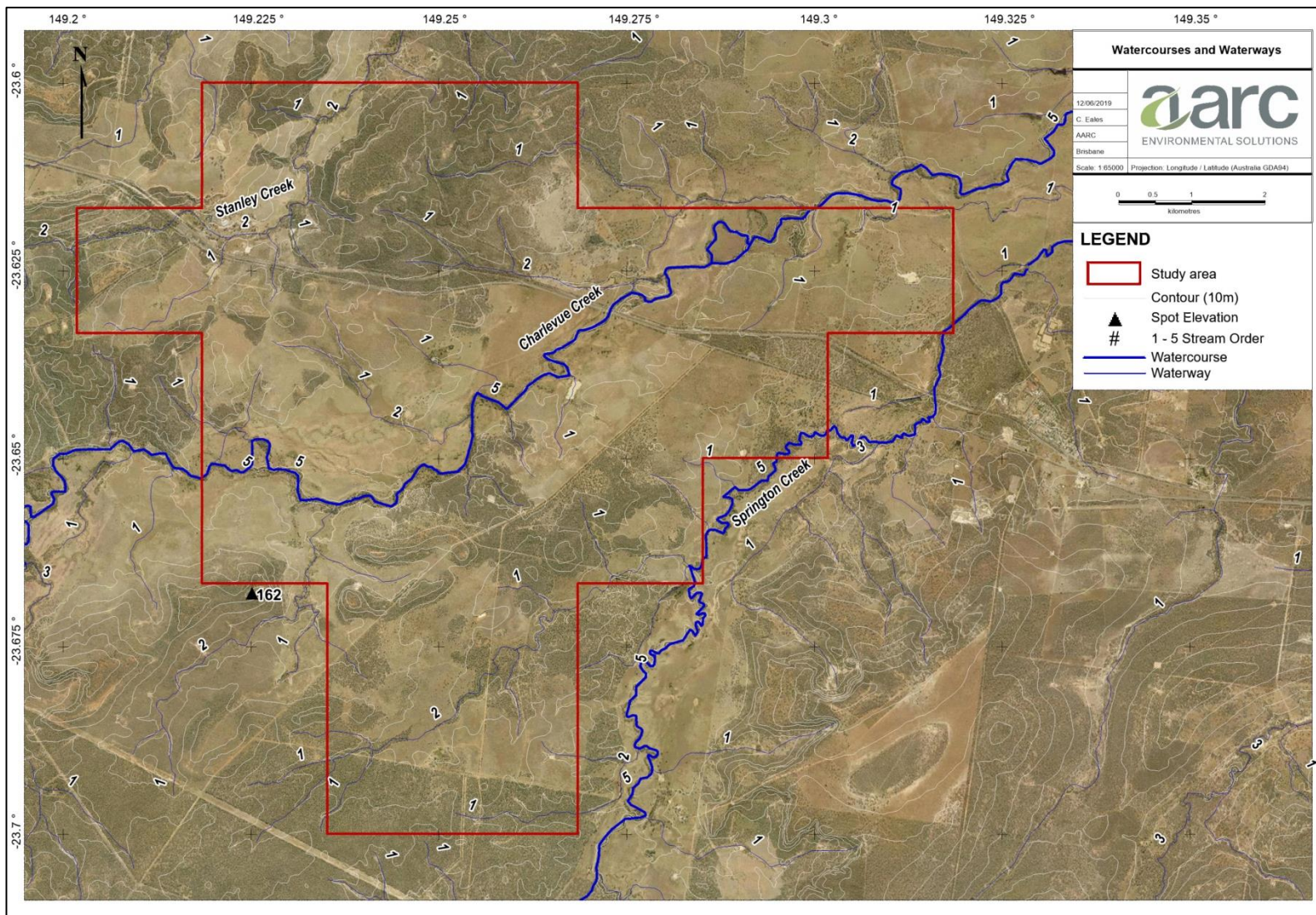
Charlevue Creek traverses the study area in a north-easterly direction. This watercourse begins within the boundaries of Blackdown Tablelands National Park, flowing north-east before joining with Springton Creek and the Fitzroy River, and eventually into the Pacific Ocean approximately 46 km north of Gladstone. Stanley Creek and Springton Creek cross the study area in the north-west and south-east, respectively. These two creeks also eventually converge with the Mackenzie River. First and second order streams associated with Charlevue Creek and Springton Creek also occur in the study area. Figure 2 shows the extent and location of the waterways within the study area.

Springton Creek and Charlevue Creek are defined watercourses under the *Water Act 2000 (Queensland)*. Springton Creek and Charlevue Creek within the study area are 5<sup>th</sup> order streams. Stanley Creek is a 2<sup>nd</sup> order stream.

Topography of the land varies from flat to undulating, with elevation within the study area ranging between 120 metres (m) and 150 m. The landscape is influenced by Charlevue Creek, which has a lower elevation than the surrounding landscape. The topography of the study area is representative of the surrounding region.



**Figure 1 Project and Study Area Location**



**Figure 2 Waterways and topography associated with the study area**

## 1.5 GEOLOGY

The geology of the region is dominated by its position within the Bowen Basin, one of Queensland's largest depositional regions, which formed through a period of rifting and subsidence lasting from the Early Permian - Mid-Triassic. The area is dominated by clastic sedimentary rocks of marine and lacustrine origin, including sandstones, conglomerates, mudstones, siltstones and coal (Geoscience Australia 2018).

The coastal and inland depositional environments which created these deposits allowed for the formation of extensive coal seams throughout the Bowen Basin, with the anoxic deposition of organic matter subsequently compacted and de-volatilised through compression and increased temperatures (Brooks & Smith 1969).

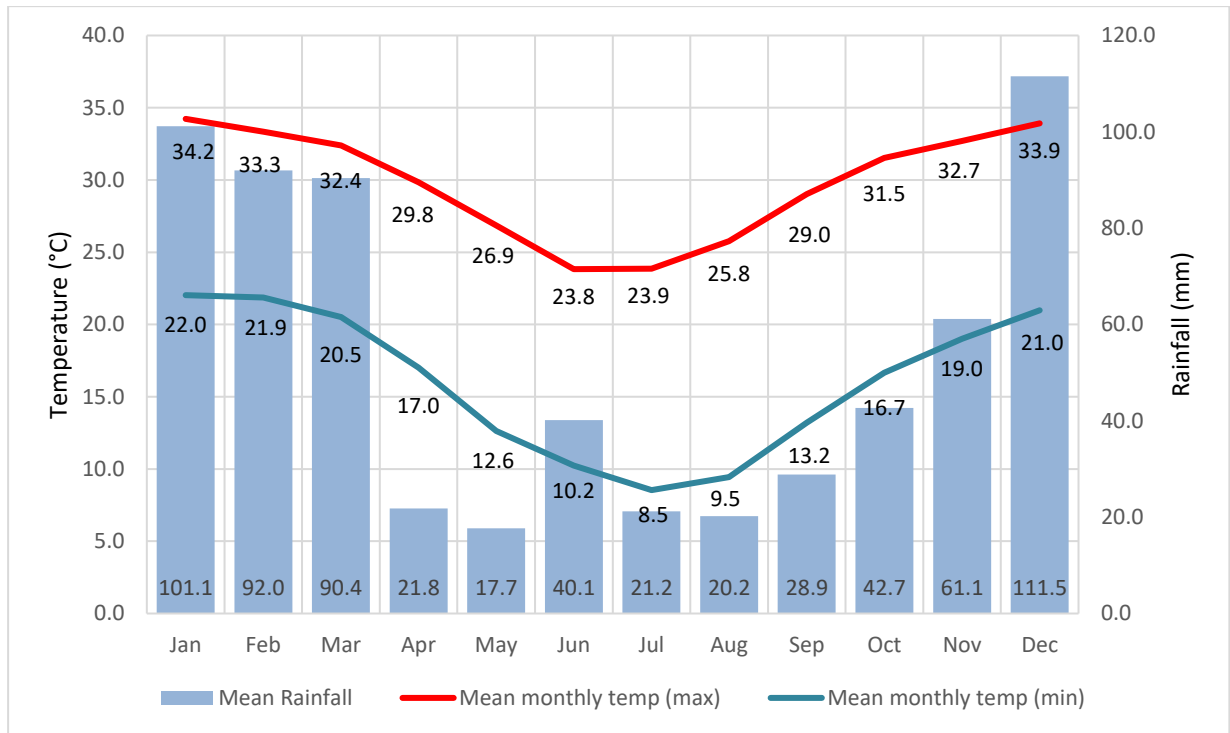
Generally, coal seams found in the east-central part of the basin contain higher quality coking coal deposits, with rank falling below coking range farther south and west (Hutton 2009). The high-quality coal measures are of Permian age, buried less than 60 m from the surface (Mutton 2003).

## 1.6 REGIONAL CLIMATE

The regional climate is classified as semi-arid, characterised with warm dry summers and warm winters. Climate data for the study area has been sourced from Scientific Information for Land Owners (SILO) climate database (Queensland Government), which operates by interpolating data from the Commonwealth Bureau of Meteorology (BoM) into a single point data drill.

Figure 3 shows predicted average temperature and rainfall for the area from January 1999 to July 2019. The data indicates the annual mean rainfall for the region is highest between December and March with the maximum average occurring in December (111.5 millimetres (mm)).

The hottest months typically occur between October and March while the coolest months occur between May and September. The highest mean maximum temperature typically occurs in December (34.2 degrees Celsius (°C)) and the lowest mean minimum temperature in July (8.5°C). The mean annual maximum temperature for the region is predicted to be 29.8°C and the mean annual minimum temperature is predicted to be 16°C.



**Figure 3 Mean temperature and rainfall data for the region (Source: SILO)**



## 2.0 RELEVANT LEGISLATION AND POLICY

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Commonwealth and State legislation and policies relevant to the assessment of aquatic ecological values on the study area are discussed below.

### 2.1 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

Under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), an action requires approval from the Federal Environment Minister if the action has, will have, or is likely to have a significant impact on a Matter of National Environmental Significance (MNES).

An EPBC Referral (2010/5775) was lodged in 2010 for the Gemini Project previously known as the Dingo West Project by Dingo West Pty Ltd, which was declared 'Not a Controlled Action if undertaken in a Particular Manner' in July 2011.

The Particular Manner Decision conditions (EPBC 2010/5775) are as follows:

1. *To prevent downstream impacts to the Fitzroy River Turtle (Rheodytes leukops) the person taking the action must appropriately bund or locate pits in a manner that prevents surface water from entering the pit during a 1:1000 year flood event (as indicated in flood modelling at Attachment A).*
2. *To prevent downstream impacts to the Fitzroy River Turtle (Rheodytes leukops) the person taking the action must appropriately bund or locate dams in a manner that prevents surface water from entering or damaging the dams during a during a 1:1000 year flood event (as indicated in flood modelling at Attachment A).*

The Gemini Project complies with the Particular Manner Decision (EPBC 2010/5775). Furthermore, the level of impact to MNES have been assessed to be no greater than those described in the EPBC Referral (20105775).

### 2.2 NATURE CONSERVATION ACT 1992

The most relevant components of the Queensland *Nature Conservation Act 1992* (NC Act) to the Project, are the sections which pertain to Wildlife and Habitat Conservation. The classes of wildlife to which the NC Act applies includes protected wildlife, which is defined as Extinct wildlife; Endangered wildlife; Vulnerable wildlife; Near Threatened wildlife; and Least Concern wildlife. Species listed under the above classes are published in the associated *Nature Conservation (Wildlife) Regulation 2006* (NCWR).

'Threatening processes' are also relevant to wildlife and habitat conservation. The NC Act defines 'threatening processes' as any process that is capable of:

- a) threatening the survival of any protected area, area of major interest, protected wildlife, community of native wildlife or native wildlife habitat; or
- b) affecting the capacity of any protected area, area of major interest, protected wildlife, community of native wildlife or native wildlife habitat to sustain natural processes.

The NC Act is relevant to the Project for any protected flora or fauna species (as detailed in the NCWR) found in the study area.

## 2.3 BIOSECURITY ACT 2014

The Queensland *Biosecurity Act 2014* (Biosecurity Act) provides comprehensive biosecurity measures to safeguard our economy, agricultural and tourism industries, environment and way of life, from pests (e.g. wild dogs and weeds), diseases (e.g. foot-and-mouth disease), and contaminants (e.g. lead on grazing land).

Biosecurity matters are separated into three broad categories:

- A '**prohibited matter**' is a biosecurity matter that is not found in Queensland but would have a significant adverse impact on our health, way of life, and the economy or the environment if it entered the State. Prohibited matters must be reported to Biosecurity Queensland within 24 hours and all reasonable steps taken to minimise the risks of the prohibited matter and not make the situation worse;
- A '**restricted matter**' is a biosecurity matter found in Qld and has a significant impact on human health, social amenity, the economy or the environment. Restricted matters are further broken down into seven categories, with each category placing restrictions on the dealings with the biosecurity matter or actions required to be taken to minimise the spread and adverse impact of the biosecurity matter;
- An '**other matter**' is a biosecurity matter that is not a prohibited or restricted matter. Everyone is obligated to take all reasonable and practical steps to minimise the risks associated with other biosecurity matters under their control.

The Biosecurity Act is relevant to the Project in regard to the control and management of invasive plant and animal species.

## 2.4 QUEENSLAND ENVIRONMENTAL OFFSETS FRAMEWORK

The Queensland environmental offsets framework consists of the *Environmental Offsets Act 2014*, *Environmental Offsets Regulation 2014*, and the *Queensland Environmental Offsets Policy (Version 1.7)* (DES 2019). The offsets framework requires environmental offsets to be delivered where an activity is likely to result in a significant residual impact on a prescribed environmental matter. The *Significant Residual Impact Guideline* (DEHP 2014) is used to determine whether the residual impacts are significant.

Prescribed Environmental Matters include:

- Matters of National Environmental Significance (MNES);
- Matters of State Environmental Significance (MSES) (outlined below); and
- Matters of Local Environmental Significance (MLES).

MSES are defined in Schedule 2 of the *Environmental Offsets Regulation 2014*, and comprise:

- Regulated vegetation including:
  - i. Endangered and Of Concern regional ecosystems;
  - ii. Regional ecosystems (REs) that intersect areas shown as wetlands on the Vegetation Management Wetlands map;
  - iii. REs located within a defined distance from the defining banks of a relevant watercourse or relevant drainage feature; or

- iv. REs mapped as essential habitat for endangered and vulnerable flora and fauna;
- Areas that provide connectivity and maintain ecosystem functioning;
- Mapped wetlands and watercourses including:
  - i. Wetland protection areas, or areas of high ecological significance as shown on the Map of referable wetlands; or
  - ii. High ecological value waters (as defined under the *Environmental Protection (Water) Policy 2009*);
- Designated precincts in a strategic environmental area under the *Regional Planning Interests Regulation 2014*;
- Protected wildlife habitat, which includes;
  - i. High risk areas on the flora survey trigger map;
  - ii. Areas that contain endangered or vulnerable plants;
  - iii. Non-juvenile koala habitat trees in certain areas of south-east Queensland; or
  - iv. Habitat for endangered, vulnerable and special least concern animals;
- Protected areas and highly protected zones of State marine parks;
- Fish habitat areas;
- Waterways providing for fish passage;
- Marine plants; and
- Legally secured offsets.

## **2.5 FISHERIES ACT 1994**

This state legislation protects all aquatic ecosystems from unauthorised disturbance. The main purpose of the Queensland *Fisheries Act 1994* (Fisheries Act) is to provide for:

- the protection of fisheries;
- the protection of marine fish;
- the protection of marine plants; and
- the facilitation of management plans.

As of the 3rd July 2017, the Fisheries Act requires waterway barrier works to be developed in accordance with the accepted development requirements. The accepted development requirements are those outlined in *Accepted development requirements for operational work that is constructing or raising waterway barrier works* (DAF 2018).

## **2.6 ENVIRONMENTAL PROTECTION (WATER AND WETLAND BIODIVERSITY) POLICY 2019**

The *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (EPP (Water and Wetland Biodiversity)) is subordinate legislation under the *Environmental Protection Act 1994*. The EPP (Water and Wetland Biodiversity) provides a framework for:

1. identifying environmental values (EVs) for Queensland waters, and deciding water quality objectives (WQOs) to protect or enhance those EVs; and
2. including the identified EVs and WQOs under Schedule 1 of the EPP (Water and Wetland Biodiversity).

The EPP (Water and Wetland Biodiversity) is relevant to the Project with regard to the protection of EVs occurring in the Mackenzie River sub-basin and associated tributaries.

The EVs and WQOs for waters occurring on or surrounding the study area are provided in the document titled *Environmental Protection (Water) Policy 2009; EPP (Water) for the Mackenzie River Sub-basin EVs and WQO Basin No. 130 (part), including all waters of the Mackenzie River Sub-basin* (DEHP 2011a).

### 3.0 DESKTOP ASSESSMENT

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A desktop assessment was conducted to collate information on aquatic ecological values identified in the region. These searches include previous surveys, community records and other sources. A review of databases was conducted to inform the specific field survey techniques to target certain aquatic flora and fauna species known from the region.

All database searches were based on either the Lot/Plan, the study area, or a central coordinate point, depending on the database search undertaken. Database search results can be found in Appendix A. The following databases searches were undertaken:

1. Environmental Reports Online (search based on study area);
  - a. Aquatic Conservation Assessments;
  - b. Matters of State Environmental Significance;
  - c. Regional Ecosystems;
2. Environmentally Sensitive Area (ESA) Mapping (search based on study area);
3. Protected Plants Flora Survey Trigger Map (search based on central coordinate point);
4. EPBC Act Protected Matters Search Tool (PMST) (two searches based on central coordinate point with 20 km and 50 km buffers);
5. Regulated Vegetation Management Report (search based on Lot/Plan);
6. Wildlife Online Species List Request (two searches based on central coordinate point with 10 km and 50 km buffers);
  - a. Rare and Threatened Species;
  - b. Introduced Species; and
7. Department of Environment and Science (DES) interactive Wetland*Maps* database and Map of Referable Wetlands; and
8. WildNet Records Conservation Significant Species List (search based on circular area selected over the study area to reflect a 'central point with buffer'; area selected was roughly equivalent to a 20 km buffer with a report area of greater than 285,000 ha).

Additional resources that provide species records and related information such as the Atlas of Living Australia (ALA) and Queensland Museum were consulted where appropriate to support likelihood desktop study.

The following sections address items of nature conservation relevant to the study area identified within the desktop assessment.

### 3.1 SPECIES OF CONSERVATION SIGNIFICANCE

No aquatic flora species of conservation significant were identified by the desktop searches. Database searches identified four fauna species of conservation significance with potential to occur within 50 km of the study area.

A detailed assessment of the likelihood of species of conservation significance occurring within the study area was completed prior to conducting the field survey, for the purpose of determining targeted species and to guide field survey methodology. The detailed assessment was based on the knowledge of ecologists, habitat suitability and scientific literature.

The detailed assessment of likelihood of occurrence considered that all four of the species identified by the desktop assessment were unlikely to occur within the study area (Table 1).

The Fitzroy River turtle was previously identified as potentially being impacted by the Dingo West Project by the EPBC Referral Decision (2010/5775). The potential impact of the Gemini Project on the Fitzroy River turtle is assessed in Section 9.1.2.

**Table 1 Fauna Species of Conservation Significance identified by Desktop Searches**

Scientific Name Common Name	Status		Database Searches		Habitat and Distribution	Desktop Likelihood of Occurrence
	EPBC Act	NC Act	PMST	Wildlife Online Records		
<b>Fish</b>						
<i>Maccullochella peelii</i> Murray cod	V	NL	Species or species habitat <b>may</b> occur within area (0-10 km)	No records	The species lives in a wide range of habitats, from clear, rocky streams to slow flowing, turbid rivers and billabongs (DoEE 2018a).	<u>Unlikely</u> This species was returned in the 10 km PMST search as may occur. No records of this species were recorded within 50 km of the study area. The watercourses present within the study area are ephemeral in nature and only run during periods of high rainfall.
<b>Reptiles</b>						
<i>Crocodylus porosus</i> Salt water crocodile	Ma, Mi	V	Species or species habitat <b>likely</b> to occur within area (10-50 km)	No records	Salt-water crocodiles are restricted to coastal waterways and floodplain wetlands within Queensland.	<u>Unlikely</u> Only ephemeral waterways are present within the study area with limited to no water persisting throughout the year. Salt-water crocodiles are known to inhabit the lower reaches of rivers. This species was returned in the 10 km PMST search as likely to occur. There are no records of this species have occurred within 50 km of the study area. Given the habitat requirements of this species it would not occur within the study area.
<i>Eseya albagula</i> Southern snapping turtle	CE	E	Species or species habitat <b>likely</b> to occur within area (0-10 km) Species or species habitat <b>known</b> to occur within area (10-50 km)	2 (10-50 km)	The Southern snapping turtle is only found in the Burnett, Fitzroy, Raglan and Mary river drainages of south-east Queensland. It prefers permanent flowing water habitats where there are suitable shelters and refuges (e.g. fallen trees) (DES, 2017). Found only in Queensland in the Fitzroy, Mary and Burnett Rivers and associated smaller drainages in south eastern Queensland (DoEE, 2018b).	<u>Unlikely</u> No permanent watercourses occur within the study area. No records within 10 km of the Project on Wildlife Online, ALA, or WildNet but 2 records occur between 10 and 50 km. However, this species was returned in the 10 km PMST search as likely occur, and as known to occur between 10 and 50 km. Given the habitat requirements of this species it would not occur within the study area.
<i>Rheodytes leukops</i> Fitzroy River turtle	V	V	Species or species habitat <b>likely</b> to occur within area (0-10 km) Species or species habitat <b>known</b> to occur within area (10-50 km)	1 (10-50 km)	The Fitzroy River turtle is limited to the Fitzroy River catchment in central Queensland. Previously thought to prefer shallow (<2.0 m) riffle zones with high water velocities, the species is now known to occupy large pools (>1 km long; >2 m deep) and reservoirs. This species will nest in alluvial sand-loam riverbanks (Curtis et al. 2012).	<u>Unlikely</u> No suitable habitat for this species occurs in the study area. No records within 10 km of the study area on Wildlife Online, ALA, or WildNet however, 1 record occurs between 10 and 50 km. A review of ALA records indicate this species is associated with the waters of the Mackenzie River and Fitzroy River.

## 3.2 WETLAND HABITATS

A review of the Department of Environment and Science (DES) interactive *WetlandMaps* database and the Map of Referable Wetlands indicated three types of waterbodies are potentially present within the study area. Riverine wetlands have been identified in association with the Charlevue Creek. Several small riverine, palustrine and lacustrine wetlands are mapped as potentially present within the study area (Figure 4). All of the lacustrine and palustrine wetlands within the study area have been identified as artificial (farm) dams or not present during previous terrestrial ecology surveys (AARC 2019). Riverine wetlands (corresponding with riverine vegetation) have been discussed in the Terrestrial Ecology Assessment (AARC 2019). No wetlands of national or international importance have been recorded within the study area or surrounds. One High Ecological Significance (HES) wetland occurs approximately 4 km east of the study area (Figure 4). The potential impact on this HES wetland has been addressed in the Terrestrial Ecology Assessment (AARC 2019).

The Aquatic Conservation Assessments defines the study area as having a sub-catchment conservation significance of medium, indicating that these wetlands have varied combinations of high and medium values amongst the assessment criteria.

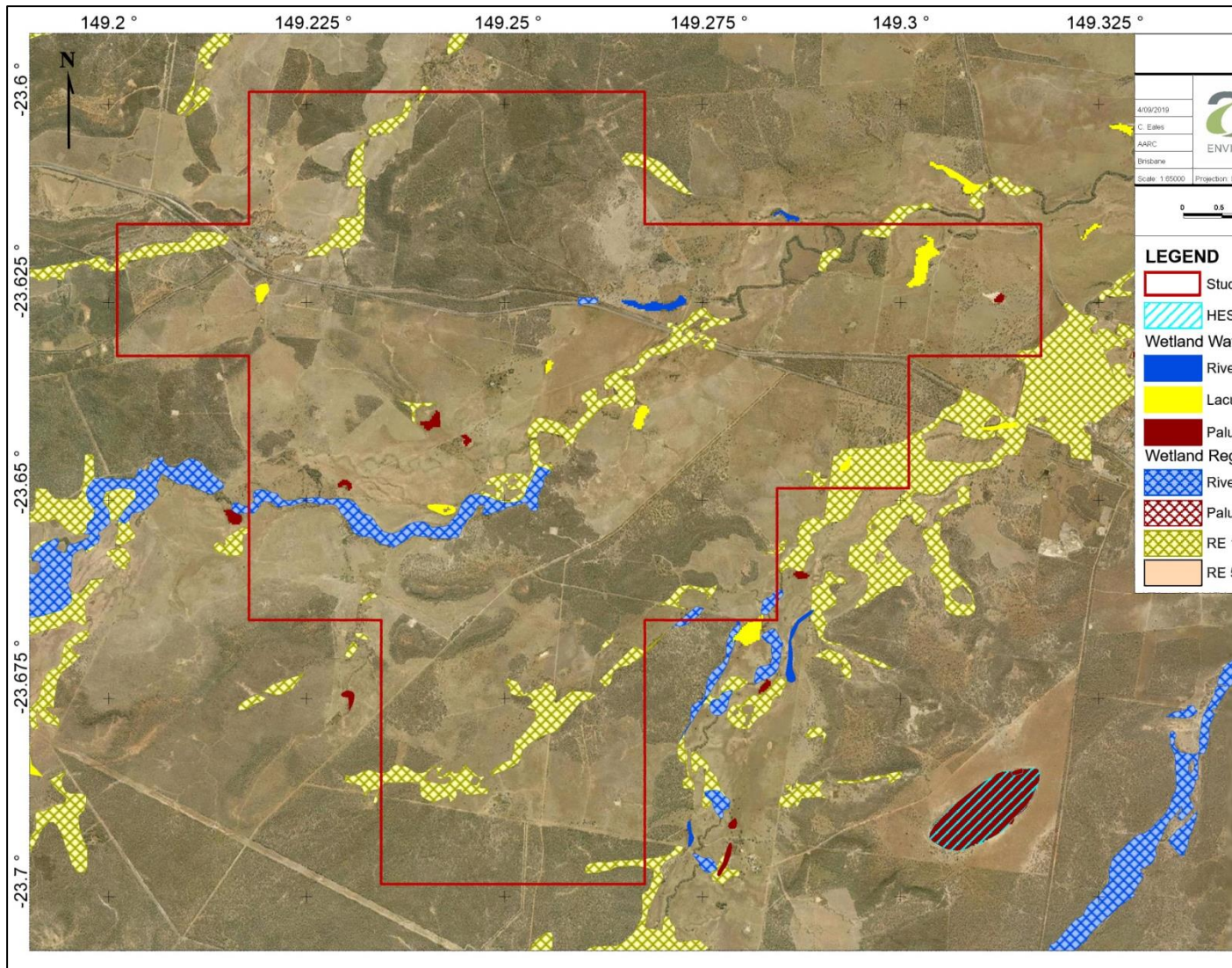
## 3.3 WATERWAYS FOR FISH HABITAT

Waterways, as defined by the Fisheries Act, include rivers, creeks, streams, watercourses or inlets of the sea.

The *Queensland Waterways for Waterway Barrier Works* (DAF 2013) mapping indicates the level of 'risk' associated with undertaking waterway barrier works within Queensland waterways. Waterways with higher stream orders, steeper slopes, higher flow rates, greater number of fish present and fish with stronger swimming abilities obtain a higher level of risk.

Charlevue Creek and Springton Creek are mapped as being at major risk of adverse impact from waterway barrier works on fish movement. Stanley Creek is mapped as being of moderate risk of adverse impact. Tributaries of the streams are mapped within the study area as being of either low, moderate or high risk of adverse impact from waterway barrier works on fish movement.





**Figure 4 Wetland Habitats**

## 4.0 ENVIRONMENTAL VALUES AND OBJECTIVES

### 4.1 ENVIRONMENTAL VALUES

The waterways of the Project fall within the Mackenzie River catchment. The *EPP (Water) Central Queensland Map Series (WQ1304 – Mackenzie River Sub-basin)* (DEHP 2011b) identifies several waterways on and surrounding the study area.

Environmental Values are defined as the qualities of water that make it suitable for supporting aquatic ecosystems and a variety of human water uses (DEHP 2013a). The *EPP (Water and Wetland Biodiversity)* specifies that the EVs for this catchment are those set out in the '*EPP (Water) for the Mackenzie River Sub-basin EVs and WQO Basin No. 130 (part), including all waters of the Mackenzie River Sub-basin*' (DEHP 2011a).

This document identifies ten EVs in the Mackenzie River sub-basin, two of which are deemed as relevant EVs for the waters surrounding the study area; namely protection of aquatic ecosystem values, and suitability for stock watering. The waters within and directly surrounding the study area are defined as moderately disturbed waters by the '*EPP (Water) for the Mackenzie River Sub-basin EVs and WQO Basin No. 130 (part), including all waters of the Mackenzie River Sub-basin*' (DEHP 2011a).

#### 4.1.1 Water Quality Objectives

The *EPP (Water) for the Mackenzie River Sub-basin EVs and WQO Basin No. 130 (part), including all waters of the Mackenzie River Sub-basin* provides WQOs to support and protect the different EVs identified for waters within the Mackenzie River southern tributaries. WQOs are provided in two main parts;

1. For the purposes of protecting the aquatic ecosystem EV; and
2. For EVs other than aquatic ecosystems (human use EVs such as stock watering).

The guideline WQOs for the protection of aquatic ecosystems and for stock watering are provided in Table 2.

**Table 2 WQO Guideline Values**

Mackenzie River Sub-basin EVs and WQO Basin No. 130 (part)		
Management Intent (level of protection)	WQOs to protect EV	
	Parameter	Water Quality Objective
Aquatic ecosystem (moderately disturbed)	<b>Water</b>	
	Ammonia N	<20 µg/L
	Oxidised N	<60 µg/L
	Organic N	<420 µg/L
	Total nitrogen	<7 µg/L
	Filterable reactive phosphorus	<20 µg/L
	Total phosphorus	<160 µg/L
	Chlorophyll a	<5.0 µg/L
	Dissolved oxygen	85% – 110% saturation
	Turbidity	<50 NTU
Suspended solids	<110 mg/L	

Mackenzie River Sub-basin EVs and WQO Basin No. 130 (part)		
Management Intent (level of protection)	WQOs to protect EV	
Aquatic ecosystem <i>(moderately disturbed)</i>	pH	6.5 – 8.5
	Conductivity (EC) baseflow	<310 µS/cm
	Conductivity (EC) high flow	<210 µS/cm
	Sulphate	<10 mg/L
	<b>Macroinvertebrates</b>	
	Taxa richness (composite)	12–21
	Taxa richness (edge habitat)	23–33
	PET taxa richness (composite)	2–5
	PET taxa richness (edge habitat)	2–5
	SIGNAL index (composite)	3.33–3.85
	SIGNAL index (edge habitat)	3.31–4.20
	% tolerant taxa (composite)	25–50%
	% tolerant taxa (edge habitat)	44–56%
	Stock watering	<b>Water</b>
Total Dissolved Solids		3000 mg/L
Aluminium		5 mg/L
Arsenic		0.5 (up to 5) mg/L
Beryllium		ND
Boron		5 mg/L
Cadmium		0.01 mg/L
Chromium		1 mg/L
Cobalt		1 mg/L
Copper		0.4 (sheep), 1 (cattle), 5 (pigs), 5 (poultry)
Fluoride		2 mg/L
Iron		not sufficiently toxic
Lead		0.1 mg/L
Manganese		not sufficiently toxic
Mercury		0.002 mg/L
Molybdenum		0.15 mg/L
Nickel		1 mg/L
Selenium		0.02 mg/L
Uranium		0.2 mg/L
Vanadium		ND
Zinc	20 mg/L	

Notes: N nitrogen  
 EC electrical conductivity  
 ND no data  
 µg/L micrograms per litre  
 mg/L milligrams per litre  
 NTU Nephelometric Turbidity Units  
 µS/cm microSiemens per centimetre  
 PET – Plecoptera, Ephemeroptera, Trichoptera

### 4.1.2 Stream Sediment Quality Objectives

Baseline levels of metals in stream sediments are important, to investigate the accrual of any pollutants. Stream sediment quality objectives for the study area are adopted from the *Default Sediment Quality Guideline values* (SQG) (ANZECC & ARMCANZ 2000a) (Table 3).

**Table 3 ANZECC Stream Sediment Quality Guideline Objectives**

Contaminant	Sediment Quality Guideline Value (mg/kg)	
	Low Value	High Value
Arsenic	20	70
Cadmium	1.5	10
Chromium	80	370
Copper	65	270
Lead	50	220
Nickel	21	52
Mercury	0.15	1
Zinc	200	410

Note: mg/kg – milligrams per kilogram

## 5.0 METHODOLOGY

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Two field surveys were undertaken by AARC ecologists within the study area on the 23<sup>rd</sup> and 24<sup>th</sup> February 2018, and from the 3<sup>rd</sup> to 9<sup>th</sup> of April 2019.

The standard methodologies described in Sections 5.3 to 5.7 were used to survey:

- Surface Water Quality;
- Stream Sediment Quality;
- Creek Ecology;
  - Physical Assessment;
  - Habitat Bioassessment;
  - Condition Assessment;
  - Macroinvertebrate Sampling;
  - Fish and Crustacean Sampling
- Riparian and Aquatic Vegetation; and
- Riparian Zone Vertebrate Fauna.

Only surface water sampling and stream sediment sampling was conducted in February 2018; all other methods were employed by the April 2019 survey.

### 5.1 FIELD SURVEY WEATHER CONDITIONS

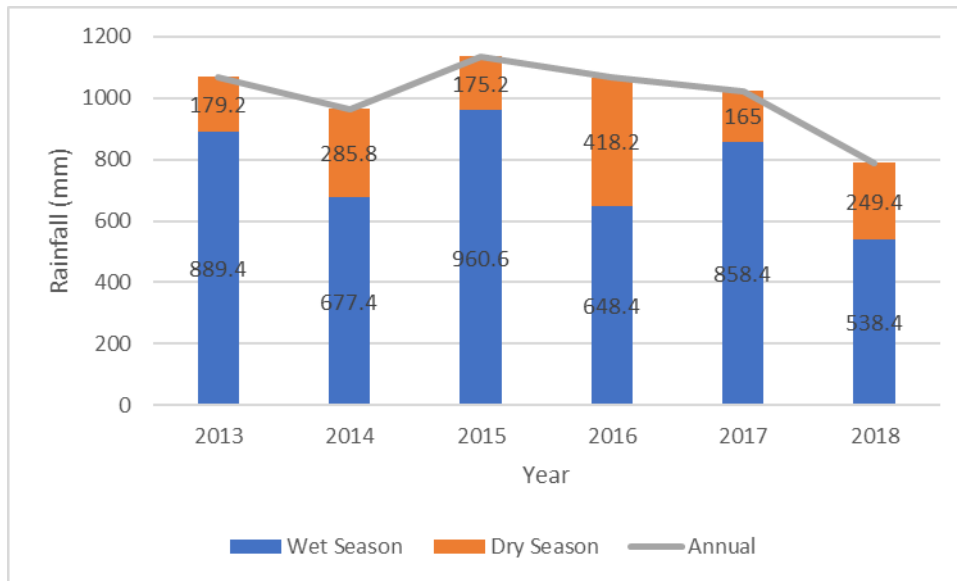
#### ***February 2018 Survey***

In the week preceding the February 2018 survey a total of 76.8 mm of rainfall was recorded (February 2018) at the Blackdown Tablelands AL weather station (035186) located approximately 14.2 km south-west of the study area. A total of 470.6 mm of rain fell in the preceding three months to the survey.

#### ***April 2019 Survey***

Conditions during the subsequent survey (April 2019) were mostly fine, with no rainfall occurring during the survey. In the preceding three months a total of 349.6 mm was recorded by the Blackdown Tablelands AL weather station, of which 93.4 mm fell in the two weeks leading up to the survey.

In the preceding six years (2013 to 2018) rainfall varied across both the wet and dry seasons (Figure 5). The total annual rainfall for 2013, 2015, 2016 and 2017 was fairly consistent, whilst 2014 and 2018 saw a drop in both the wet season rainfall and the total annual rainfall.



**Figure 5 Regional Seasonal Rainfall Trends for 2013 – 2018 (Source: BoM 2019)**

## 5.2 SAMPLING SITES

The desktop selection of sampling sites was based on two primary objectives:

- Spatial distribution across the study area; and
- Capturing ‘entry’ and ‘exit’ points of waterways traversing the Project, to collect suitable baseline data for ‘reference’ and ‘impact’ sites that could be utilised in any long-term monitoring programs.

Table 4 describes each sampling site and sampling location (Table 5), details the survey methods used at each sampling site. The location of the aquatic sampling sites and the surface water sampling sites are shown in Figure 6.

**Table 4 Sampling Site Locations**

Site Code	Reference Location	Easting	Northing
<b>DWR1</b>	Located on southern side of highway along Stanley Creek. Upstream of DWI1.	0725805	7386321
<b>DWR4</b>	Located along depression on intermittent creek.	0729204	7383227
<b>DWR5</b>	Located along unnamed waterway that flows into Charlevue Creek in south-western boundary of the EPC.	0727640	7381080
<b>DWR6</b>	In south-western area of EPC, located along a depression area on unnamed waterway that feeds into Springton Creek.	0728513	7378595
<b>DWI1</b>	Located along Stanley Creek, northern side of highway at northern boundary of EPC. Downstream of DWR1.	0728501	7388431
<b>DWI3</b>	Located along unnamed waterway that flows into Charlevue Creek. North-eastern boundary of EPC.	0731394	7387482
<b>DWI6</b>	Located along Springton Creek, outside of EPC. Located at bridge along highway.	0736131	7383371
<b>DWI8</b>	Located along upstream of Springton Creek along unnamed waterway.	0731237	7378414
<b>DWI9</b>	South-eastern boundary of EPC, on unnamed waterway that feeds into Springton Creek eventually.	0731262	7377611
<b>DAR1</b>	Upstream site along Charlevue Creek, on western EPC boundary	0726345	7382842
<b>DAI1</b>	Located along Charlevue Creek, downstream of DAR1.	0728076	7382226
<b>DAI2</b>	Located along Charlevue Creek, downstream of DAR1 and DWI1.	0729813	7382850
<b>DAI3</b>	Located along Charlevue creek, downstream of DAR1, DAI2 and DWI1. Upstream of DAI4. South of highway.	0730973	7384370
<b>DAI4</b>	Located along Charlevue creek, downstream of DAR1, DAI2, DAI3. North of highway.	0732590	7385626
<b>DAI5</b>	Located along Springton Creek, at most eastern point creek leaves the EPC. Downstream of DWI8 and DWI9.	0732951	7381182

Note: All sample site locations are in Geocentric Datum of Australia (GDA) 94 Zone 55K

**Table 5 Survey Methods**

Site Code	Surface Water Sampling	Sediment Sampling	Creek Ecology					Riparian Vegetation	Riparian Zone Fauna				
			Physical Assessment	Habitat Bioassessment	Condition Assessment	Macroinvertebrate Sampling	Fish and Crustacean Trapping		Bird Survey	Spotlighting	Call Play Backs	Habitat Searches	
DWR1	2018	✓	✓										
	2019		✓	✓	✓	✓		✓					
DWR4	2018		✓										
	2019		✓	✓	✓	✓		✓					
DWR5	2018	✓	✓										
	2019	✓	✓	✓	✓	✓	✓	✓					
DWR6	2018		✓										
	2019		✓	✓	✓	✓		✓					
DWI1	2018		✓										
	2019		✓	✓	✓	✓		✓					
DWI3	2018		✓										
	2019		✓	✓	✓	✓		✓					
DWI6	2018	✓	✓										
	2019	✓	✓	✓	✓	✓	✓	✓					
DWI8	2018		✓										
	2019		✓	✓	✓	✓		✓					
DWI9	2018		✓										
	2019	✓	✓	✓	✓	✓	✓	✓					
DAR1	2018	✓	✓										
	2019	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DAI1	2018	✓	✓										
	2019	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DAI2	2018	✓	✓										
	2019	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DAI3	2018	✓	✓										



Site Code	Surface Water Sampling	Sediment Sampling	Creek Ecology					Riparian Vegetation	Riparian Zone Fauna			
			Physical Assessment	Habitat Bioassessment	Condition Assessment	Macroinvertebrate Sampling	Fish and Crustacean Trapping		Bird Survey	Spotlighting	Call Play Backs	Habitat Searches
	2019	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DAI4	2018	✓	✓									
	2019	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DAI5	2018	✓	✓									
	2019	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

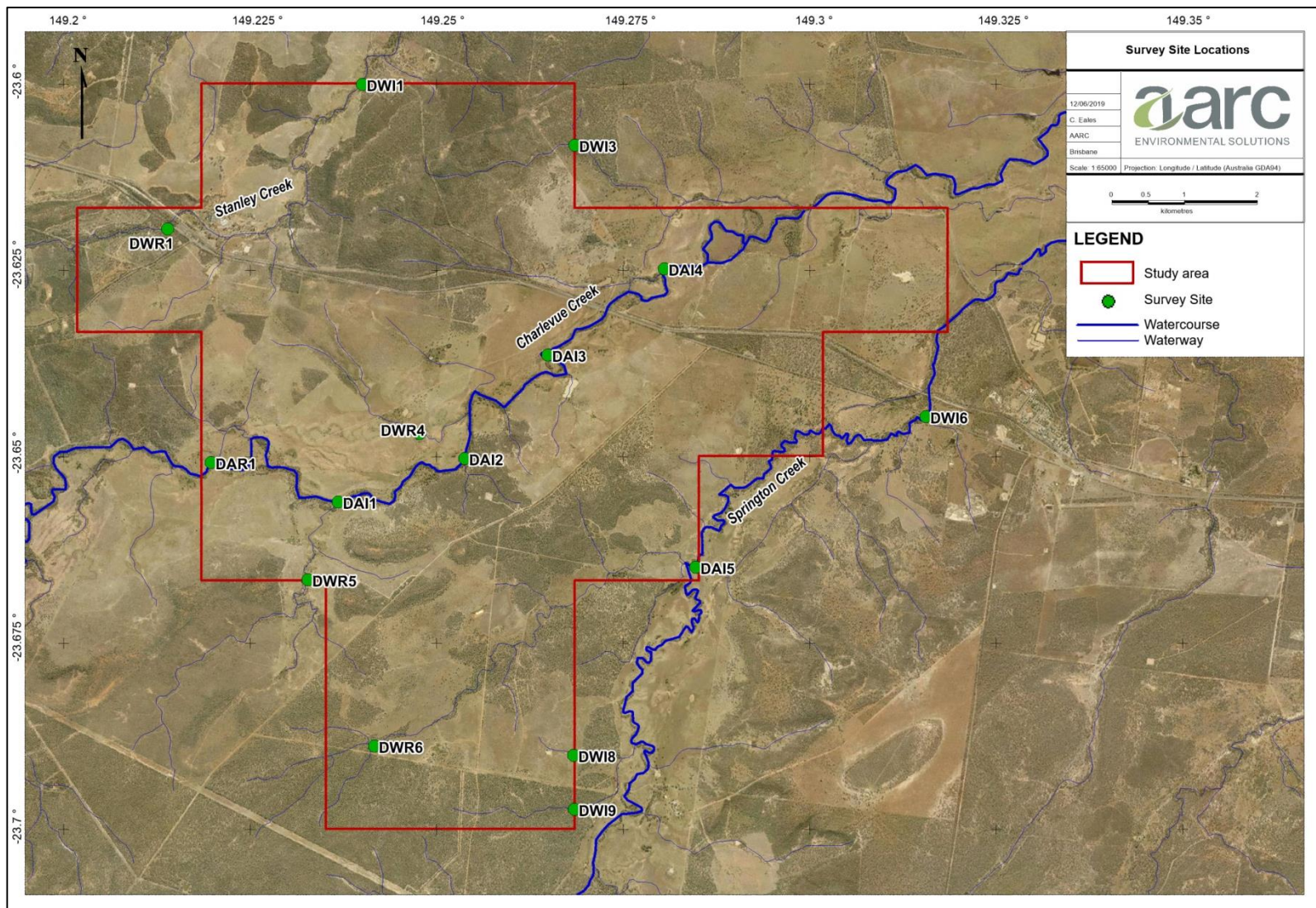


Figure 6 Location of Survey Sites

### **5.3 SURFACE WATER SAMPLING**

Water quality sampling was carried out in accordance with the *Monitoring and Sampling Manual: Environmental Protection (Water) Policy 2009* (DES 2018b) methodology. Field readings of pH, dissolved oxygen (DO), turbidity, electrical conductivity (EC) and temperature were also recorded. In-situ measurements were collected using a multi-parameter water quality meter that is laboratory calibrated to the manufacturers' specifications.

Grab samples were collected at a depth of 10 to 20 cm where sufficient water was available. Several water samples were collected at each site (where possible) in analyte specific sterilised collection bottles and a suite of parameters tested. All water samples were kept on ice or refrigerated during storage and transport to a National Association of Testing Authorities (NATA) accredited laboratory for analysis.

### **5.4 STREAM SEDIMENT QUALITY**

Stream sediment quality sampling was undertaken in accordance with the *Monitoring and Sampling Manual EPP (Water) 2009* (DES 2018b). Five sub-samples (approximately 500 grams (g)) each) of stream-bed substrate was taken at 10 m intervals along a 50 m transect in the river bed. Sub-samples were collected using a non-metallic shovel and mixed in a plastic bucket to obtain a composite sample. A representative 500 g sample is taken from the sub-sample composite and sent to a NATA accredited laboratory for analysis of trace metals and particle size.

### **5.5 CREEK ECOLOGY**

#### **5.5.1 Physical Assessment**

This assessment method utilises monitoring techniques adapted from the following environmental sampling manuals:

- *AusRivAS Physical Assessment Protocol* (Parsons et al. 2002b, p.5); and
- *Queensland AusRivAS Sampling and Processing Manual* (DNRM 2001).

The monitoring methodologies utilised in the aquatic ecology assessments are presented in Table 6. The physical assessment does not require the presence of water and was consequently undertaken at all sampling sites.

**Table 6 Physical Assessment Methodology**

<b>Characteristic</b>	<b>Monitoring Methodology</b>
<b>Bank Shape</b>	Categorise the predominant shape of the left and right banks along the length of the monitoring site in accordance with the AusRivAS physical assessment categories for bank shape (i.e. concave, convex, stepped, wide lower bench or undercut).
<b>Bank Slope</b>	Categorise the predominant slope of the left and right banks along the length of the monitoring site in accordance with the AusRivAS physical assessment categories for bank slope (i.e. vertical, steep, moderate, low or flat).
<b>Factors Affecting Bank Stability</b>	Identify disturbance factors present that may negatively influence bank stability of either the left or right bank.
<b>Artificial Bank Stability Features</b>	Note the presence of any artificial bank protection measures.
<b>Large Woody Debris</b>	Visually estimate the percent cover of large woody debris within the lower embankment and channel area, along a length of stream that is equal to the length of the monitoring site. Large woody debris includes logs and branches greater than 10 centimetre (cm) in diameter.
<b>Turbidity, Water and Sediment Oils and Odours</b>	Visually assess and categorise the presence of oily residues or odours in surface water and stream sediments at the aquatic sites.
<b>Bare Ground</b>	Note the extent of bare ground including eroded areas or those not supporting vegetation, due to some form of disturbance that would otherwise be expected to be vegetated.
<b>Exposed Tree Roots</b>	Note whether tree roots are exposed due to any disturbances.
<b>Gully Erosion</b>	Record any visible gully erosion adjacent to the watercourse.
<b>Bank Slumping</b>	Record any evidence of slumping banks along the watercourse.
<b>Local Catchment Erosion</b>	Note the erosion in the surrounding catchment on the approach to the site.

### 5.5.2 Habitat Bioassessment

A habitat assessment was performed at selected sites using a modified version of the AusRivAS protocols developed by the former Department of Natural Resources and Mines (Conrick & Cockayne 2001). AusRivAS is a nationally standardised method for undertaking an assessment of the biological health of inland rivers within Australia.

The assessment considers morphological characteristics of waterways only; including the broad habitat type, channel pattern, water level and flow, substrate character and cover, bed and bank stability, and riparian cover at each site. Each surveyed site was given a score out of 135, with higher numbers indicating favourable habitats normally associated with healthy waterways. Habitat assessments were completed at all sites in 2019. Table 7 provides a framework for interpreting habitat assessment scores.

**Table 7 Key to AusRivAS Habitat Assessment Scores**

Habitat Assessment Score	Interpretation
0 – 35	Habitat is poor. There is limited habitat availability for in-stream fauna. There is little variation in velocity and depth of water, and the creek bed consists of a single sediment type. The water body typically consists of a small, shallow pool. Streamside vegetation, if present, consists of grasses and sedges. There is moderate to significant erosion on the banks.
36 – 70	Habitat variety is moderate. This could be due to leaf litter and other vegetation or detritus in the water, or the presence of boulders and rocks. The streamside vegetation consists mainly of grasses and sedges. There is moderate evidence of bank erosion, and the percentage of vegetative cover on the banks is less than 50%.
71 – 100	Habitat is relatively good. The bank is stable, there is variety in depth and velocity within the water body and substrate type is variable and tending towards boulders and rocks. Streamside vegetation is of trees and shrubs, adding to the bank stability. The percentage of streamside cover by vegetation is relatively high.
101 – 135	Indicates a pristine and favourable habitat. There is no bank erosion and the dominant vegetation is trees. There is great variety in depth and velocity, and the habitat is quite complex, offering many types of protection for fauna. This is usually afforded by logs and branches, leaf litter, variety in substrate type, variety in water depth, and presence of vegetation living within the water body.

### 5.5.3 Condition Assessment

The condition assessment is an evaluation of the possible impacts to aquatic environmental values caused by major disturbances within the waterway. Each category is scored from one to five, one indicating a ‘very major’ disturbance, and five indicating an ‘indiscernible’ disturbance. This assessment evaluated the influence of:

- agriculture upstream;
- major extractive industry (current or historical) upstream;
- major urban area upstream;
- major point source wastewater discharge upstream;
- dam or major weir;
- alteration to seasonal flow regime;
- alteration to the riparian zone;
- erosion and damage by stock on riparian zone and banks;
- major geomorphological change on stream channel; and
- alteration to instream conditions and habitats.

#### 5.5.4 Macroinvertebrate Sampling

Macroinvertebrate sampling was conducted in accordance with the AusRivAS sampling and assessment methodology as outlined by the *Queensland Monitoring and Sampling Manual: Environmental Protection (Water) Policy 2009* (DES 2018b).

Along a ten metre stretch of the waterbody, a 250 micrometre D-frame net was used to sample macroinvertebrates at each sampling site containing sufficient suitable aquatic habitat (refer Table 5). The nets were checked thoroughly for damage before use and washed between sites to ensure no cross contamination of samples. This procedure targets various micro-habitats where available, including riffles, runs, pools and edge/backwaters. Due to the ephemeral nature of the creeks and in the receiving environment, micro-habitats available for sampling were limited to pool and edge habitats. Ideally site sampling should include sampling in shallow and deep sections to target the various micro-habitats, however this was not possible in any of the sites due to the limited water levels. Macroinvertebrates were live picked on-site, samples preserved, and sent for taxonomic identification to an AusRivAS accredited laboratory.

Data collected was assessed using a range of indices including:

- Total Abundance;
- Taxa Richness;
- Plecoptera, Ephemeroptera and Trichoptera (PET) Richness;
- SIGNAL 2 Biotic Index;
- Community composition; and
- Percentage Tolerance Taxa.

#### 5.5.5 Fish and Crustacean Sampling

Fish and crustacean sampling was conducted at five sites in April 2019 using box traps and opera house traps.

- Baited aquatic traps (three opera house traps and three box traps per site) (0.5 mm mesh) were deployed at the sites detailed in Table 5 to sample small bodied fish and crustaceans. A total of 30 collapsible, baitfish traps were deployed within the range of microhabitat types present within the site (i.e. littoral margin, among snags, open water) for four nights across the sites.

All captured aquatic fauna were identified, counted and measured for total length. Any exotic species captured were euthanized in accordance with permit conditions, and all native species were released at the site of capture. No wounds, lesions or deformities on captured aquatic fauna were recorded.

### 5.6 RIPARIAN AND AQUATIC VEGETATION

The *Gemini Project Terrestrial Ecology Assessment* (AARC 2019) conducted for the Project has surveyed and described the flora values of the study area including vegetation communities identified. For the aquatic ecology assessment, a meandering 100 m transect in the riparian corridor at each sampling site was walked recording the riparian vegetation species encountered.

### 5.7 RIPARIAN ZONE VERTEBRATE FAUNA

The *Gemini Project Terrestrial Ecology Assessment* (AARC 2019) conducted for the Project has surveyed and described the vertebrate fauna values of the study area. For the aquatic ecology

assessment several fauna surveying methodologies were undertaken in the riparian zone across several sites (DAR1, DAI1, DAI2, DAI3, DAI4, and DAI5). Survey effort was consistent across these six sites. A description of the additional techniques employed to survey the fauna occurring within the riparian zones in the study area are detailed below.

### Bird Surveying

Dedicated searches for birds were conducted visually and aurally during early mornings during peak avian activity. A minimum of one hour of bird surveying at each of the six sites was conducted in the early morning or late afternoon when bird activity was highest. In addition, opportunistic diurnal searches were also conducted on foot in areas considered likely to have high avian diversity (e.g. vegetated watercourses or dams), or likely to contain cryptic or threatened bird species.

### Spotlighting

Spotlighting was carried out in the early evenings (before midnight) during the April 2019 to maximise encounter rate of nocturnal wildlife such as night birds and arboreal mammals primarily active at night. Two spotlighting techniques were employed:

1. Foot traverses: Dedicated spotlighting events were undertaken on foot at each of the six sites. Searches were undertaken over two events where possible, one within the first hour following nightfall, and one after the first hour. Two ecologists randomly traversed the area with spotlights and binoculars, and wherever possible, bark crevices and tree hollows were examined. A slow walking speed (approximately 1 km per hour) was maintained across the length of the survey area to fully facilitate intensive listening and thorough visual searching.
2. Vehicle searches: During any driving on the study area after dark, spotlighting was conducted by the passenger/s from the slow-moving vehicle, to maximise study area coverage that cannot be achieved with foot traverses alone. Spotlights were used to scan trackside vegetation for arboreal and ground-dwelling wildlife.

### Call Playback

Several nocturnal bird species are highly cryptic; occurring in naturally low population densities, are wide-ranging, and call infrequently. Detection rates are typically low without solicitation in the form of playback of pre-recorded calls to elicit a response (Kavanagh and Peake 1993; Debus 1995). Detectability of smaller nocturnal bird species such as the Southern boobook (*Ninox novaeseelandiae*) and Australian owlet nightjar (*Aegotheles cristatus*), and the arboreal marsupial Yellow-bellied glider (*Petaurus australis*) also increase with playback of large owl calls. Smaller, cryptic arboreal species such as Squirrel glider (*P. norfolcensis*) and Sugar glider (*P. breviceps*) can also respond to owl call playback. In addition, call playbacks can be utilised for the identification of cryptic amphibian species such as the Tusked frog (*Adelotus brevis*). During the 2019 survey call playbacks were conducted at sites specified in Table 5, the species targeted included:

- Tusked frog (*Adelotus brevis*);
- Powerful owl (*Ninox strenua*);
- Australian owlet nightjar (*Aegotheles cristatus*);
- Southern boobook (*Ninox novaeseelandiae*); and
- Greater glider (*Petaurus volans*).

Call playback is undertaken prior to spotlighting foot traverses to minimise the chance of spooking species capable of leaving the area undetected. A series of species call would be selected depending on the surrounding habitat suitability, and each would be played for three minutes, followed by a two-minute listening period, with the cycle repeated three times for each species. Calls were played using a megaphone and loud enough so that the softest call could be heard 100-200 m away. Following the completion of all playback cycles, the area would then be spotlighted as described above.

### Habitat Searching

To further enhance the likelihood of detecting small cryptic species, dedicated diurnal searches were conducted at each of the six sites. This was spread over several events, two per site, during the survey period. Additional habitat searches were carried out during aquatic trap checks and while conducting vegetation transects. Searches were typically undertaken during the late morning, allowing for reptile activity to increase with rising temperatures, but before the maximum heat of the day. Searching techniques involve the careful rolling of rocks and logs, rustling through leaf litter, and peeling back of exfoliating bark from standing trees. For targeted reptile species, dedicated searches were conducted opportunistically when preferred habitat was encountered (e.g. Gilgai formations or dense ground debris).

Evidence of wildlife such as the identification of tracks, scats and other signs of occupation (e.g. tree trunk scratches) was also conducted during these habitat searches. For scats not identifiable in the field, they were collected and sent to a scat analysis expert (Barbara Triggs) for identification of the species responsible for the scat and/or where possible, the identification of prey species material present in predator scats.

### Incidental Recordings

Throughout the April 2019 survey, ecologists were traversing the study area on foot and by vehicle every day for numerous hours whilst conducting routine survey activities (e.g. driving between sites, checking traps, vegetation transects, sampling etc.). The ecologists remained alert and would record numerous wildlife species as observed or heard during the survey period. As with the habitat searches, this included signs or evidence of wildlife, and included constant vigilance for raptor nests. All areas of the study area have been visited by ecologists throughout the surveys.



## 6.0 RESULTS AND DISCUSSION

### 6.1 SURFACE WATER QUALITY

The results from the 2018 and 2019 analysis were compared to the EPP (Water) WQOs (Table 8 to Table 15). Data analysis and interpretation of surface water quality results were referred to the *EPP (Water) WQO for the protection of aquatic ecosystems in the Mackenzie River Sub-basin Waters – southern tributaries (WQ130)*. Exceedances of the EPP WQO are highlighted orange in the tables below. In order to assess the health of each watercourse, the analysis results were compared within each major watercourse and drainage feature ;Charlevue Creek, Stanley Creek and Springton Creek.

The following parameters exceeded the WQO at the Project:

#### Charlevue Creek:

- Physico-chemical parameters;
  - pH (2019), turbidity (2018, 2019), sulphate (2019), ammonia (2018, 2019), dissolved oxygen (2018, 2019)
- Petroleum hydrocarbons (2018).

#### Stanley Creek:

- Physico-chemical parameters;
  - Turbidity (2018); sulphate (2018); ammonia (2018), dissolved oxygen (2018)
- Dissolved Metals;
  - Chromium (2018)
- Petroleum hydrocarbons (2018).

#### Springton Creek:

- Physico-chemical parameters;
  - pH (2019); turbidity (2018, 2019); ammonia (2019), dissolved oxygen (2018-2019)
- Dissolved metals;
  - Manganese (2018);
- Petroleum hydrocarbons (2018).

Exceedances of WQOs for turbidity across all sites and years were observed. Turbidity is an indicator of water quality, where clear water is typically considered part of a healthy system. Exceedances of this parameter can indicate soil erosion, runoff, pollution, and algal blooms; however, some waterways can have naturally high levels of suspended solids and turbidity (Fondriest Environmental Inc. 2014). However, the WQO set for the Mackenzie River Sub-basin indicate that high levels of turbidity are not natural, and increased levels can lead to impaired water quality for both aquatic flora and fauna.

Low levels of DO were observed across all sample sites and occurred in 2018 and 2019 at a variety of sites. These low levels of dissolved oxygen were recorded in stagnant pools along ephemeral waterways. Stagnant pools in intermittent streams naturally experience values of DO below 50 per cent saturation (DEHP 2011a). As such the exceedances observed in relation to the study area are not a reliable indicator of system long term health.

Analysis showed that petroleum hydrocarbons for Charlevue Creek (DWR5, DAI1, DAI2, DAI3, and DAI4), Stanley Creek (DWR1) and Springton Creek (DAI5 and DWI6) exceeded WQO values. At Charlevue Creek the upstream site along an unnamed waterway; DWR5 had the highest exceedance of petroleum hydrocarbons. This unnamed waterway feeds into Charlevue Creek at site DAI1. Only the sites located downstream of DWR5 on Charlevue Creek exceeded this parameter. Sites DAR1

(upstream) and DWR4 (on a neighbouring waterway) did not exceed the WQOs. This indicates that DWR5 may be a source of the petroleum hydrocarbons recorded further downstream. These areas are currently used for agricultural and pastoral purposes and the presence of petroleum hydrocarbons may have been the result of those practices. These results represent important baseline data for future monitoring as repeat exceedances in petroleum hydrocarbons may indicate an existing and consistent local source of petroleum hydrocarbons.

Given the higher carbon chain fractions being reported, possible sources include; crude oil, heavy fuel oils, lubricating oils, asphalts and pitch and even waxes and other related products. Sites DWR1 and DWI6 occur along the Capricorn Highway and are possible point sources for the petroleum hydrocarbons observed at these locations.

Macroinvertebrate sampling provides a good indication of aquatic ecosystem health due to their sensitivity to a variety of factors such as turbidity, DO, pollutants and salinity. Water quality at the study area had high turbidity, presence of petroleum hydrocarbon pollutants and very low levels of DO. It is anticipated that macroinvertebrate sampling results will be consistent with a degraded system.

**Table 8 Physico-Chemical Parameters (Charlevue Creek)**

Parameter	WQO	DAR1		DWR5		DAI1		DAI2		DAI3		DAI4	
		2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
pH	6.5 - 8.5 <sup>a</sup>	7.27	7.12	7.28	6.27	6.63	6.24	6.91	6.37	6.92	6.78	6.87	6.58
Temperature (°C)	n/a	27.1	20.5	29.5	21.2	30.8	20.7	26	21	26.8	20.1	26.3	21.2
EC (µS/cm)	<310 <sup>a</sup>	73.1	120.6	209.5	211.2	74.1	113.9	67	128.1	83.6	124.4	70.3	105.4
Suspended Solids (mg/L)	n/a	58	172	8660	43	2080	131	880	228	6170	103	168	152
Total Dissolved Solids (mg/L)	3000 <sup>b</sup>	45.6	85.8	125.3	147.9	43.5	80.6	42.8	90.1	51.9	89.3	44.6	73.8
Dissolved Oxygen (DO) (%)	85-110 <sup>a</sup>	87	28	88	61	67	58	80	15	80	46	81	56
Oxygen Reduction Potential (millivolts)	n/a	140.5	179.8	205.4	203.8	228.7	197.8	269.3	160.6	198.3	184	137.4	210.8
Turbidity (NTU)	<50 <sup>a</sup>	387	12154.4	1231.6	23199	2050.3	13046.2	831.2	13896.6	2582.6	16031.5	506.3	13455.6
Sulphate as SO <sub>4</sub> - Turbidimetric (mg/L)	<10 <sup>a</sup>	2	<1	5	15	2	<1	<1	<1	2	<1	<1	1
Fluoride (mg/L)	2 <sup>ab</sup>	0.1	0.2	0.1	0.1	0.1	0.3	0.1	0.3	0.2	0.2	0.1	0.2
Ammonia (mg/L)	<0.02 <sup>a</sup>	0.02	0.1	0.28	0.43	0.04	0.23	0.09	0.07	0.08	0.14	0.14	0.13

a – EPP (Water) 2009

b – Livestock Drinking

c – ANZECC Guidelines

**Table 9 Physico-Chemical Parameters (Stanley Creek, Springton Creek)**

Parameter	WQO	Stanley Creek		Springton Creek				
		DWR1 - 2018		DWI9	DAI5		DWI6	
		South	North	2019	2018	2019	2018	2019
pH	6.5 - 8.5 <sup>a</sup>	6.61	7.61	6.11	6.84	6.28	7.34	5.95
Temperature (°C)	n/a	28.1	31.4	22.9	27.8	21	24.6	23.2
EC (µS/cm)	<310 <sup>a</sup>	113.8	0.4	140.7	121.2	137.2	0.3	65
Suspended Solids (mg/L)	n/a	106	145	238	852	68	215	86
Total Dissolved Solids (mg/L)	3000 <sup>b</sup>	69.9	0.25	95.4	74.8	96.6	0.197	43.8
Dissolved Oxygen (DO) (%)	85-110 <sup>a</sup>	4	98	17.1	53	46	95	50
Oxygen Reduction Potential (millivolts)	n/a	98.2	147.1	116.5	242.5	220.9	158.6	222.8
Turbidity (NTU)	<50 <sup>a</sup>	155.3	4.1	44098.4	3734.08	30580.5	21.4	10730.4
Sulphate as SO <sub>4</sub> - Turbidimetric (mg/L)	<10 <sup>a</sup>	10	2	4	7	4	<1	2
Fluoride (mg/L)	2 <sup>ab</sup>	0.2	0.2	0.2	0.2	0.2	0.2	0.1
Ammonia (mg/L)	<0.02 <sup>a</sup>	0.12	0.13	0.9	<0.01	0.2	0.02	0.12

a – EPP (Water) 2009

b – Livestock Drinking

c – ANZECC Guidelines

**Table 10 Dissolved Metals (Charlevue Creek)**

Parameter	WQO	DAR1		DWR5		DAI1		DAI2		DAI3		DAI4	
		2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
Arsenic (mg/L)	0.5 <sup>b</sup>	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001
Beryllium (mg/L)	ND	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (mg/L)	5 <sup>b</sup>	0.08	0.06	0.26	0.1	0.13	<0.05	0.07	<0.05	0.1	<0.05	0.1	<0.05
Cadmium (mg/L)	0.01 <sup>a</sup>	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (mg/L)	1 <sup>b</sup>	<0.001	<0.001	0.002	0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
Cobalt (mg/L)	1 <sup>b</sup>	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper (mg/L)	0.4 <sup>b</sup>	0.004	0.003	0.003	0.003	0.004	0.003	0.004	0.003	0.004	0.003	0.004	0.003
Iron (mg/L)	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead (mg/L)	0.1 <sup>a</sup>	0.003	0.005	0.002	0.002	0.002	0.007	0.002	0.004	0.004	0.006	0.002	0.006
Manganese (mg/L)	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mercury (mg/L)	0.002 <sup>b</sup>	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.002
Nickel (mg/L)	1 <sup>b</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium (mg/L)	0.02 <sup>b</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium (mg/L)	ND	<0.005	<0.005	0.018	<0.005	0.082	0.005	0.053	<0.005	0.028	0.006	0.056	<0.005
Zinc (mg/L)	20 <sup>b</sup>	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001

a – EPP (Water) 2009

b – Livestock Drinking

c – ANZECC Guidelines

**Table 11 Dissolved Metals (Stanley Creek, Springton Creek)**

Parameter	WQO	Stanley Creek		Springton Creek				
		DWR1 - 2018		DWI9	DAI5		DWI6	
		South	North	2019	2018	2019	2018	2019
Arsenic (mg/L)	0.5 <sup>b</sup>	0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001
Beryllium (mg/L)	ND	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (mg/L)	5 <sup>b</sup>	0.06	0.13	0.07	0.21	0.07	0.06	<0.05
Cadmium (mg/L)	0.01 <sup>a</sup>	0.0001	0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Chromium (mg/L)	1 <sup>b</sup>	6	5	<0.001	<0.001	0.003	0.002	<0.001
Cobalt (mg/L)	1 <sup>b</sup>	0.002	0.002	0.001	<0.001	<0.001	0.005	<0.001
Copper (mg/L)	0.4 <sup>b</sup>	0.001	<0.001	0.002	0.004	0.003	0.008	0.001
Lead (mg/L)	-	0.002	<0.001	<0.001	<0.001	<0.001	0.004	<0.001
Manganese (mg/L)	0.1 <sup>a</sup>	0.055	0.003	0.041	0.021	0.009	0.562	0.037
Mercury (mg/L)	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel (mg/L)	0.002 <sup>b</sup>	0.005	0.004	0.002	0.002	0.004	0.005	0.002
Selenium (mg/L)	1 <sup>b</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium (mg/L)	0.02 <sup>b</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc (mg/L)	ND	0.044	<0.005	<0.005	0.056	0.005	0.039	<0.005

a – EPP (Water) 2009

b – Livestock Drinking

c – ANZECC Guidelines

**Table 12 Total Metals (Charlevue Creek)**

Parameter	WQO	DAR1		DWR5		DAI1		DAI2		DAI3		DAI4	
		2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
Arsenic (mg/L)	0.5 <sup>b</sup>	0.003	0.005	0.011	0.005	0.007	0.004	0.004	0.006	0.013	0.005	0.003	0.005
Barium (mg/L)	-	0.114	0.47	1.72	0.576	0.612	0.492	0.358	0.544	1.74	0.616	0.173	0.547
Beryllium (mg/L)	ND	<0.001	0.001	0.014	0.004	0.003	0.002	0.002	0.002	0.008	0.002	<0.001	0.002
Boron (mg/L)	5 <sup>b</sup>	<0.05	0.06	0.12	0.15	<0.05	0.05	<0.05	0.05	0.07	0.06	<0.05	0.06
Cadmium (mg/L)	0.01 <sup>b</sup>	<0.0001	<0.0001	0.0001	0.0004	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001
Chromium (mg/L)	1 <sup>b</sup>	0.011	0.025	0.223	0.061	0.05	0.025	0.027	0.028	0.112	0.029	0.019	0.031
Cobalt (mg/L)	1 <sup>b</sup>	0.007	0.011	0.119	0.024	0.026	0.011	0.016	0.016	0.081	0.014	0.007	0.013
Copper (mg/L)	0.4 <sup>b</sup>	0.012	0.032	0.181	0.057	0.053	0.034	0.03	0.038	0.149	0.041	0.018	0.039
Iron (mg/L)	-	0.09	0.45	<0.05	0.16	<0.05	0.47	0.12	1.21	0.08	0.48	0.07	0.44
Lead (mg/L)	0.1 <sup>b</sup>	0.008	0.014	0.084	0.026	0.029	0.014	0.016	0.016	0.082	0.018	0.008	0.017
Manganese (mg/L)	-	0.113	0.566	3.45	0.388	1.07	0.423	0.712	1.06	4.03	0.689	0.198	0.446
Mercury (mg/L)	0.002 <sup>b</sup>	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Nickel (mg/L)	1 <sup>b</sup>	0.008	0.029	0.252	0.04	0.051	0.028	0.027	0.032	0.0124	0.034	0.016	0.033
Selenium (mg/L)	0.02 <sup>b</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium (mg/L)	ND	0.04	0.07	0.48	0.13	0.11	0.07	0.06	0.08	0.24	0.08	0.04	0.08
Zinc (mg/L)	20 <sup>b</sup>	0.018	0.082	0.286	0.049	0.11	0.133	0.058	0.093	0.248	0.076	0.026	0.096

a – EPP (Water) 2009

b – Livestock Drinking

c – ANZECC Guidelines

**Table 13 Total Metals (Stanley Creek, Springton Creek)**

Parameter	WQO	Stanley Creek		Springton Creek				
		DWR1 - 2018		DWI9	DAI5		DWI6	
		South	North	2019	2018	2019	2018	2019
Arsenic (mg/L)	0.5 <sup>b</sup>	0.004	0.003	0.004	0.006	0.007	0.006	0.002
Barium (mg/L)	-	0.26	0.269	0.904	0.974	0.748	0.182	0.19
Beryllium (mg/L)	ND	0.002	0.002	0.008	0.004	0.006	0.001	0.001
Boron (mg/L)	5 <sup>b</sup>	0.06	0.06	0.13	<0.05	0.11	0.06	<0.05
Cadmium (mg/L)	0.01 <sup>b</sup>	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (mg/L)	1 <sup>b</sup>	0.036	0.033	0.064	0.039	0.078	0.039	0.033
Cobalt (mg/L)	1 <sup>b</sup>	0.013	0.018	0.054	0.024	0.026	0.013	0.009
Copper (mg/L)	0.4 <sup>b</sup>	0.024	0.024	0.056	0.058	0.085	0.024	0.021
Iron (mg/L)	-	0.61	0.17	2.2	0.18	0.94	0.34	0.4
Lead (mg/L)	0.1 <sup>b</sup>	0.01	0.013	0.035	0.033	0.038	0.012	0.011
Manganese (mg/L)	-	0.28	0.349	0.776	1.15	1.16	0.758	0.42
Mercury (mg/L)	0.002 <sup>b</sup>	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel (mg/L)	1 <sup>b</sup>	0.036	0.033	0.042	0.043	0.076	0.029	0.023
Selenium (mg/L)	0.02 <sup>b</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium (mg/L)	ND	0.06	0.08	0.11	0.1	0.16	0.07	0.05
Zinc (mg/L)	20 <sup>b</sup>	0.053	0.059	0.046	0.095	0.209	0.049	0.039

a – EPP (Water) 2009  
b – Livestock Drinking  
c – ANZECC Guidelines



**Table 14 Petroleum Hydrocarbons (Charlevue Creek)**

Parameter	WQO	DAR1		DWR5		DAI1		DAI2		DAI3		DAI4	
		2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
C6 – C9 Fraction (µg/L)	20 <sup>c</sup>	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C10 – C14 Fraction (µg/L)	100 <sup>c</sup>	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15 – C28 Fraction (µg/L)	100 <sup>c</sup>	<100	<100	120	<100	120	<100	<100	<100	<100	<100	<100	<100
C29 – C36 Fraction (µg/L)	100 <sup>c</sup>	<50	<50	90	<50	60	<50	<50	<50	<50	<50	<50	<50
C10 – C36 Fraction (sum) (µg/L)	100 <sup>c</sup>	<50	<50	210	<50	180	<50	<50	<50	<50	<50	<50	<50
C6 - C10 Fraction (µg/L)	20 <sup>c</sup>	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C6 - C10 Fraction minus BTEX (F1) (µg/L)	100 <sup>c</sup>	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
>C10 - C16 Fraction (µg/L)	100 <sup>c</sup>	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C16 - C34 Fraction (µg/L)	100 <sup>c</sup>	<100	<100	180	<100	140	<100	110	<100	120	<100	120	<100
>C34 - C40 Fraction (µg/L)	100 <sup>c</sup>	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum) (µg/L)	100 <sup>c</sup>	<100	<100	180	<100	140	<100	110	<100	120	<100	120	<100
>C10 - C16 Fraction minus Naphthalene (F2) (µg/L)	100 <sup>c</sup>	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100

a – EPP (Water) 2009

b – Livestock Drinking

c – ANZECC Guidelines

**Table 15 Petroleum Hydrocarbons (Stanley Creek, Springton Creek)**

Parameter	WQO	Stanley Creek		Springton Creek				
		DWR1 - 2018		DWI9	DAI5		DWI6	
		South	North	2019	2018	2019	2018	2019
C6 – C9 Fraction (µg/L)	20 <sup>c</sup>	<20	<20	<20	<20	<20	<20	<20
C10 – C14 Fraction (µg/L)	100 <sup>c</sup>	<50	<50	<50	<50	<50	<50	<50
C15 – C28 Fraction (µg/L)	100 <sup>c</sup>	140	190	<100	180	<100	230	<100
C29 – C36 Fraction (µg/L)	100 <sup>c</sup>	60	70	<50	70	<50	90	<50
C10 – C36 Fraction (sum) (µg/L)	100 <sup>c</sup>	200	260	<50	250	<50	320	<50
C6 - C10 Fraction (µg/L)	20 <sup>c</sup>	<20	<20	<20	<20	<20	<20	<20
C6 - C10 Fraction minus BTEX (F1) (µg/L)	100 <sup>c</sup>	<20	<20	<20	<20	<20	<20	<20
>C10 - C16 Fraction (µg/L)	100 <sup>c</sup>	<100	<100	<100	<100	<100	<100	<100
>C16 - C34 Fraction (µg/L)	100 <sup>c</sup>	170	230	<100	220	<100	280	<100
>C34 - C40 Fraction (µg/L)	100 <sup>c</sup>	<100	<100	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum) (µg/L)	100 <sup>c</sup>	170	230	<100	220	<100	280	<100
>C10 - C16 Fraction minus Naphthalene (F2) (µg/L)	100 <sup>c</sup>	<100	<100	<100	<100	<100	<100	<100

a – EPP (Water) 2009

b – Livestock Drinking

c – ANZECC Guidelines

## 6.2 STREAM SEDIMENT QUALITY

Analytical results produced for the stream sediment samples have been compared against SQG values for stream sediment quality at all sampling sites (Table 16, Table 17, Table 18).

The chemistry of all stream sediment sample sites is well below the relevant SQG low and high trigger values for all parameters except nickel (Table 16). Nickel results only exceeded the SQG low trigger value at DWR6 during the 2018 and 2019 sampling. This site is located along an unnamed waterway which feeds into Springton Creek at DA15. The results for cadmium, and mercury were below the limit of reporting (and SQG values).

**Table 16 Stream Sediment Total Metals Results**

Site	Total Metals (mg/kg)								
	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	
<b>SQG-Low</b>	<b>20</b>	<b>1.5</b>	<b>80</b>	<b>65</b>	<b>50</b>	<b>0.15</b>	<b>21</b>	<b>200</b>	
<b>SQG-High</b>	<b>70</b>	<b>10</b>	<b>370</b>	<b>270</b>	<b>220</b>	<b>1</b>	<b>52</b>	<b>410</b>	
<b>Stanley Creek</b>									
DWR1	South 2018	2.64	<0.1	16.8	11.4	7.3	0.01	15.9	18.3
	North 2018	2.14	<0.1	19.2	8.9	4.8	0.01	15.5	1.7
	2019	2.02	<0.1	9.1	4.8	4.3	<0.01	5.3	9.4
DWI1	2018	1.23	<0.1	7.3	1.1	1.7	<0.01	1.3	1.7
	2019	4.71	<0.1	10.2	5.4	4.8	<0.01	2.5	4.1
<b>Springton Creek</b>									
DWR6	2018	2.51	<0.1	23.5	12.2	8	0.02	28.1	23.5
	2019	2.33	<0.1	19.7	10.4	7.9	0.01	21.9	16.8
DWI9	2018	4.7	<0.1	25.2	2.8	8.8	<0.01	1.8	2.3
	2019	2.06	<0.1	13.6	3.4	7.4	<0.01	1.8	2.3
DWI8	2018	3.2	<0.1	11.8	3.1	6.2	<0.01	1.5	2
	2019	1.06	<0.1	7.9	1.6	2.3	<0.01	1.1	<1.0
DAI5	2018	3.56	<0.1	15.8	10.8	11.7	0.01	9.2	15.8
	2019	2.92	<0.1	13.1	11.2	9.8	0.01	9.4	15.2
DWI6	2018	2.54	<0.1	15.7	10.8	8.8	0.01	10.3	17.9
	2019	2.53	<0.1	13.4	10.9	9.3	0.01	9.2	14.2
<b>Charlevue Creek</b>									
DAR1	2018	1.23	<0.1	4.2	1.4	2.4	<0.01	1.4	3.1
	2019	1	<0.1	4.4	2.4	3.5	<0.01	2.8	4.6
DWR5	2018	6.73	<0.1	35.2	4.9	11.7	<0.01	4.7	5.3
	2019	2.84	<0.1	18.4	5.5	5.3	<0.01	5	4.9
DAI1	2018	3.08	<0.1	15.3	12.1	8.8	0.01	11.3	22.2
	2019	3	<0.1	12.1	15.2	10	0.02	11.7	23.5
DWR4	2018	1.63	<0.1	12.9	12.3	11.1	0.02	8	31.5
	2019	1.37	<0.1	11.7	13.9	11.7	0.002	7.4	30.5
DAI2	2018	3.42	<0.1	14.3	17.6	11.4	<0.01	15.8	33.9
	2019	1.03	<0.1	4.9	5	3.4	<0.01	4	9.6
DAI3	2018	2.33	<0.1	7	4	7.9	<0.01	4.8	6.14
	2019	2.07	<0.1	8.4	6.6	11.8	<0.01	6.6	9.3
DAI4	2018	3.7	<0.1	14	15.1	10.6	<0.01	13.7	28
	2019	1.54	<0.1	6.8	5.1	6.8	<0.01	5.1	8.9
DWI3	2018	<1.0	<0.1	3.3	<1.0	1.2	<0.01	<1.0	<1.0
	2019	1.12	<0.1	6.3	1.2	1.3	<0.01	1.4	1.8

**Table 17 Stream Sediment Particle Size Analysis**

Site		Particle Sizing (%)											
		µm					mm						
		+75	+150	+300	+425	+600	+1.18	+2.36	+4.75	+9.5	+19.0	+37.5	+75
<b>Stanley Creek</b>													
DWR1	South 2018	39	30	16	9	4	1	<1	<1	<1	<1	<1	<1
	North 2018	48	38	19	12	8	4	1	<1	<1	<1	<1	<1
	2019	74	69	53	40	26	7	1	<1	<1	<1	<1	<1
DWI1	2018	98	97	57	29	14	5	2	<1	<1	<1	<1	<1
	2019	98	97	64	39	23	9	5	3	<1	<1	<1	<1
<b>Charlevue Creek</b>													
DAR1	2018	97	94	92	87	68	22	2	<1	<1	<1	<1	<1
	2019	86	81	68	49	25	3	<1	<1	<1	<1	<1	<1
DWR5	2018	94	92	75	54	39	23	11	3	<1	<1	<1	<1
	2019	67	63	52	38	25	9	3	<1	<1	<1	<1	<1
DAI1	2018	41	30	19	14	11	6	1	<1	<1	<1	<1	<1
	2019	57	51	45	40	27	7	1	<1	<1	<1	<1	<1
DWR4	2018	31	21	10	6	5	3	<1	<1	<1	<1	<1	<1
	2019	23	14	6	4	3	2	<1	<1	<1	<1	<1	<1
DAI2	2018	7	3	2	2	1	<1	<1	<1	<1	<1	<1	<1
	2019	78	77	74	65	41	6	<1	<1	<1	<1	<1	<1
DAI3	2018	88	86	77	60	38	12	2	<1	<1	<1	<1	<1
	2019	81	72	53	35	12	1	<1	<1	<1	<1	<1	<1
DAI4	2018	31	20	12	8	5	3	2	<1	<1	<1	<1	<1
	2019	83	78	69	52	22	2	<1	<1	<1	<1	<1	<1
DWI3	2018	95	84	40	21	9	2	<1	<1	<1	<1	<1	<1
	2019	94	82	29	12	4	<1	<1	<1	<1	<1	<1	<1
<b>Springton Creek</b>													
DWR6	2018	23	15	9	7	6	3	<1	<1	<1	<1	<1	<1
	2019	33	20	8	6	5	3	2	<1	<1	<1	<1	<1
DWI9	2018	97	97	82	65	48	24	9	2	<1	<1	<1	<1
	2019	68	51	48	30	16	4	1	<1	<1	<1	<1	<1
DWI8	2018	79	65	41	29	21	15	11	8	5	<1	<1	<1
	2019	94	81	41	28	20	14	9	4	<1	<1	<1	<1
DAI5	2018	31	17	7	6	5	4	2	<1	<1	<1	<1	<1
	2019	51	35	12	6	3	1	<1	<1	<1	<1	<1	<1
DWI6	2018	26	16	7	3	2	<1	<1	<1	<1	<1	<1	<1
	2019	39	26	9	5	4	2	<1	<1	<1	<1	<1	<1

**Table 18 Stream Sediment Particle Size Classification**

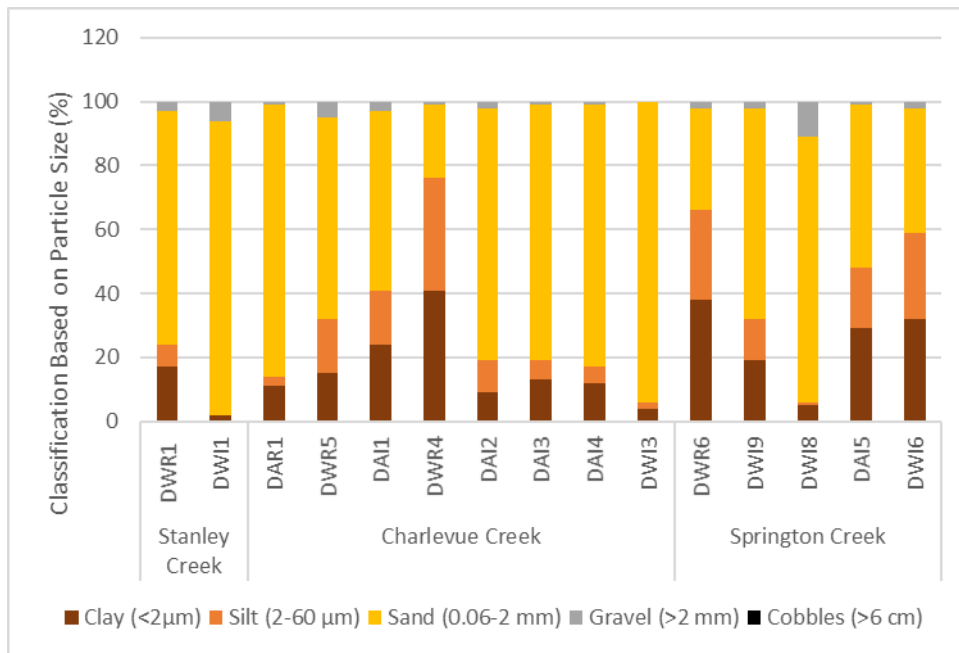
Site		Classification Based on Particle Size (%)				
		Clay (<2µm)	Silt (2-60 µm)	Sand (0.06-2 mm)	Gravel (>2 mm)	Cobbles (>6 cm)
<b>Stanley Creek</b>						
DWR1	South 2018	33	27	39	1	<1
	North 2018	26	23	49	2	<1
	2019	17	7	73	3	<1
DWI1	2018	<1	1	96	3	<1
	2019	2	<1	92	6	<1
<b>Charlevue Creek</b>						
DAR1	2018	1	2	89	8	<1
	2019	11	3	85	1	<1
DWR5	2018	2	4	79	15	<1
	2019	15	17	63	5	<1
DAI1	2018	27	29	42	2	<1
	2019	24	17	56	3	<1
DWR4	2018	37	17	45	1	<1
	2019	41	35	23	1	<1
DAI2	2018	25	66	9	<1	<1
	2019	9	10	79	2	<1
DAI3	2018	7	3	85	5	<1
	2019	13	6	80	1	<1
DAI4	2018	26	41	31	2	<1
	2019	12	5	82	1	<1
DWI3	2018	4	1	94	1	<1
	2019	4	2	94	<1	<1
<b>Springton Creek</b>						
DWR6	2018	35	25	38	2	<1
	2019	38	28	32	2	<1
DWI9	2018	2	<1	85	13	<1
	2019	19	13	66	2	<1
DWI8	2018	16	5	66	13	<1
	2019	5	1	83	11	<1
DAI5	2018	30	34	34	2	<1
	2019	29	19	51	1	<1
DWI6	2018	38	31	31	<1	<1
	2019	32	27	39	2	<1

Stream sediment was collected from Stanley Creek, Charlevue Creek and Springton Creek at all sites across 2018 and 2019. Particle size analysis (Table 17) and particle size classification (Table 18 and Figure 7) show Stanley Creek at the site DWR1 the stream sediment is predominantly sand, with small amounts of clay (17-33%) and silt (7-27%). However further downstream along Stanley Creek, the stream sediment is characterised as sand (92-96%) with minor contributions of gravel, silt and clay.

Along Springton Creek stream sediment levels vary between sites but remain consistent across sample years. Springton Creek itself is characterised by predominantly sand, with consistent levels of clay and silt.

Charlevue Creek stream sediment is characterised by high percentages of sand (56-94%) at the majority of sites (excluding DAI1, DWR4, DAI2, and DAI4) with variable levels of clay (1-24%) and silt (1-17%). Though minor, the presence of gravel was recorded across the sites along Charlevue Creek. Sites DAI1, DWR4, DAI2, and DAI4 presented lower levels of sand (9-45%) and higher percentages of fine sediments (clay 25-41% and silt 17-66%). Of these sites only DWR4 had higher levels of fine particles

during both the 2018 and 2019 sample periods. This site was located along a natural depression which flows into Charlevue Creek.



**Figure 7 Stream Sediment Particle Size Analysis**

### 6.3 CREEK ECOLOGY

#### 6.3.1 Physical Assessment

At all sites the full AusRivAS Physical Assessment Protocol (Parsons et al. 2002a) was followed, and the data collected at each site along with photos of each site is provided in Appendix B. Table 19 provides the erosion specific observations at each site. No flow was recorded at most sites with baseline flow recorded only at site DW16.

The effects of erosion on the banks of the receiving waters was evident across all survey sites. The leading cause of local erosion appeared to be stock access, with runoff and the influence of edge effects from historic clearing also promoting degradation. Large rainfall events each year would cause increased runoff, potentially washing sediment away from the bank and depositing it into the creeks. Cattle compact soil structures and trample vegetation; both leading to increased erosion. The impact of large woody debris at the sites was minimal and not considered significant.

**Table 19 Erosion Observations at AARC 2019 Sites**

Site	DWR1	DWR4	DWR5	DWR6	DWI1	DWI3	DWI6	DWI8	DWI9	DAR1	DAI1	DAI2	DAI3	DAI4	DAI5
<b>Bare Ground</b>	Low	Low	Low	None	None	Low	Low	*Mod	Low	*Mod	*Mod	Low	Low	Some	Low
<b>Exposed Tree Roots</b>	Low	None	Low	None	None	Low	Some	*Mod	None	Low	Low	*Mod	Some	*Mod	Low
<b>Gully Erosion</b>	Low	None	Low	Low	None	Some	*Mod	^Ext	Low	None	Low	Some	Some	Some	Some
<b>Bank Slumping</b>	None	None	Some	None	None	*Mod	*Mod	*Mod	Low	Some	Low	Some	*Mod	*Mod	Low
<b>Local Catchment Erosion</b>	None	None	*Mod	Low	Some	*Mod	Some	Some	Some	Low	^Ext	Low	Some	Some	Some

\*Mod – Moderate

^Ext – Extensive

Note: Observations were scored according to the following categories [None, Low (1-10%), Some (10-50%), Moderate (50-75%), or Extensive (>75%).

### 6.3.2 Habitat Bioassessment

This assessment considered the morphological characteristics of waterways (as specified in Section 5.5.2), with 135 representing a perfect score for a healthy waterway. Habitat assessments were completed at all sites.

The habitat bioassessment scores from the aquatic sites within the sampling environment primarily fell into the moderate and good categories (Figure 8), with the exception of one site DWR1 which was classed as excellent. These results are indicative of the general health of the river and the surrounding systems, it does not consider the quality of the water present. The following broad habitat types were recorded in and adjacent to the study area; non-riverine wetlands, ephemeral streams and farm dams.

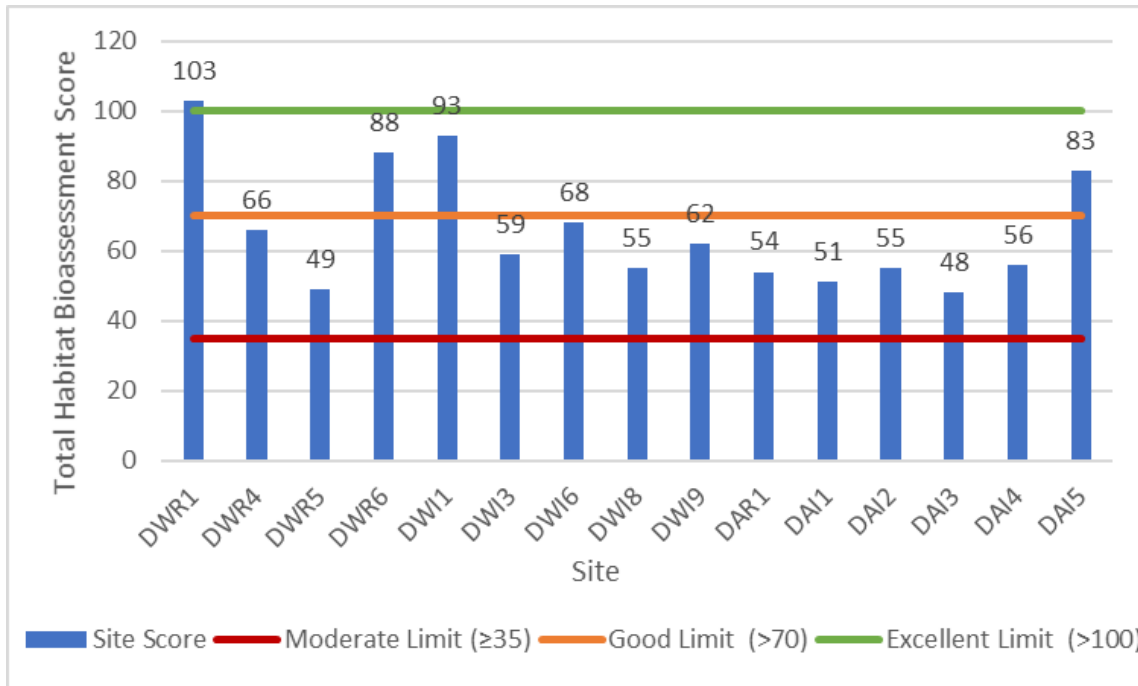
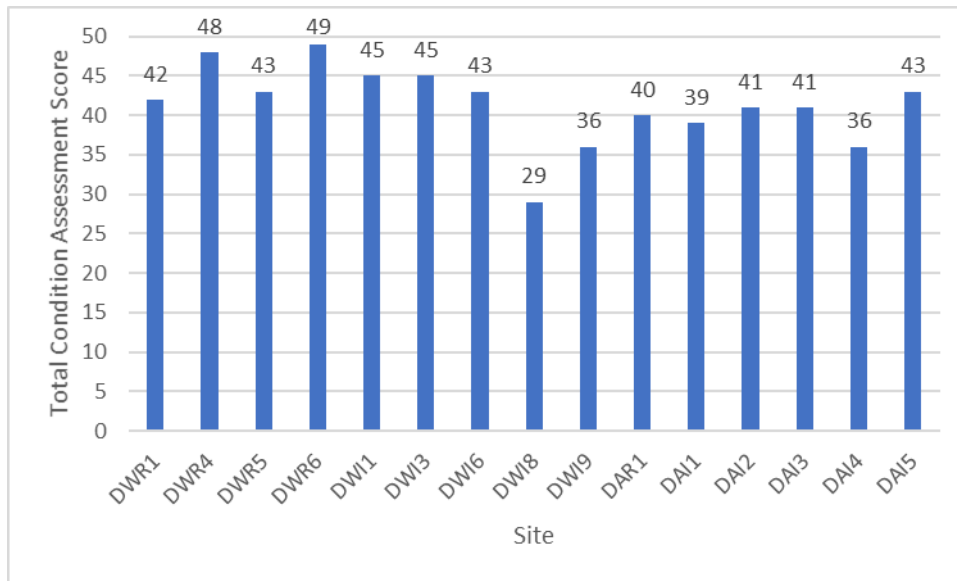


Figure 8 Habitat Bioassessment Scores

### 6.3.3 Condition Assessment

The condition assessment considered the impact/influence of ten different upstream activities on the waterways (as outlined in Section 5.5.3) with 50 representing the maximum score (no impact) and ten representing the minimum score (full impact). Impact assessments were completed at all sites and site assessment scores are presented in Figure 9.





**Figure 9 Condition Assessment Scores**

DWI8 had the lowest rating of 29, indicating that this site was influenced by upstream activities to a higher degree than the other sites. This site was one of two sites that received a rating of 1 (very major impact). DWI8 received a rating of 1 for the influence of alterations to the riparian zone. This site had been heavily cleared and showed signs of significant erosion. DAI1 was the other site that received the rating of 1, this was for the impact of erosion and damage from stock on the riparian zone. DWR6 had the highest rating of 49 indicating that the influence of activities upstream of this site had minimal impact.

### 6.3.4 Macroinvertebrate Sampling

Macroinvertebrate results from the 2019 survey have been summarised by calculating total abundance, taxonomic richness, PET taxa richness, SIGNAL 2 scores, community composition and percent tolerant taxa. Where applicable, these indices have been compared to relevant WQO for macroinvertebrates in the Mackenzie River Sub-basin. Nine sites were sampled for macroinvertebrates during the 2019 survey (DAI1, DAI2, DAI3, DAI4, DAI5, DAR1, DWR5, DWI6, and DWI9).

During sampling baseline flow was present at one site (DWI6), with the remaining sites having only standing pools of water with no flow, conditions which can impact the abundance and richness of macroinvertebrate taxa found. Due to the ephemeral nature of the waterways being sampled, habitats for macroinvertebrate sampling were limited to only edge (or bank) habitats during the 2019 survey.

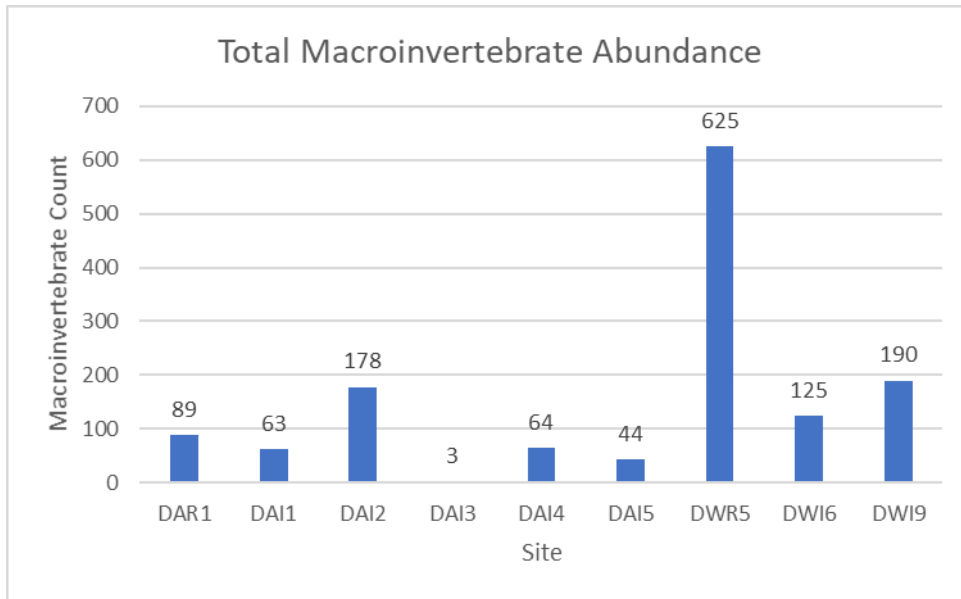
The taxa composition of macroinvertebrates is used to provide an estimate of a waterbody’s health. Macroinvertebrates are sensitive to a variety of factors such as turbidity, DO, pollutants in waterways and salinity. The surface water quality results support the low macroinvertebrate diversity, lack of PET taxa and low Signal 2 scores recorded across the study area.

#### 6.3.4.1 Total Abundance

Total abundance of macroinvertebrates sampled at aquatic sites within the 2019 survey varied significantly between sites. A complete list of all identified macroinvertebrates is available in Appendix C.

Macroinvertebrate abundance ranged from three (DAI3) to 625 (DWR5) (Figure 10). Fluctuation in total abundance is expected due to habitat availability for macroinvertebrates and the varying nature of the waterways sampled. Sites DWR5, DAR1, DAI1, DAI2, DAI3 and DAI4 all occur along or in close relation

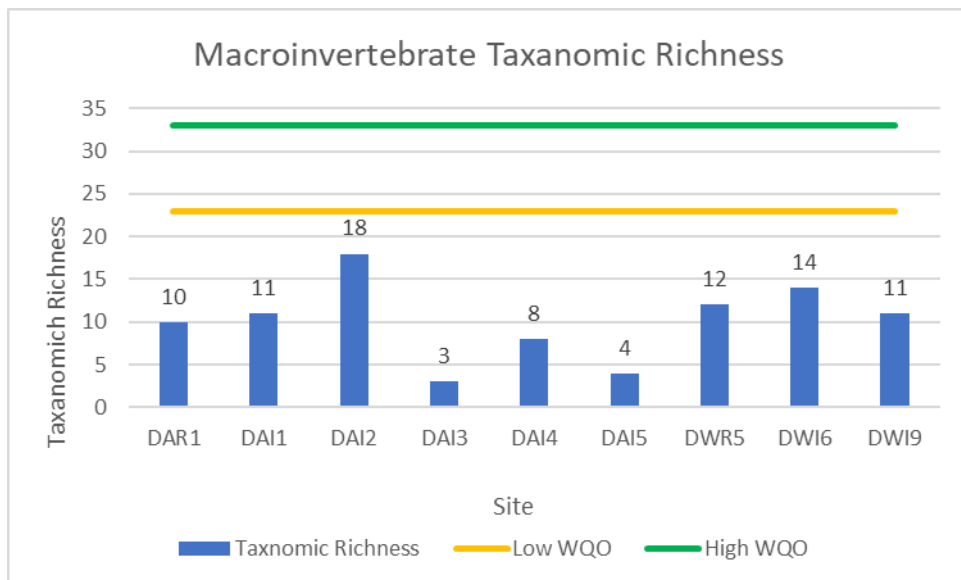
to Charlevue Creek. DAI5, DWI6 and DWI9 occur along Springton Creek or a tributary that flows into Springton Creek.



**Figure 10 Macroinvertebrate Abundance**

#### 6.3.4.2 Taxonomic Richness

Taxonomic richness recorded at the sites is shown in Figure 11; none of the sites sampled reached the lower WQO for taxonomic richness. The site that came closest was DAI2 which occurs along Charlevue Creek. This is an indicator of poor habitat quality and only a small number of macroinvertebrate taxa were recorded in the available habitat. Two sites had very low taxonomic richness with only three (DAI3) and four (DAI5) taxa recorded.



**Figure 11 Macroinvertebrate Taxonomic Richness**

### 6.3.4.3 PET Taxa Richness

The PET taxa are three orders of macroinvertebrate that are particularly sensitive to disturbance. They require favourable water quality conditions and diverse habitat to survive. PET taxa richness in ephemeral waterbodies tends to be low, due to the naturally harsh conditions in these waterways (i.e. poor water quality and low habitat diversity). However, trending declines in the number of PET taxa at a site may be an indication of pollution or poor water quality. Only four sites were found to support PET taxa (DAR1, DAI1, DAI2 and DAI4). These sites were found to only contain one PET taxa from the Ephemeroptera order. No other PET taxa were identified at the other sites. No sites were found to meet the lower WQO for PET taxa richness. The low levels of PET taxa sampled is likely due to the lack of available habitats during the sampling events and a lowered health of the water available for sampling.

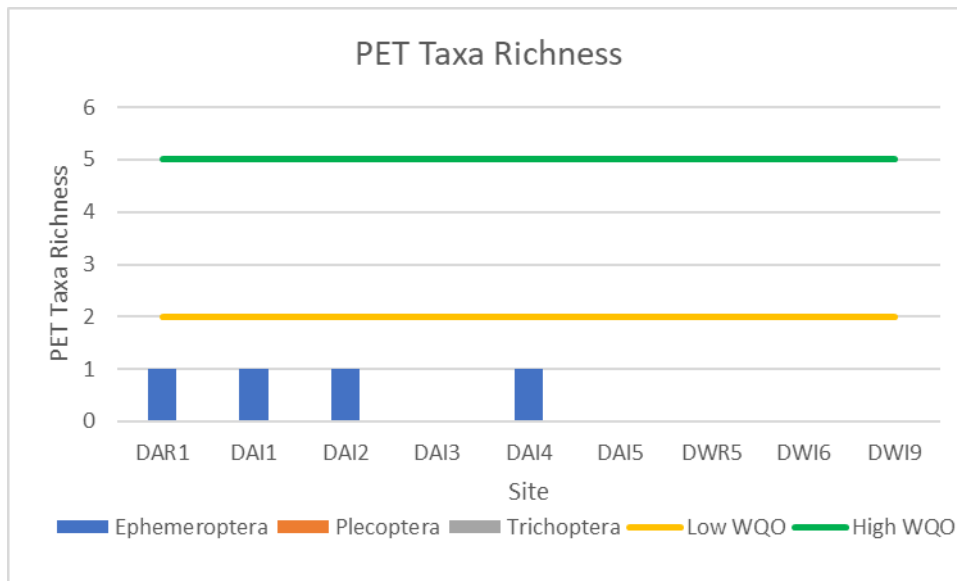
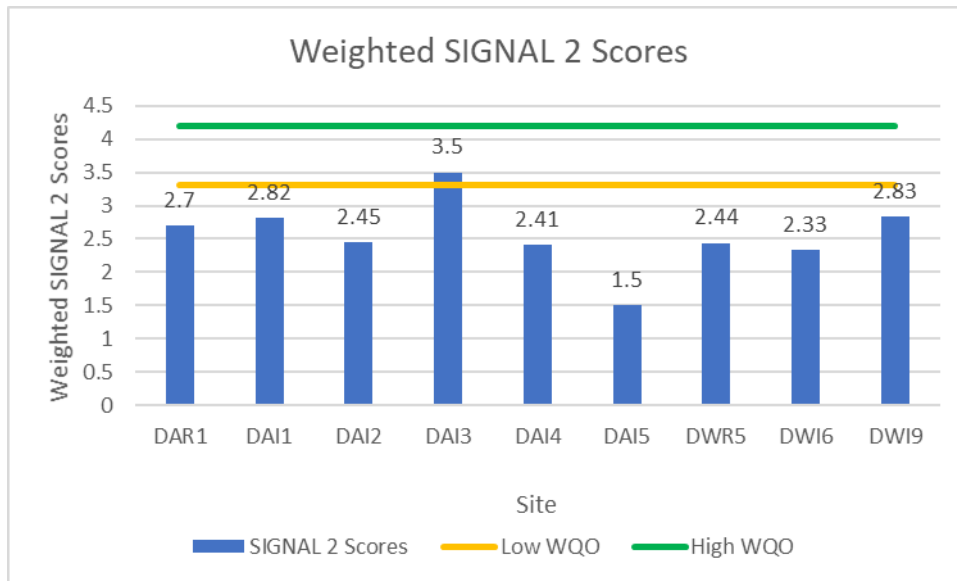


Figure 12 PET Taxonomic Richness

### 6.3.4.4 SIGNAL 2 Scores

Each macroinvertebrate family is allocated a score between 1 and 10 to represent their sensitivity to specific environmental conditions and varying levels of pollution. A lower score indicates that the macroinvertebrate family can tolerate a range of environmental conditions and common forms of water pollution; while a higher grade indicates that the macroinvertebrate family is sensitive to most forms of pollution.

The SIGNAL 2 scores recorded (Figure 13) indicated poor habitat availability and environmental conditions. All sites except one (DAI3) site fell below the lower WQO. Factors that would have influenced these results include the flow conditions at the site and the ephemeral nature of the waterways. Taxa found in ephemeral waters vary largely with rainfall events and as flow conditions change. Low abundance of sensitive macroinvertebrate taxa is likely to result from the environmental conditions.



**Figure 13 Macroinvertebrate SIGNAL 2 Site Scores**

**6.3.4.5 SIGNAL 2 Bi-Plot**

A SIGNAL 2 bi-plot was created for the aquatic sites to demonstrate the level of pollution and suitability of the site for macroinvertebrate habitation (Figure 14). Sites that fall into quadrant 4 exhibit levels of pollutants that reflect urban, industrial, or agricultural pollution. Sites in quadrant 3 indicate the presence of harsh physical environments or toxic pollution. Sites in quadrant 2 reflect waters which are high in nutrients or salinity. Sites in quadrant 1 are indicative of favourable water quality and minimal levels of disturbance. All sites fell within quadrant 4 which is consistent with what the sites are exposed to, as the sites are exposed to anthropogenic pollutions (urban/industrial developments), agricultural pollution, and downstream effects of dams.as all were open to human and livestock access.

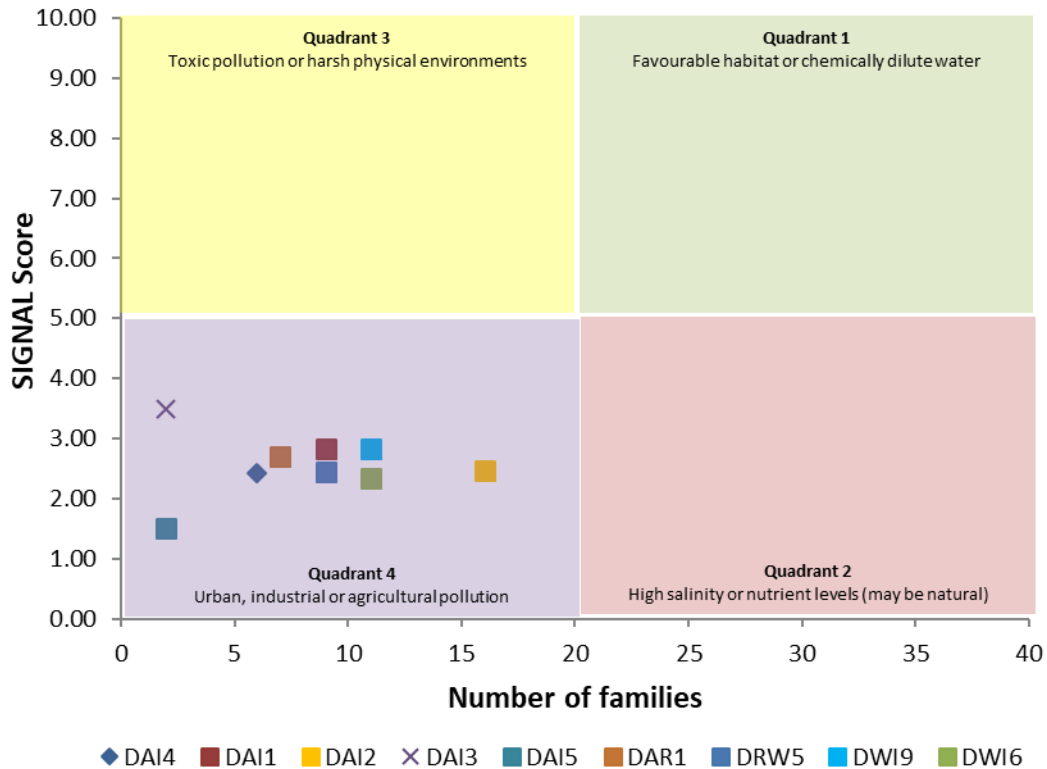
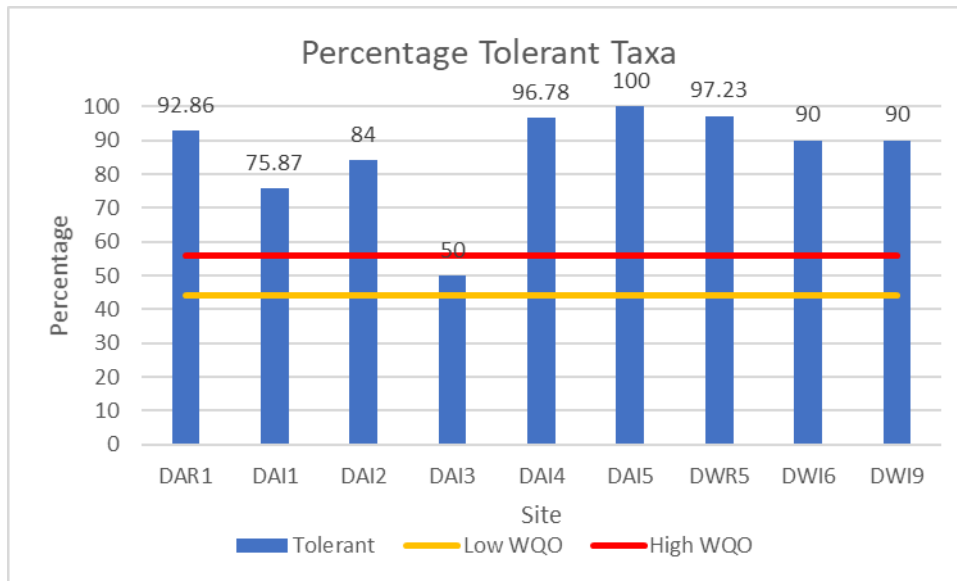


Figure 14 Macroinvertebrate SIGNAL 2 Bi-Plot

#### 6.3.4.6 Percent Tolerant Taxa

This index is based on the proportion of taxa that are rated as having a tolerant sensitivity grade (SIGNAL grades 1, 2 and 3). A higher proportion of tolerant taxa were recorded than the WQOs at all sites, only one site did not exceed the high WQO (DAI3). It should be noted that DAI3 had only 3 macroinvertebrates recorded, as such this result is not a true reflection of the macroinvertebrate population present at DAI3.

Typically, high proportions of tolerant taxa are reflective of poor health in the creek. This is indicative of ephemeral creeks; as the more resilient macroinvertebrate taxa survive. Figure 15 compares the percentage of tolerant taxa found at each site. Most of the taxa sampled were generalist taxa that are tolerant to higher levels of disturbance and higher salinity concentrations.



**Figure 15 Percentage of Tolerant Macroinvertebrate Taxa**

#### 6.3.4.7 Community Composition – AusRivAS Predictive Modelling

Macroinvertebrate community composition was interpreted by running data through an AusRivAS predictive modelling program. This model is used to predict macroinvertebrate assemblages that are expected to occur within a site in the absence of impact. This model is then used to compare the expected macroinvertebrate assemblage to that of the assemblage of macroinvertebrates collected during site sampling.

Observed versus Expected (O/E) taxa score is a ratio of the number of macroinvertebrate families observed onsite to that of the number of families expected; this provides a measure of biological impairment at the sample site. Five bands are used to categorise O/E taxa scores based on their biological condition;

- Band X indicates that the site is more biologically diverse than anticipated;
- Band A indicates that the site is similarly biologically diverse as expected and is therefore not negatively impacted by any conditions onsite; and
- Bands B, C, and D reflect environments with increasingly impaired health impacting on the diversity of macroinvertebrate assemblages.

Table 20 show the results of the AusRivAS predictive modelling assessment. All sample sites fell within or below Band B, indicating that the sites are potentially impacted either by water quality and/or the availability of macroinvertebrate habitats.

DAI1, DAI2, DAI5 and DWI9 received scores within the assessment Band B indicating that these sites are significantly impaired and exhibit fewer than expected taxa. Evidence of disturbance from cattle grazing was recorded at these sites and is likely the major contributor to the impaired scores. Sites DAR1, DAI4, DWR5 and DWI6 fell within Band C indicating that these habitats are severely impaired resulting in a lowered macroinvertebrate biodiversity. DAI3 received the lowest score falling within Band D, indicating that it is highly degraded and has extremely poor water and/or habitat quality. This site had the lowest macroinvertebrate abundance and macroinvertebrate taxa recorded.

**Table 20 AusRivAS Predictive Modelling Results**

Sample ID	O/E Taxa Score (OE50)	Habitat used for overall site assessment	Overall sample assessment band	Bandwidth-Upper limit
DAR1	0.29	Edge	C	0.37
DAI1	0.40	Edge	B	0.79
DAI2	0.70	Edge	B	0.79
DAI3	0.00	Edge	D	0
DAI4	0.10	Edge	C	0.37
DAI5	0.50	Edge	B	0.79
DWR5	0.30	Edge	C	0.37
DWI6	0.30	Edge	C	0.37
DWI9	0.40	Edge	B	0.79

### 6.3.5 Fish and Crustacean Sampling

#### 6.3.5.1 Crustaceans

Blue claw crayfish (*Cherax destructor*) were captured at all aquatic trap sites, except one (DAI3). The Inland freshwater crab (*Austrothelphusa transversa*) was captured at DAR1, DAI1, DAI2, and DAI5. The Inland freshwater crab can burrow up to one metre deep in heavy clay to avoid desiccation during periods of prolonged estivation (Nathan 2016). Two Freshwater shrimp (*Paratya australiensis*) were captured at DAI4.

Crustacean species living in highly ephemeral waterways display their own unique adaptation to cope with the harsh environment. Many crustaceans can survive long periods outside of a waterbody by extracting oxygen from air with their gills. This can only occur if the gills are kept moist so many species dig burrows to avoid desiccation and remain underground in estivation until water returns to the system. Mechanisms for desiccation resistance are observed in many species, including those that were identified during field surveys.

#### 6.3.5.2 Fish

Australia yields a low diversity of fish species predominantly due to its large areas of arid and semi-arid land, as well as the ephemeral nature of large areas of catchments (Allen et al. 2002). Due to the ephemeral nature of the waterways present within the study area the overall habitat available to freshwater species is relatively low. For most of the year, the waterways onsite are vastly unconnected with other aquatic habitats. Resulting in shallow still pools of water with limited refuge, breeding or feeding areas.

The 2019 aquatic survey identified two species of fish; Agassiz's glassfish (*Ambassis agassizii*), and Spangled perch (*Leiopotherapon unicolor*). The Agassiz's glassfish was recorded at DAI4 and DAI5, while the Spangled perch was recorded at DAI2 and DAI4.

All fish species recorded in the study area are considered to be common or widespread species in the Mackenzie River Sub-basin. Fish species of the study area can be generally considered either a 'small-bodied' species (Agassiz's glassfish) or a moderately sized species (Spangled perch). Most of the fish species recorded in the study have adaptations that allow rapid colonization and/or exploitation of ephemeral pool habitats;

- they are all generalist species (i.e. flexible dietary and habitat requirements); and/or
- some species (e.g. Spangled perch and Agassiz's glassfish) are able to move rapidly to newly created pools.

Such adaptations are necessary for exploiting the temporary habitat resources within the study area.

## 6.4 RIPARIAN AND AQUATIC VEGETATION

Riparian vegetation condition, species presence and plant health were assessed at each aquatic site. For the purposes of this survey, vegetation monitoring at each site was conducted along a 50 m transect, recording aquatic and riparian species within the riparian zone.

### 6.4.1 Vegetation Assessment

A full list of species is provided in Appendix D and photos of the sites are provided in Appendix B with the AusRivAS Physical Assessment Site information.

The total number of flora species sampled across the surveys at all the sites was 111. A total of 40 species were introduced species; eight of which are commonly used as pasture grasses or livestock feed. Of the remaining introduced species, the Velvety tree pear (*Opuntia tomentosa*), Mimosa (*Mimosa pigra*), Lantana (*Lantana camara*) and Parthenium weed (*Parthenium hysterophorus*) are declared Weeds of National Significance (WoNS) and Restricted Invasive species under the Biosecurity Act. Three additional flora species recorded within the study area are classed as Restricted Invasive species under the Biosecurity Act, these include Mother of millions (*Bryophyllum delagoense*), Mother of thousands (*Bryophyllum daigremontianum*) and Rubber vine (*Cryptostegia grandiflora*). Noogoora burr (*Xanthium pungens*) is classed as other Invasive Plants under the Biosecurity Act.

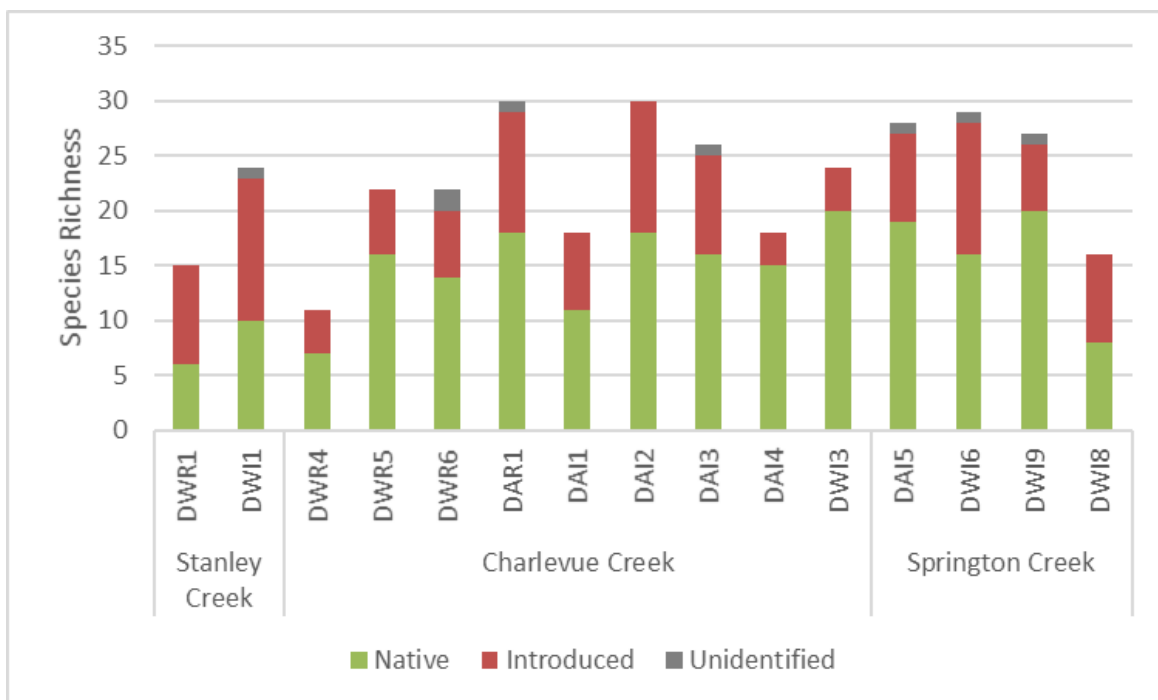
The riparian vegetation exhibited no signs of dieback, and constituted a mixture of low to moderate disturbance, and were located within both remnant and non-remnant environs (Table 21). Total species richness at each site varied between 11 and 30 species, incorporating between three and twelve introduced species (Figure 16). There was a fairly consistent species composition present with a mix of sedges, grasses, forbs, and trees and shrubs present at all sites, except for DWR4 which lacked any tree or shrub species (Figure 17). No in-stream aquatic macrophytes were recorded within the study area.



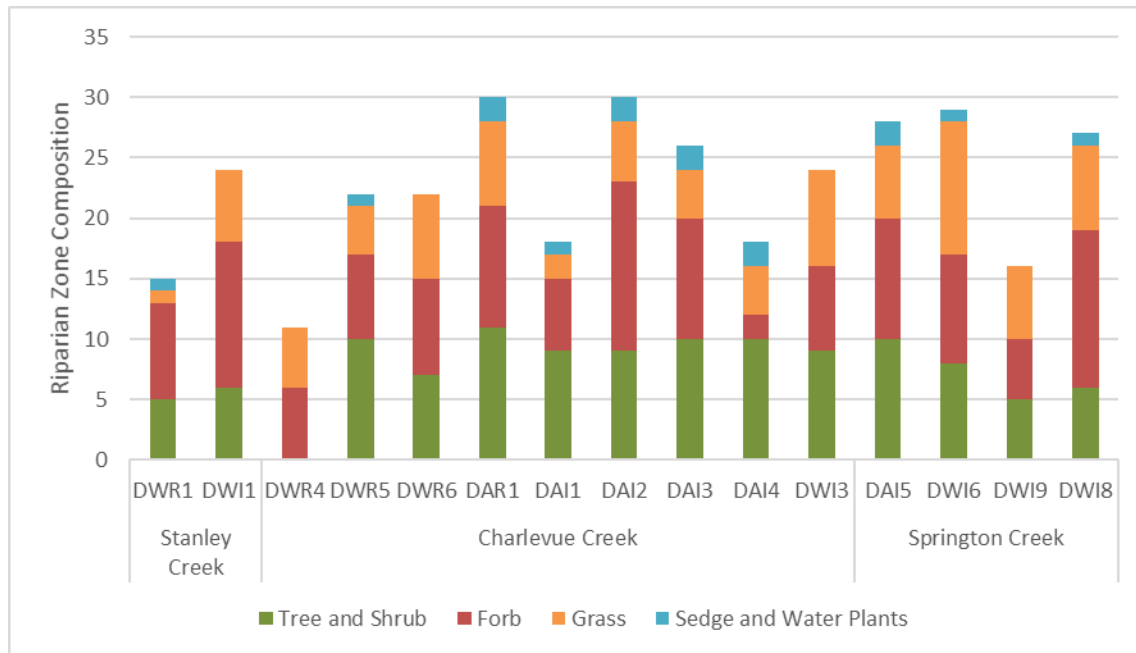
**Table 21 Vegetation Assessment**

Parameter	Remnant Riparian Vegetation	Level of Disturbance	Presence of Dieback
DWR1	Yes	High	No
DWI1	Yes	Low	No
DWR4	No	Low	No
DWR5	Yes	Moderate	No
DWR6	Yes	Low	No
DAR1	Yes	Low	No
DAI1	Yes	Low	No
DAI2	Yes	Moderate	No
DAI3	Yes	Moderate	No
DAI4	Yes	Moderate	No
DWI3	Yes	Low	No
DAI5	Yes	Moderate	No
DWI6	Yes	Moderate	No
DWI9	Yes	Low	No
DWI8	No	Moderate	No

Note the level of disturbance was categories based on observed levels of human impact (including land clearing), pastoral animal and feral animal impacts, disturbance from agriculture and riparian vegetation alteration (including the presence of introduced species). Categories included low, moderate and high.



**Figure 16 Vegetation Species Richness**



**Figure 17 Vegetation Species Composition**

### 6.4.2 Flora of Conservation Significance

No flora species of conservation significance were observed within the riparian zone during the surveys.

## 6.5 WETLANDS

There are several small non-riverine wetlands of medium conservation significance mapped by the Department of Environment and Science (DES) within the study area. These all occur in close association with Charlevue Creek which runs through the centre of the study area. These wetlands are ephemeral and do not hold water throughout the year. At the time of the 2019 sampling no water was present within the mapped wetland areas and therefore no aquatic assessment was able to be completed.

## 6.6 RIPARIAN ZONE VERTEBRATE FAUNA

Two amphibian species were identified during the surveys including one introduced species, the Cane toad (*Rhinella marina*), and one native species, the Bumpy rocket frog (*Litoria inermis*) (Photo Plate 1). The Cane toad was identified at DAI1 and the Bumpy rocket frog was observed at DAI5.

Eight reptile species were identified during the field surveys, including the Keelback snake (*Tropidonophis mairii*) (Photo Plate 2), Tommy Roundhead (*Diporiphora australis*), Dubious dtella (*Gehyra dubia*) and several skink species (Appendix E).

A total of 54 bird species representing 31 families were identified by the surveys. A list of the bird species recorded is provided in Appendix E. No migratory bird species were identified during the field survey within the study area. One Marine species was detected during the field surveys; the Rainbow bee-eater (*Merops ornatus*).

Two mammal species were identified rarely, the Common brushtail possum (*Trichosurus vulpecula*) and Greater glider (*Petauroides volans volans*). Greater gliders are classified as Vulnerable under both the EPBC Act and the NC Act. The Greater glider was recorded along Charlevue Creek at DAI1 and DAI2.

No aquatic fauna species of conservation significance were observed during surveys.



**Photo Plate 1 Bumpy rocket frog**



**Photo Plate 2 Keelback snake at DAI2**

## **6.7 SUMMARY OF AQUATIC VALUES**

The waterways of the study area are ephemeral, experiencing periodic flows. Charlevue Creek and Springton Creek are determined watercourses under the *Water Act 2000*. Extensive clearing for agricultural purposes has been undertaken across much of the study area including the removal of riparian vegetation. The removal of riparian vegetation and direct stock access to the waterways has resulted in bank instability, erosion and occurrence of weeds.

Surface water quality was found to be generally poor. At the time of sampling there was no surface flow. Results for physico-chemical parameters were outside the WQO guideline values for the protection of aquatic ecosystems at many sites including pH, dissolved oxygen, turbidity, ammonia, and sulphate (as  $\text{SO}_4^{2-}$ ). Petroleum hydrocarbons were found to exceed WQO guideline values at several sites, considered likely due to the highway and agricultural practices.

Stream sediments were found to contain a high proportion of sand particles with some sites containing a mixture of silt and clay. Metal concentrations in stream sediment were generally low, except for nickel levels at site DWR6.

Macroinvertebrate diversity, abundance and PET richness were generally low. SIGNAL scores were correspondingly low and consistent with the expected results for ephemeral streams in an agricultural setting. The AusRivAS predictive modelling assessed the aquatic environments at the sample sites as significantly impaired to highly degraded. While impaired habitats is common in ephemeral creeks, the extent and severity of the impairment indicates low waterway health.

The diversity and abundance of fish and crustaceans was found to be low.

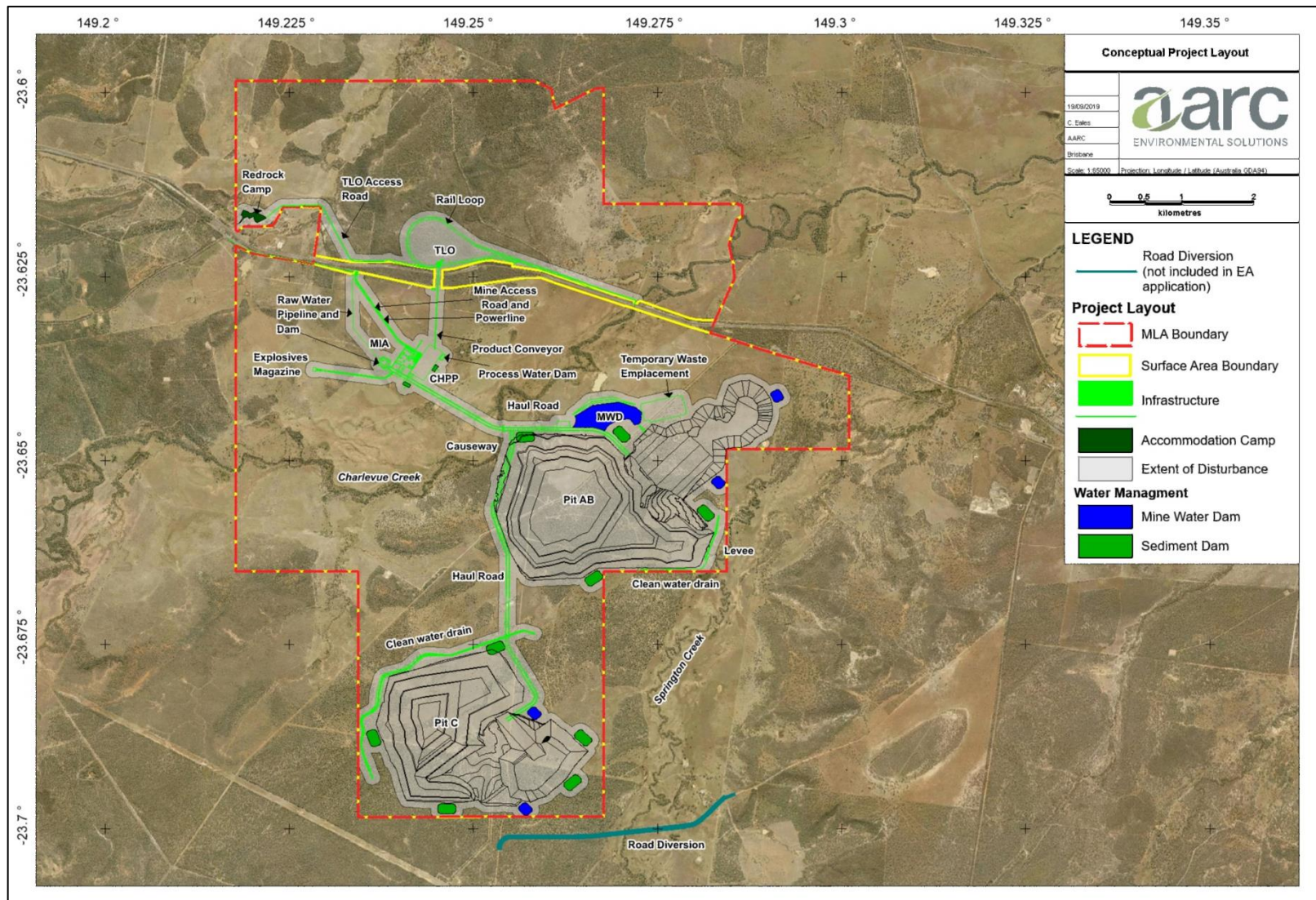
## 7.0 POTENTIAL IMPACTS

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The aquatic ecology values within the study area are limited to riverine ecosystems including Charlevue and Springton Creeks and some tributaries. The creeks are highly ephemeral, experiencing periodic flows only following rainfall events. Past clearing for agricultural purposes has been undertaken across much of the study area including the removal of riparian vegetation. The removal of riparian vegetation and direct stock access to the waterways has resulted in bank instability, erosion and occurrence of weeds.

The Project (Figure 18) has potential to impact on aquatic ecology values through:

- The release of mine affected water to the receiving waterways and associated impacts to ecosystem health;
- Potential for spills and leaks from the mining operation to cause contamination in the receiving waterways;
- Direct impacts to riverine ecosystems via land disturbance for vehicle crossings or diversions of drainage features;
- Risk of increased erosion from cleared lands or mine infrastructure such as spoil dumps, resulting in increased sediment loads entering the aquatic ecosystems; and
- Impediments to fish or other aquatic fauna movements due to the construction of crossings or other infrastructure.



**Figure 18 Conceptual Project Layout**

## 8.0 MITIGATION STRATEGIES

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Aquatic ecology values are primarily attributed to Charlevue and Springton Creeks within the MLA. The following mitigation measures will be implemented to protect existing values:

- Sediment and erosion control structures will be installed and maintained near all at risk areas to prevent sediment release to wetlands;
- Crossing design should provide for the fish passage during low and high flow events;
- The release of Mine Affected Water, will be in accordance with the quality controls provided by the model mining conditions;
- Fuel and hazardous liquids will be stored in a bunded facility, in accordance with Australian Standards;
- A Spill and Emergency Management plan will be implemented during construction and operation to minimise the risk of contaminant release to aquatic ecosystems;
- The Project open pits will be appropriately bunded or located in a manner that prevents surface water from entering the open pits during a 1:1000 year flood event and the Project dams will be appropriately bunded or located in a manner that prevents surface water from entering or damaging the dams during a 1:1000 year flood event (consistent with the 'Not a Controlled Action if undertaken in a particular manner' EPBC Referral decision); and
- A Receiving Environment Monitoring Program (REMP) will be implemented and will include monitoring of water, sediments, riparian / riverine vegetation health and biological indicators in aquatic environments.

## 9.0 PROJECT ENVIRONMENTAL OFFSETS

The offsets framework requires environmental offsets to be delivered where an activity is likely to result in a significant residual impact on a prescribed environmental matter. The *QEOP Significant Residual Impact Guideline* (DES 2014b) is used to determine whether residual impacts are considered to be significant.

Prescribed environmental matters (MSES) are listed in Schedule 2 of the Environmental Offsets Regulation. The following prescribed matters were mapped or identified within the Project area by the aquatic ecology surveys:

- Fish habitat areas and waterways providing for fish passage (under the *Fisheries Act 1994*);
- A habitat for an animal that is endangered wildlife or vulnerable wildlife, or a special least concern animal is a matter of State environmental significance; and
- a wetland—of high ecological significance shown on the map of Queensland wetland environmental values.

### 9.1 ASSESSMENT OF PRESCRIBED MATTERS IDENTIFIED IN THE STUDY AREA

#### 9.1.1 Fish Passage

Charlevue Creek is mapped as being at major risk of adverse impact from waterway barrier works on fish movement. Stanley Creek is mapped as being of moderate risk of adverse impact. Tributaries of the streams are mapped within the study area as being of either low, medium or high risk of adverse impact from waterway barrier works on fish movement. As described above, the Project will require:

- The crossing of Charlevue Creek (mapped as major risk);
- The Stanley Creek crossing (mapped as moderate risk);
- The development of clean water drains along a tributary of Springton Creek (and/or its tributaries) (mapped as low to moderate risk); and
- The disturbance of first and second order waterways (mapped as low to moderate risk).

The *Queensland Environmental Offsets Policy: Significant Residual Impact Guideline* (DEHP 2014) is designed to assist in determining whether or not the impacts of a project will, or is likely, to have a significant residual impact on a MSES.

As stated in the significant residual impact guidelines:

**Passage** for fish, means the natural movement patterns of fish species required to maintain the biological integrity of the species.

When assessed against the MSES significant residual impact guidelines (Table 22), the Project is considered unlikely to result in a significant residual impact on the waterways providing for fish passage. Based on the assessment, no offsets under the *Environmental Offset Regulation 2014* for waterways providing for fish passage are considered to be required for the Project.



**Table 22 MSES Residual Impact Assessment of Waterways providing for Fish Passage**

Significant Residual Impact Criteria	Ecological Assessment
<p>Will the action result in the mortality or injury of fish?</p>	<p>No, the Project would not result in the mortality or injury of fish</p> <ul style="list-style-type: none"> <li>The habitat within the study area offers limited habitat for fish species as the water systems are ephemeral and only flow during high rainfall events.</li> <li>All waterway crossings (Charlevue Creek and Stanley Creek) would be constructed in consideration of the <i>Accepted development requirements for operational work that is constructing or raising waterway barrier works</i> (DAF 2018), so as not to create a barrier to fish movement; and</li> <li>The development of the clean water drains along the Springton Creek tributary would be designed to replicate natural features where possible with the aim of providing similar conditions to the original waterway, so as to provide habitat and refuge for fish inhabiting or passing through the diversion.</li> </ul>
<p>Will the action result in conditions that substantially increase risks to the health, wellbeing, and productivity of fish seeking passage such as through the depletion of fishes energy reserves, stranding, increased predation risks, entrapment or confined schooling behaviour in fish?</p>	<p>No, the Project will not result in conditions that substantially increase risks to the health, wellbeing and productivity of fish seeking passage within the site. Given the intended design of the waterway crossings and the design of the Springton Creek tributary clean water drains that will be implemented, the Project is unlikely to result in the depletion of fishes' energy reserves, stranding fish, increase the risk of predation, entrapment or confined schooling behaviour in fish.</p>
<p>Will the action reduce the extent, frequency or duration of fish passage previously found at a site?</p>	<p>No, the habitat within the study area offers limited habitat for fish species as the water systems are ephemeral and only flow during high rainfall events. The Project will not reduce the extent, frequency or duration of fish passage within the site because the Project will ensure that:</p> <ul style="list-style-type: none"> <li>All waterway crossings (Charlevue Creek and Stanley Creek) would be constructed in consideration of the <i>Accepted development requirements for operational work that is constructing or raising waterway barrier works</i> (DAF 2018), so as not to create a barrier to fish movement; and</li> <li>The development of the clean water drains along the Springton Creek tributary would be designed to replicate natural features where possible with the aim of providing similar conditions to the original waterway, so as to provide habitat and refuge for fish inhabiting or passing through the diversion.</li> </ul>
<p>Will the action substantially modify, destroy or fragment areas of fish habitat (including, but not limited to in-stream vegetation, snags and woody debris, substrate, bank or riffle formations) necessary for the breeding and/or survival of fish?</p>	<p>No, the Project will not substantially modify, destroy or fragment areas of fish habitat necessary for breeding and/or the survival of fish, as the Project will ensure that:</p> <ul style="list-style-type: none"> <li>All waterway crossings (Charlevue Creek and Stanley Creek) would be constructed in consideration of the <i>Accepted development requirements for operational work that is constructing or raising waterway barrier works</i> (DAF 2018), so as not to create a barrier to fish movement; and</li> <li>The development of the clean water drains along the Springton Creek tributary would be designed to replicate natural features where possible with the</li> </ul>

Significant Residual Impact Criteria	Ecological Assessment
	<p>aim of providing similar conditions to the original waterway, so as to provide habitat and refuge for fish inhabiting or passing through the diversion.</p> <p>Several unnamed tributaries of the Springton Creek and Charlevue Creek are expected to be removed or otherwise impacted by mining activities. These waterways have been mapped as low to moderate risk of impact of fish passage. These waterways are of low stream orders (1 or 2) and are ephemeral. These waterways are not considered to provide fish habitat necessary for the breeding and/or the survival of fish.</p>
<p>Will the action result in a substantial and measurable change in the hydrological regime of the waterway, for example, a substantial change to the volume, depth, timing, duration and frequency of flows?</p>	<p>No, The Project is unlikely to result in substantial and measurable changes in the hydrological regime of the waterways within and around the study area. The volume, depth, timing, duration and frequency of flows are anticipated continue to reflect the ephemeral and variable flow nature of the waterways around the study area.</p>
<p>Will the action lead to significant changes in water quality parameters such as temperature, dissolved oxygen, pH and conductivity that provide cues for movement in local fish species?</p>	<p>No, given the water management measures that will be implemented (Section 8.0), the Project is unlikely to decrease the quality of habitat for fish utilising the study area or lead to a significant change in water quality parameters. The Project will also ensure that any water releases will be managed in accordance with the EA conditions (once developed).</p>

### 9.1.2 Fitzroy River Turtle

The *Queensland Environmental Offsets Policy: Significant Residual Impact Guideline* (DEHP 2014) is designed to assist in determining whether or not the impacts of a Project will, or is likely to, have a significant residual impact on a MSES.

An assessment of the potential impact of the Project on the Fitzroy River turtle using the MSES significant impact criteria is presented in Table 23.

**Table 23 Fitzroy River turtle MSES Significant Residual Impact Assessment**

Significant Residual Impact Criteria	Ecological Assessment
<p>Will the action lead to a long-term decrease in the size of local population of a species?</p>	<p>No, the habitat within the study area is not suitable for this species as the water systems are ephemeral and only flow during high rainfall events. The Project includes measures to prevent downstream impacts to the Fitzroy River turtle, specifically the:</p> <ul style="list-style-type: none"> <li>• appropriately bunding or location of pits in a manner that prevents surface water from entering the pit during a 1:1000 year flood event;</li> <li>• appropriately bunding or location of dams in a manner that prevents surface water from entering or damaging the dams during a 1:1000 year flood event.</li> </ul>
<p>Will the action reduce the extent of occurrence of the species ?</p>	<p>No, the proposed Project disturbance and downstream water releases are unlikely to reduce the potential area of occupancy for the Fitzroy River turtle.</p>

Significant Residual Impact Criteria	Ecological Assessment
Will the action fragment an existing population into two or more populations?	No, the Project would not fragment an existing population into two or more populations.
Will the action result in genetically distinct populations forming as a result of habitat isolation adversely?	No, given the water management measures to prevent downstream impacts to the Fitzroy River turtle the Project is unlikely to result in genetically distinct populations forming.
Will the action disrupt ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species?	No, given the water management measures to prevent downstream impacts to the Fitzroy River turtle the Project is unlikely to disrupt an ecologically significant location of this species.
Will the action result in invasive species that are harmful to the species becoming established in the species habitat?	No, while the Fitzroy River turtle is vulnerable to predation on nests from introduced pest species; pest management strategies will be implemented to minimise the risk of introduced pest species (such as feral pigs, <i>Sus scrofa</i> ) predating on the Fitzroy River turtle.
Will the action introduce disease that may cause the population to decline, or interfere with the recovery of the species?	No diseases are known for the species that could be caused by mining activities and cause the species' population to decline, nor would actions associated with mining activities interfere substantially with the recovery of the species.

When assessed against the MSES significant residual impact guidelines, the Project is considered unlikely to result in a significant residual impact on the Fitzroy River turtle. Based on the assessment, no offsets under the *Environmental Offset Regulation 2014* for the Fitzroy River turtle are considered to be required for the Project.

## 9.1 OFFSETS REQUIREMENTS

There are no aquatic MSES environmental offset requirements to be delivered under the Queensland legislation as part of this Project.

## 10.0 REFERENCES

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AARC Environmental Solutions Pty Ltd (AARC) (2019) 'Gemini Project: Terrestrial Ecology Assessment', prepared for Magnetic South Pty Ltd.

Allen GR, Allen M & Midgley SH (2002) Field guide to the freshwater fishes of Australia, Western Australian Museum, Western Australia.

ANZECC & ARMCANZ (2000a) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1: The Guidelines (Chapters 1-7), prepared by ANZECC and ARMCANZ for the National Water Quality Management Strategy, Department of Agriculture and Water Resources, Commonwealth of Australia, Canberra.

Brooks JD & Smith JW (1969) The diagenesis of plant lipids during the formation of coal, petroleum and natural gas—II. Coalification and the formation of oil and gas in the Gippsland Basin, *Geochimica et Cosmochimica Acta*, 33(10), 1183-1194.

Bureau of Meteorology (BoM) (2018) Queensland River Basins, Available from: <<http://www.bom.gov.au/qld/flood/brochures/qld/map.pdf>>, accessed May 2019.

Conrick D & Cockayne B (eds.) (2001) QLD AusRivAS Sampling and Processing Manual, I Department of Natural Resources, Mines and Energy, Queensland Government, Brisbane.

Curtis LK, Dennis AJ, McDonald KR, Kyne PM, and Debus SJS, (2012) Queensland's Threatened Animals, CSIRO Publishing, Collingwood.

Debus SJS (1995) Surveys of large forest owls in northern New South Wales: methodology, calling behaviour and owl responses. *Corella* 19, 38–50.

Department of Agriculture and Fisheries (DAF) (2013) Guide for the determination of waterways using the spatial data layer Queensland waterways for waterway barrier works, Queensland Government, Brisbane.

Department of Agriculture and Fisheries (DAF) (2018) Accepted development requirements for operational work that is constructing or raising waterway barrier works, Queensland Government, Brisbane.

Department of Environment and Heritage Protection (DEHP) (2011a) Environmental Protection (Water) Policy 2009; Mackenzie River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Mackenzie River Sub-basin, Department of Environment and Science, Queensland Government, Brisbane.

Department of Environment and Heritage Protection (DEHP) (2011b) WQ130 Mackenzie River Sub-basin: Environmental Protection (Water) Policy 2009 Central Queensland Map Series, Department of Environment and Science, Queensland Government, Brisbane, available from <[https://environment.des.qld.gov.au/water/policy/pdf/plans/mackenzie\\_plan\\_300811.pdf](https://environment.des.qld.gov.au/water/policy/pdf/plans/mackenzie_plan_300811.pdf)>, accessed May 2019.

Department of Environment and Heritage Protection (DEHP) (2014) Queensland Environmental Offsets Policy Significant Residual Impact Guideline, prepared by Conservation and Biodiversity Programs, Department of Environment and Science, Queensland Government, Brisbane.

Department of Environment and Science (DES) (2017) Guideline Model mining conditions, Department of Environment and Science, Queensland Government, Brisbane.

Department of Environment and Science (DES) (2018a) Fitzroy Drainage Basin – Facts and Maps. Available from: <<https://wetlandinfo.des.qld.gov.au/wetlands/facts-maps/basin-fitzroy/>>, accessed May 2019.

Department of Environment and Science (DES) (2018b) Monitoring and Sampling Manual: Environmental Protection (Water) Policy 2009, Department of Environment and Science, Queensland Government, Brisbane.

Department of Environment and Science (DES) (2019) Queensland Environmental Offsets Policy (Version 1.7), prepared by Conservation Policy and Planning, Department of Environment and Science, Queensland Government, Brisbane.

Department of Natural Resources and Mines (DNRM) (2001) AusRivAS Sampling and Processing Manual, Department of Natural Resources, Mines and Energy, Queensland Government, Brisbane.

Department of the Environment (DoE) (2013) Matters of National Environmental Significance, Significance impact guidelines 1.1 *Environment Protection and Biodiversity Conservation Act 1999*, Commonwealth of Australia, Canberra.

Department of the Environment and Energy (DoEE) (2018a). SPRAT EPBC Migratory Lists in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: <http://www.environment.gov.au/sprat>.

Department of the Environment and Energy (DoEE) (2018b), Species Profile and Threats Database, Department of the Environment, Canberra. Available from: <<http://www.environment.gov.au/sprat>>

Eyre TJ, Ferguson DJ, Hourigan CL, Smith GC, Mathieson MT, Kelly, AL, Venz MF, Hogan, LD & Rowland, J (2018), Terrestrial Vertebrate Fauna Survey Guidelines for Queensland V3.0, Queensland Herbarium, Department of Environment and Science, Queensland Government, Brisbane.

Fondriest Environmental Inc. (2014) 'Fundamentals of Environmental Measurements: Turbidity, Total Suspended Solids & Water Clarity', Available from <<http://www.fondriest.com/environmental-measurements/parameters/water-quality/turbidity-total-suspended-solids-water-clarity/>>, accessed May 2019.

Geoscience Australia (2018) Province and Sedimentary Basin Geology - Bowen Basin. Available from: <<http://www.ga.gov.au/scientific-topics/energy/province-sedimentary-basin-geology/petroleum/onshore-australia/bowen-basin>>, accessed May 2019.

Hutton AC (2009) Geological Setting of Australasian Coal Deposits, Australasian Coal Mining Practice, pp. 40-84.

Kavanagh R P and Peake P (1993) Distribution and habitats of nocturnal forest birds in south-eastern New South Wales. In 'Australian Raptor Studies' (Ed. P. Olsen.) pp.101–125 (Royal Australasian Ornithologists Union: Melbourne.)

Mutton AJ (2003) Queensland Coals - Physical and Chemical Properties, Colliery and Company Information, Department of Natural Resources and Mines, Queensland Government, Brisbane. Available from: <<https://www.dnrm.qld.gov.au/?a=267497>>, accessed May 2019

Nathan JW (2016) Unravelling life history of the Inland Freshwater Crab *Austrothelphusa transversa* in seasonal tropical river catchments, Australian Zoologist: 2016, Vol. 38, No. 2, pp. 217-222.

Neldner, VJ, Wilson, BA, Thompson, EJ & Dillewaard, HA (2017) Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland Version 4.0, Queensland Herbarium, Department of Environment and Science, Queensland Government, Brisbane.

Parsons M, Ransom G, Thoms M & Norris R (2002a) Australian River Assessment System: AusRivAS Physical and Chemical Assessment Module, Monitoring River Health Initiative Technical Report no 23, Commonwealth of Australia and University of Canberra, Canberra.

## Appendix A Database Searches



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  
epc: 881



## 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](mailto:biodiversity.planning@des.qld.gov.au)

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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: epc: 881**

Size (ha)	7,219.57
Local Government(s)	Central Highlands Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Woorabinda
Catchment(s)	Fitzroy

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)	Brigalow Belt v2.1
Aquatic Conservation Assessment(s) (riverine)	Great Barrier Reef Catchments v1.3
Aquatic Conservation Assessment(s) (non-riverine)	Great Barrier Reef Catchments v1.3

**Table 3: Remnant regional ecosystems within the AOI as per the Qld Herbarium's 'biodiversity status'**

Biodiversity Status	Area (Ha)	% of AOI
Endangered	6.41	0.09
Of concern	236.35	3.27
No concern at present	1,816.18	25.16

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	0.0	0.0
State	887.22	12.29
Regional	325.7	4.51
Local or Other Values	1,126.39	15.6

**Table 5: Non-riverine wetlands intersecting the AOI**

Non-riverine wetland types intersecting the area of interest	#
Number of Palustrine wetlands	4
Number of Lacustrine wetlands	2

Non-riverine wetland types intersecting the area of interest	#
Total number of non-riverine wetlands	6

*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**

Name	Permanency
CHARLEVUE CREEK	Non-perennial
SPRINGTON CREEK	Non-perennial
STANLEY CREEK	Non-perennial

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	0.0	0.0
High	0.0	0.0
Medium	7,219.57	100.0
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	0.0	0.0
High	0.0	0.0
Medium	10.88	0.15
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	0.0	0.0
State	887.22	12.29
Regional	325.7	4.51
Local or Other Values	1,126.39	15.6

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

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*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 Vulnerable or Near Threatened species (A) & Nat. Threatened Ecol. Community (B1)	49.69	0.69
State	Remnant contains at least one Of Concern RE (B1) & Nat. Threatened Ecol. Community (B1)	170.08	2.36
Regional	Remnant contains at least 1 Vulnerable or Near Threatened species (A)	297.04	4.11
Regional	Remnant contains at least one Of Concern RE (B1)	24.52	0.34
Local or Other Values	Refer to diagnostic data for additional information	1,787.11	24.75

**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			346.7	4.8	1,451.58	20.1	530.12	7.3
B1: Ecosystem Value (Bioregion)	219.75	3.0	24.52	0.3	1,842.09	25.5		
B2: Ecosystem Value (Subregion)					2,086.36	28.9		
C: Tract Size			695.57	9.6	635.1	8.8	755.69	10.5
D1: Relative RE Size (Bioregion)							2,086.36	28.9
D2: Relative RE Size (Subregion)							2,086.36	28.9
F: Ecosystem Diversity	40.49	0.6	770.08	10.7	1,160.05	16.1	115.74	1.6
G: Context and Connection	182.92	2.5	467.75	6.5	1,377.66	19.1	58.03	0.8

**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)	709.9	9.83
Regional	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I)	0.32	0.0
Regional	Remnant forms part of a bioregional corridor (J)	95.17	1.32
Local	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I)	10.56	0.15

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 access 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								
Ia: Centres of Endemism								
Ib: Wildlife Refugia	709.92	9.8	0.32		10.55	0.1		
Ic: Disjunct Populations								



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
Id: Limits of Geographic Ranges								
Ie: High Species Richness								
If: Relictual Populations								
Ig: Variation in Species Composition								
Ih: Artificial Wetland								
Ii: Hollow Bearing Trees								
Ij: Breeding or Roosting Site	30.51	0.4						
Ik: 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	95.17	1.32
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
brbn_I_62	Taunton Scientific Reserve	State	Ib (refugia): VH
brbs_I_18b	None	None	None
brbs_I_47	Regionally significant natural palustrine & lacustrine wetlands	Regional	Ib (refugia): H
brbs_I_48	Locally significant natural palustrine & lacustrine wetlands	Local	Ib (refugia): M
brbs_I_49	Gilgai Remnants	State	Ib (refugia): VH; Ij (aggregation site):VH

#### Expert panel decision descriptions:

##### brbn\_I\_62

Taunton National Park (Scientific) acts as a refugia within a heavily modified landscape. The park was established primarily for the purpose of protecting the endangered bridled nailtail wallaby *Onychogalea fraenata*. Dispersal of individuals in time to suitable habitat to the south will rely on retaining connectivity from the park, particularly along the creeks Five Mile, Duckworth, Walton, Iguana, Stanley, Charlevue, Spectacle, Lagoon and Wild Horse (not captured in the spatial implementation).

Other known conservation significant fauna which occur or have been recorded within the park are golden-tailed gecko *Strophurus taenicauda*, brigalow scaly-foot *Paradelma orientalis*, ornamental snake *Denisonia maculata*, speckled warbler *Chthonicola sagittata*, koala *Phascolarctos cinereus* and squatter pigeon *Geophaps s. scripta*. Representatives from six of the Australian snake families are also found in the reserve.

With respect to flora, 12 regional ecosystems are present including endangered brigalow communities. More than 190 species of flora have been recorded, of which at least 4 are threatened - *Solanum elaeagnifolium*, *Solanum adenophorum*, *Dichanthium setosum* and *Cerbera dumicola*.

#### **brbs\_I\_18b**

None

#### **brbs\_I\_47**

The panel considered that relatively natural palustrine and lacustrine wetlands and waterbodies within the Brigalow Belt bioregion act as important refugia, especially during periods of drought.

Whilst State significant wetlands are captured under Criterion B1, the panel agreed that all such natural wetland complexes with a combined area of greater than or equal to 5ha in size should be classed as being of at least Regional significance.

Refer to brbn\_I\_92 for the northern BRB implementation of this decision.

#### **brbs\_I\_48**

The panel considered that relatively natural palustrine and lacustrine wetlands and waterbodies within the Brigalow Belt bioregion act as important refugia, especially during periods of drought.

Whilst State significant wetlands are captured under Criterion B1, and regionally significant wetlands under the decision brbn\_I\_47, the panel agreed that all remaining relatively natural wetland complexes of less than 5ha in size be classed as being of at least local significance.

Refer to brbn\_I\_93 for the northern BRB implementation of this decision.

#### **brbs\_I\_49**

The gilgai wetland systems in the Brigalow Belt tend to be dominated by acacia and casuarina (mostly brigalow *Acacia harpophylla* and *Acacia cristata*). *Melaleuca*, *Corymbia* and *Eucalyptus* species are also common along with *Astrelba* or *Dichanthium* spp. grassland. Gilgai systems are widespread and some are in good condition while others are largely cleared. The range of threatened wildlife present may use inundated gilgai as a water source at some stage of their life or are closely associated with the cracking clay soil habitat and wetlands.

Gilgai reptiles include the death adder *Acanthophs antarcticus*, De Vis' banded snake *Denisonia devisi* and ornamental snake *D. maculata*. Amphibians that use gilgai include salmon striped frog *Limnodynastes salmini*, scarlet-sided pobblebonk *L. terraereginae* and striped burrowing frog *Cyclorana alboguttata*. Other fauna which may use gilgai habitat at various times include bridled nailtail wallaby *Onychogalea fraenata*, black-striped wallaby *Macropus dorsalis* and the glossy black cockatoo *Calyptorhynchus lathami*.

Refer to brbn\_I\_75 for the northern BRB implementation of this decision.

# 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	0.0	0.0

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	0.0	0.0
Medium	7,219.57	100.0
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					1,273.24	17.6	5,946.33	82.4
2. Naturalness catchment	2.53		7,217.04	100.0				
3. Diversity and richness	1,273.24	17.6	2,074.17	28.7	3,872.16	53.6		
4. Threatened species and ecosystems			7,219.57	100.0				
5. Priority species and ecosystems	7,217.04	100.0						
6. Special features								
7. Connectivity			5,946.33	82.4	1,273.24	17.6		
8. Representative-ness								

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)
(No Records)				

*4 is the highest rating/value*

#### Expert panel decision descriptions:

(No Records)

## 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	0.0	0.0
High	0.0	0.0
Medium	10.88	0.15
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	4.68	0.1			6.19	0.1		
2. Naturalness catchment					10.87	0.2		
3. Diversity and richness			6.8	0.1	3.75	0.1	0.32	
4. Threatened species and ecosystems	2.43		4.37	0.1				
5. Priority species and ecosystems			10.87	0.2				
6. Special features								
7. Connectivity								
8. Representative-ness					6.8	0.1		

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)
ma_nr_fl_02	Regional ecosystems 8.3.4 & 11.3.27	Mackenzie	5.2.1	3

*4 is the highest rating/value*

**Expert panel decision descriptions:**

**ma\_nr\_fl\_02**

These regional ecosystems contain significant habitat values that are under threat from threatening processes such as physical alteration/ destruction and invasion by **hymenachne**.

**Note:** This priority ecosystem decision applies to the following catchments: Calliope, Comet, Dawson, Fitzroy, Isaac, Mackenzie, Misc Other Islands, Nogoia, O'Connell, Pioneer, Plane, Proserpine, Shoalwater, Styx and Waterpark.



## 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>Cerbera dumicola</i>		NT		Low			FL
<i>Geophaps scripta scripta</i>	Squatter Pigeon (southern subsp.)	V	V	Medium			FA
<i>Onychogalea fraenata</i>	Bridled Naittail Wallaby	E	E	Critical			FA
<i>Solanum elaeagnifolium</i>		E		Medium			FL

*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.

\*\*Y - wetland indicator 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**

(no results)

*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>Eucalyptus camaldulensis</i>			FL
<i>Eucalyptus tereticornis</i>			FL
<i>Lomandra longifolia</i>			FL

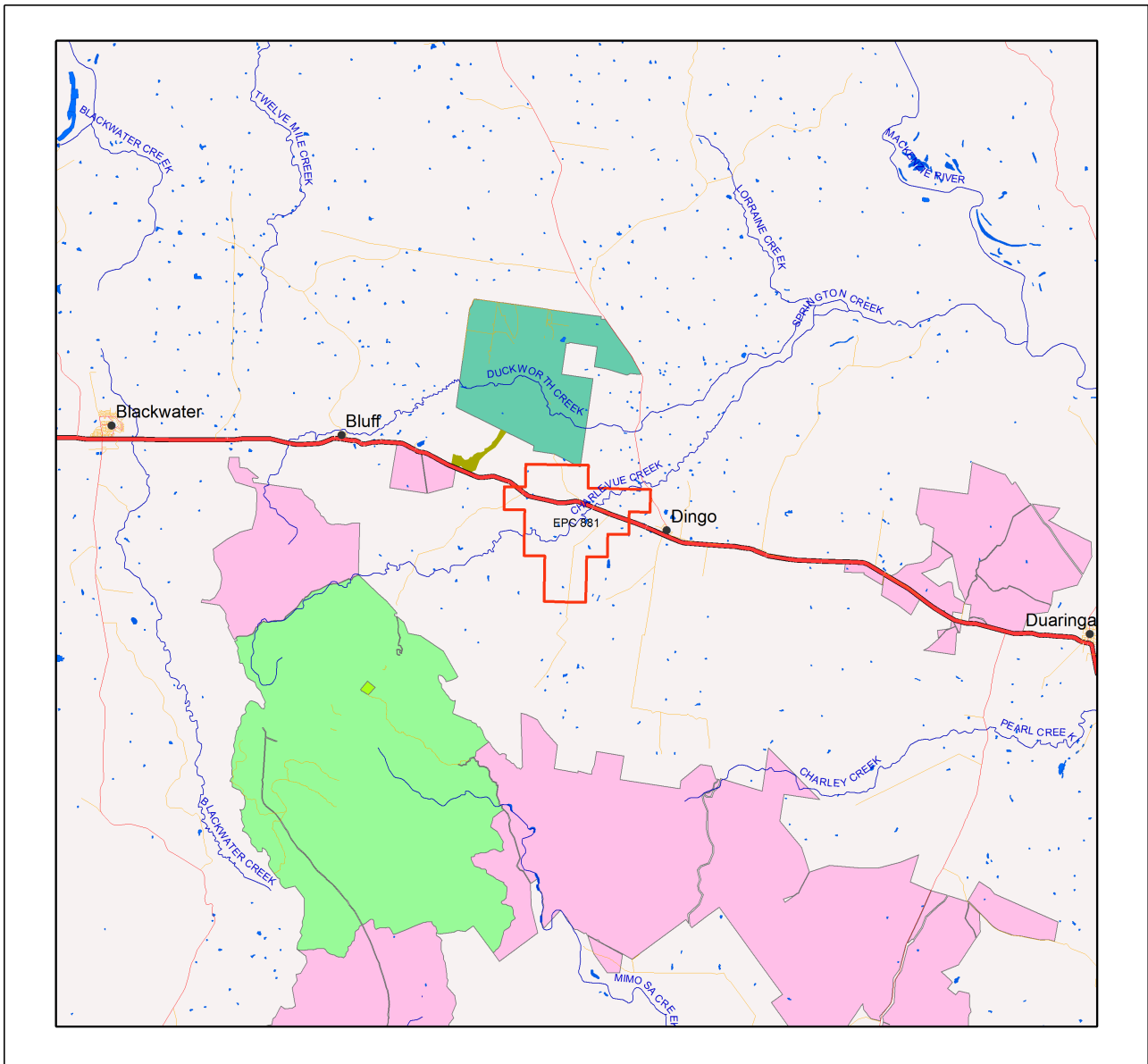
**Table 25: Priority species recorded on, or within 4 km of the AOI - non-riverine**

Species	Common name	Back on Track rank	Identified flora/fauna
<i>Eucalyptus tereticornis</i>			FL

*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

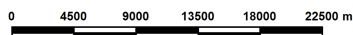
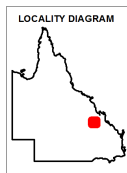
## Map 1 - Locality Map



### Locality Map

#### Legend

- Selected Exploration Permit Coal (EPC)
- 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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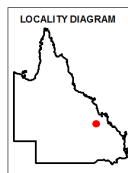
## Map 2 - Biodiversity Planning Assessment (BPA)



### Biodiversity Planning Assessments

**Legend**

- Selected Exploration Permit Coal (EPC)
- Towns
- Roads
- Major rivers/creeks
- Queensland
- Biodiversity Planning Assessment**
- State Habitat for EVNT tax
- State
- Regional
- Local or Other Values
- Non Bioregion Ecosystem



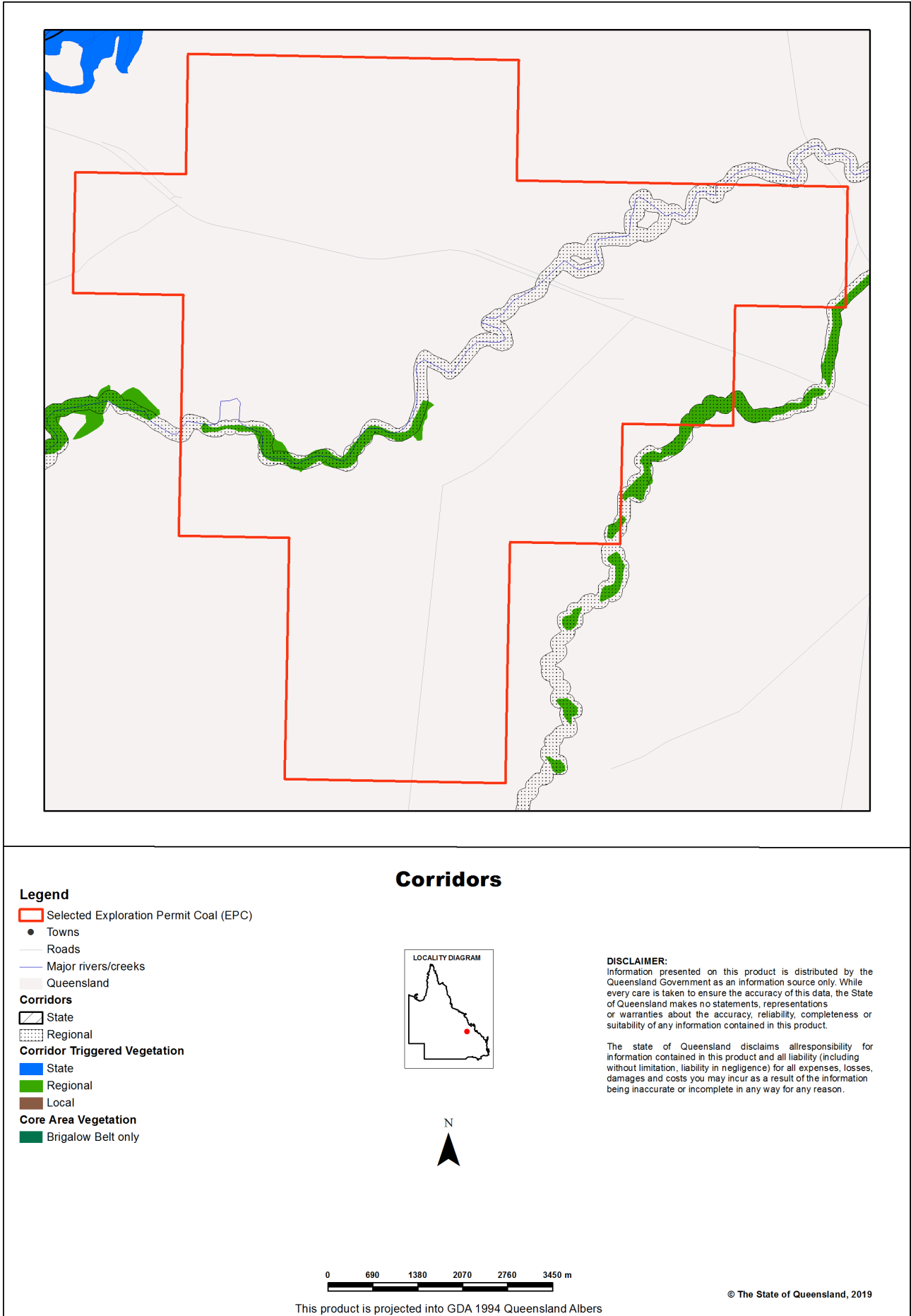
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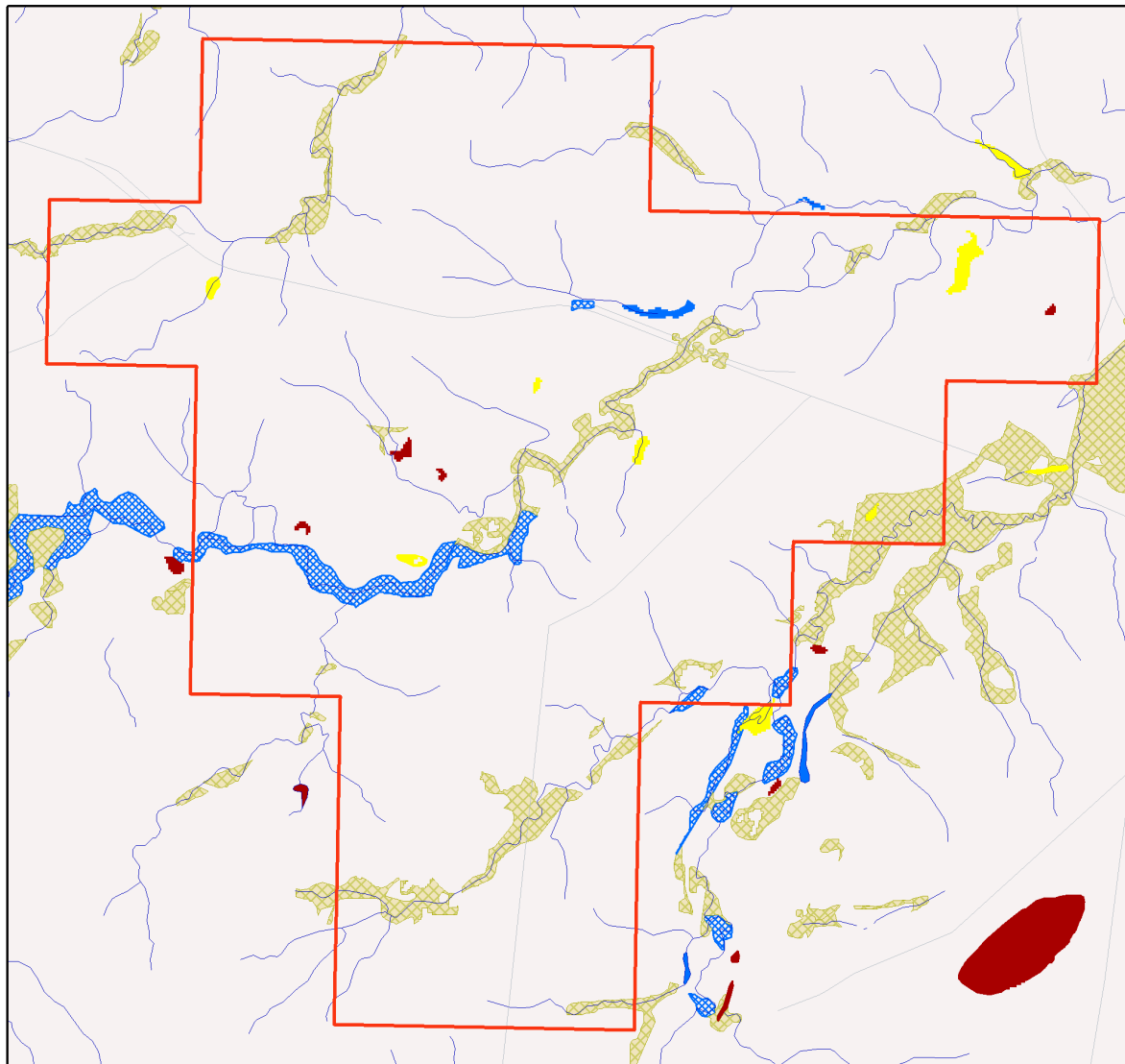
This product is projected into GDA 1994 Queensland Albers

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# Map 3 - Corridors



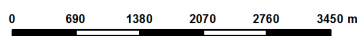
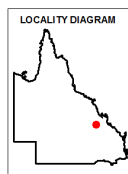
# Map 4 - Wetlands and waterways



## Wetlands and Waterways

### Legend

- Selected Exploration Permit Coal (EPC)
  - Towns
  - Roads
  - Springs
  - Rivers/Creeks
  - Directory of Important Wetlands
  - ▨ Ramsar Sites - QLD
  - Queensland
- Wetland Type**
- Marine Waterbodies
  - Estuarine Waterbodies
  - Riverine Waterbodies
  - Lacustrine Waterbodies
  - Palustrine Waterbodies
  - Marine RE
  - Estuarine RE
  - Riverine RE
  - Lacustrine RE
  - Palustrine RE
  - RE 51-80% wetland (mosaic units)
  - RE 1-50% wetland (mosaic units)



This product is projected into GDA 1994 Queensland Albers

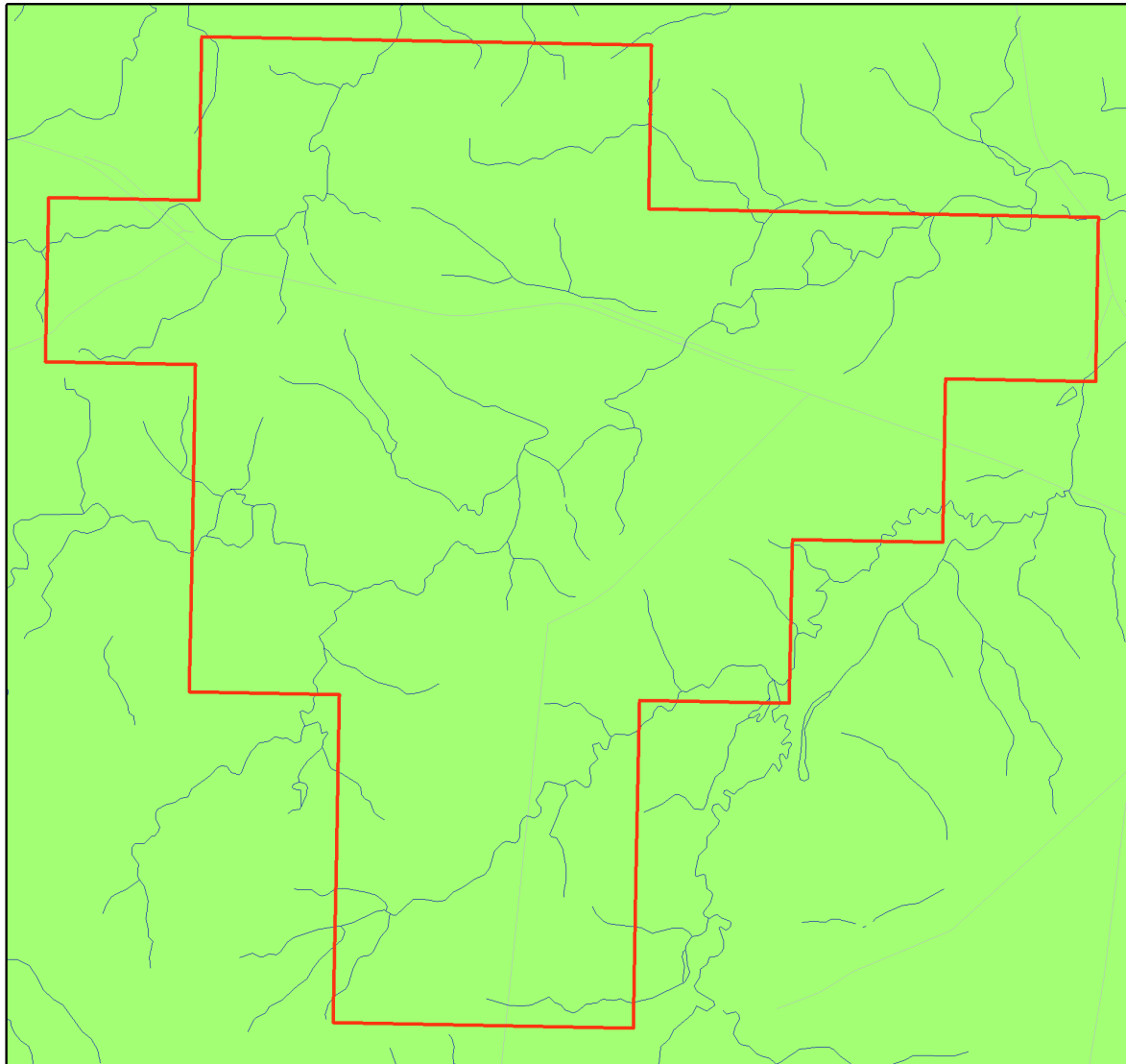
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# Map 5 - Aquatic Conservation Assessment (ACA) - riverine



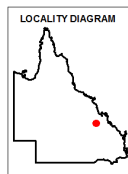
## Aquatic Conservation Assessment (ACA) - riverine

**Legend**

- Selected Exploration Permit Coal (EPC)
- Towns
- Roads
- Rivers/Creeks
- Queensland

**ACA Riverine - Subcatchment Significance**

- Very High
- High
- Medium
- Low
- Very Low



This product is projected into GDA 1994 Queensland Albers

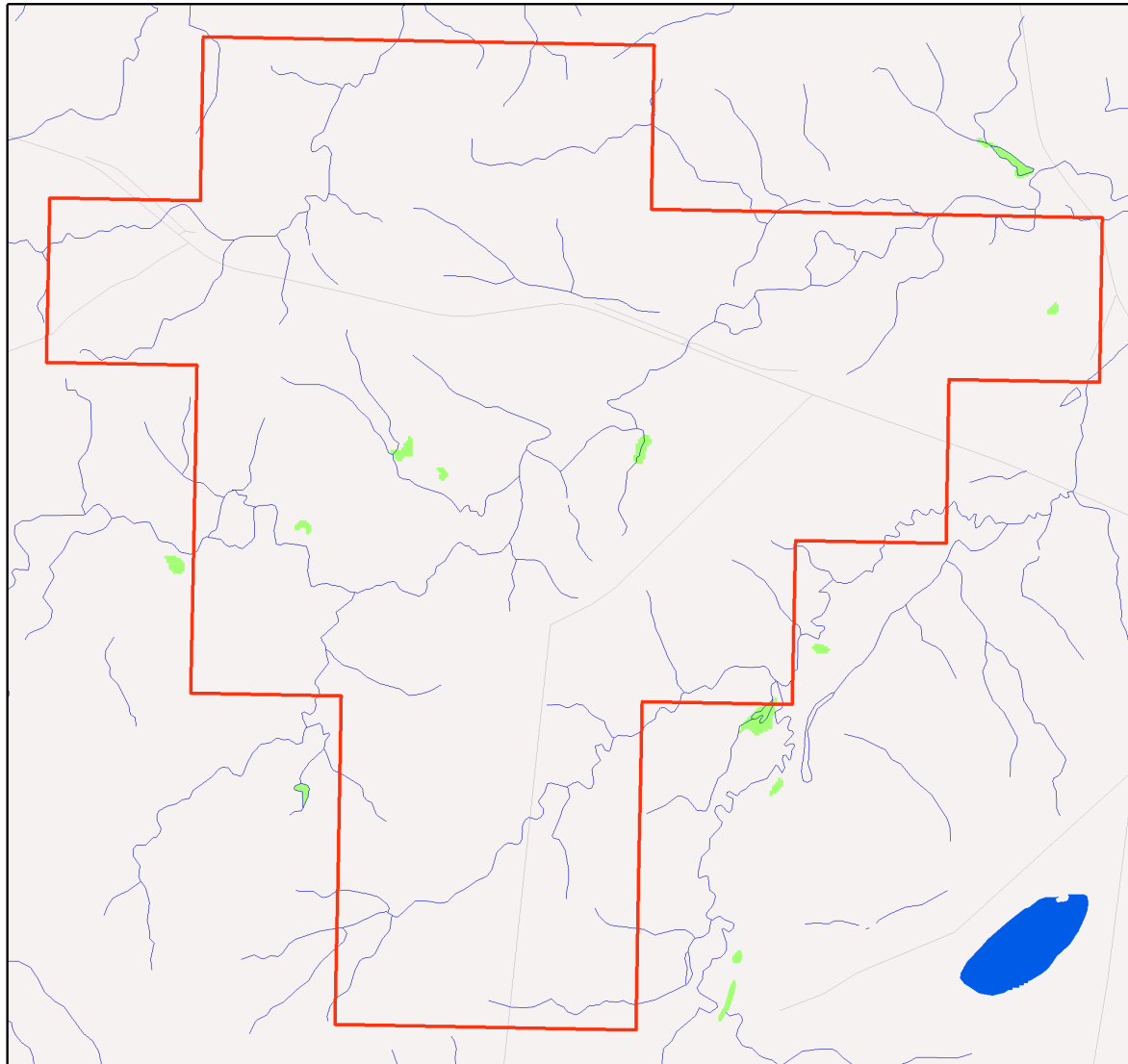
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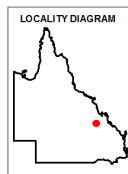
# Map 6 - Aquatic Conservation Assessment (ACA) - non-riverine



## Aquatic Conservation Assessment (ACA) - nonriverine

### Legend

- Selected Exploration Permit Coal (EPC)
- Towns
- Roads
- Rivers/Creeks
- Queensland
- ACA Non-riverine**
- Very High
- High
- Medium
- Low
- Very Low



This product is projected into GDA 1994 Queensland Albers

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## 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
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
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 Southeast Queensland v4.1
Statewide BPA Corridors*	Statewide corridors v1.4
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>

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## Appendix 2 - Acronyms and Abbreviations

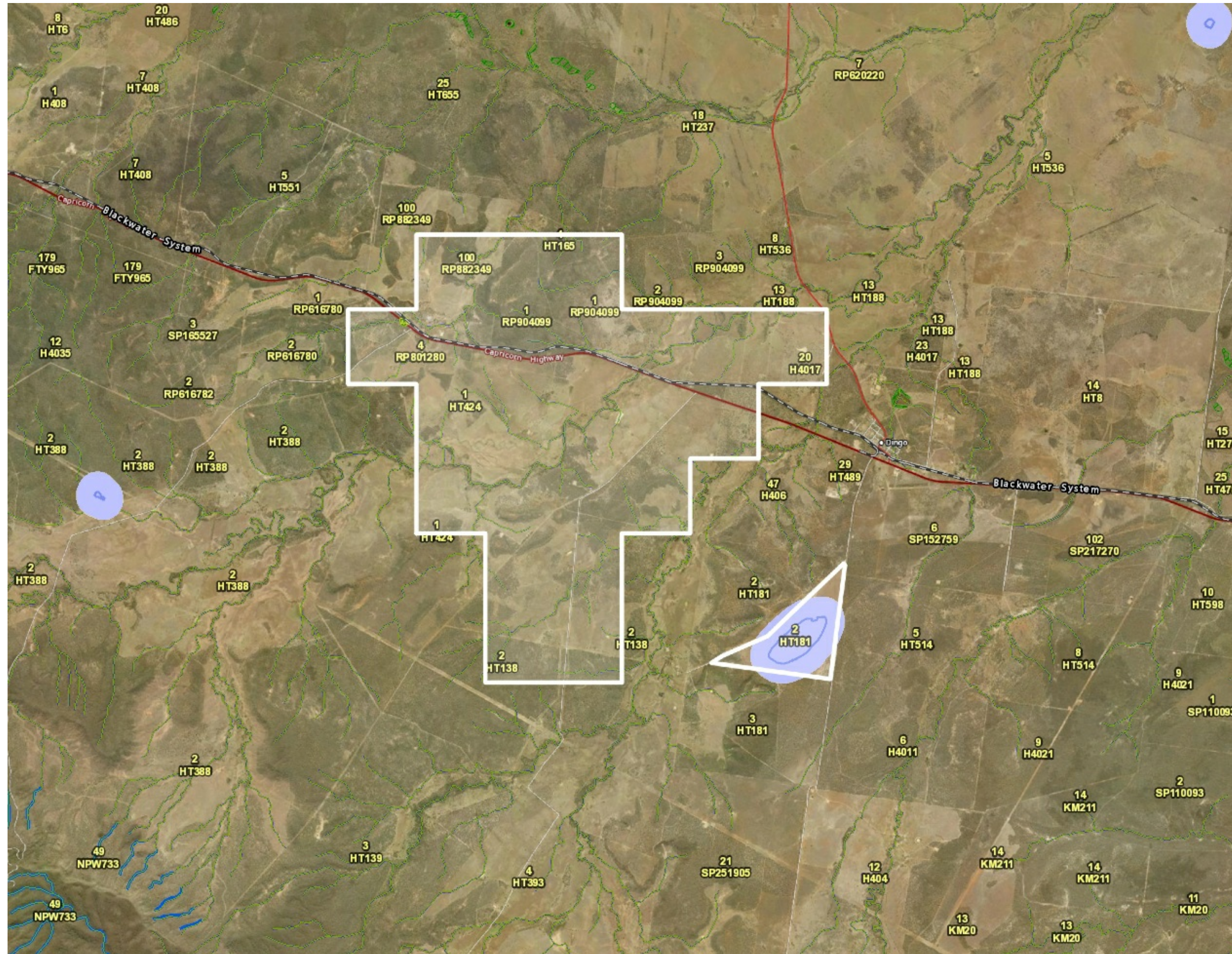
AOI	- Area of Interest
ACA	- Aquatic Conservation Assessment
AQUABAMM	- Aquatic Biodiversity Assessment and Mapping Methodology
BAMM	- Biodiversity Assessment and Mapping Methodology
BoT	- Back on Track
BPA	- Biodiversity Planning Assessment
CAMBA	- China-Australia Migratory Bird Agreement
DES	- Department 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

# Dingo West

## Wetlands of High Ecological Significance with trigger area

23°32'48"S 149°7'4"E

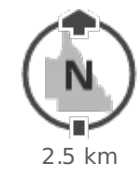
23°32'48"S 149°25'6"E



23°45'34"S 149°7'4"E

23°45'34"S 149°25'6"E

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**Queensland Globe**



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### Legend

Road	MSES strategic environmental area [designated precinct]
 Highway	
 Main	Wetlands of high ecological significance
 Local	
 Private	Vegetation management wetlands map
	 Wetlands map
VM watercourse/drainage feature - 1:100 000 and 1:250 000	Trigger area
	
	Railway
	
	Land parcel label - gt 10 ha
Pondage area	Cities and Towns
 Aquaculture	
 Salt evaporator	
 Settling pond	
MSES regulated vegetation [defined watercourse]	
	
MSES declared high ecological value waters [watercourse]	
	
MSES declared high ecological value waters [wetland]	
	
MSES high ecological significance wetlands	
	

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# WetlandMaps Report



For selected area of interest

Current as at 06/06/2019

## Environmental Reports - General Information

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 Area of Interest (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 mapping of water bodies and wetland regional ecosystems across Queensland. The Queensland wetland mapping was produced using existing information including water body mapping derived from Landsat satellite imagery, regional ecosystem mapping, topographic data, and a springs database. The result is a consistent wetland map for the whole of Queensland.

Ancillary data, such as higher resolution imagery (for example SPOT and aerial photographs), other vegetation and wetland mapping, geology, soil and land system mapping was also used in attributing and assessing the derived Queensland Wetlands Program wetland mapping products.

The wetland mapping was done in accordance with a detailed peer reviewed methodology which included quality assurance measures for all steps in the process. For more detailed information on how the Queensland Wetlands Program wetland mapping was produced, please see the [Wetland Mapping and Classification Methodology](#).

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## Summary Information

The following table provides an overview of the area of interest.

**Table 1. Area of interest details**

Size (ha)	133,776.49
Local Government(s)	Central Highlands Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Woorabinda, Isaac - Comet Downs
Catchment(s)	Fitzroy
Drainage sub-basin	Mackenzie River, Dawson River, Comet River

### NRM Regions

The following NRM region(s) are in the area of interest:

Fitzroy Basin  
Association

### Water Resource Plan Boundaries

The following Water Resource Plan(s) are in the area of interest:

Fitzroy Basin  
Great Artesian Basin and Other Regional Aquifers

## Learn more about how Wetlands are mapped in Queensland:

### Queensland Wetlands Mapping Definitions

Wetlands are areas of permanent or periodic/intermittent inundation, with water that is static or flowing fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6 metres. To be a wetland the area must have one or more of the following attributes:

- at least periodically the land supports plants or animals that are adapted to and dependent on living in wet conditions for at least part of their life cycle, or
- the substratum is predominantly undrained soils that are saturated, flooded or ponded long enough to develop anaerobic conditions in the upper layers, or
- the substratum is not soil and is saturated with water, or covered by water at some time.

Examples under this definition **include**:

- those areas shown as a river, stream, creek, swamp, lake, marsh, waterhole, wetland, billabong, pool or spring on the latest Sunmap 1:25,000, 1:50,000, 1:100,000 or 1:250,000 topographic map
- areas defined as wetlands on local or regional maps prepared with the aim of mapping wetlands
- wetland regional ecosystems (REs) as defined by the Queensland Herbarium (Environmental Protection Agency 2005a)
- areas containing recognised hydrophytes as provided by the Queensland Herbarium
- saturated parts of the riparian zone
- artificial wetlands such as farm dams
- water bodies not connected to rivers or flowing water such as billabongs and rock pools.

Examples under this definition **exclude**:

- areas that may be covered by water but are not wetlands according to the definition
- floodplains that are intermittently covered by flowing water but do not meet the hydrophytes and soil criteria
- riparian zone above the saturation level.





## Wetland Systems

*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.

*Palustrine wetlands* are primarily vegetated non-channel environments of less than 8 hectares. They include billabongs, swamps, bogs, springs, soaks etc, and have more than 30% emergent vegetation.

*Lacustrine wetlands* are large, open, water-dominated systems (for example, lakes) larger than 8ha. This definition also applies to modified systems (for example, dams), which are similar to lacustrine systems (for example, deep, standing or slow-moving waters).

*Marine wetlands* include the area of ocean from the coastline or estuary, extending to the jurisdictional limits of Queensland waters (3 nautical mile limit). This definition differs from that in Ramsar, as it includes waters deeper than 6m below the lowest astronomical tide.

*Estuarine wetlands* are those with oceanic water sometimes diluted with freshwater run-off from the land.

*Subterranean wetlands* are wetlands occurring below the surface of the ground and that are fed by groundwater i.e. caves and aquifers. These wetlands provide water to groundwater dependent ecosystems.

Methodology and Wetland Classification: <https://wetlandinfo.des.qld.gov.au/wetlands/facts-maps/wetland-background/>

## Links and support

Other sites that deliver wetland related information include:

WetlandSummary tool: <https://wetlandinfo.des.qld.gov.au/wetlands/facts-maps/>

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

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

Environmental reports online: <https://environment.ehp.qld.gov.au/report-request/environment/>

Wetland on-line education modules: <https://wetlandinfo.des.qld.gov.au/wetlands/resources/training/>

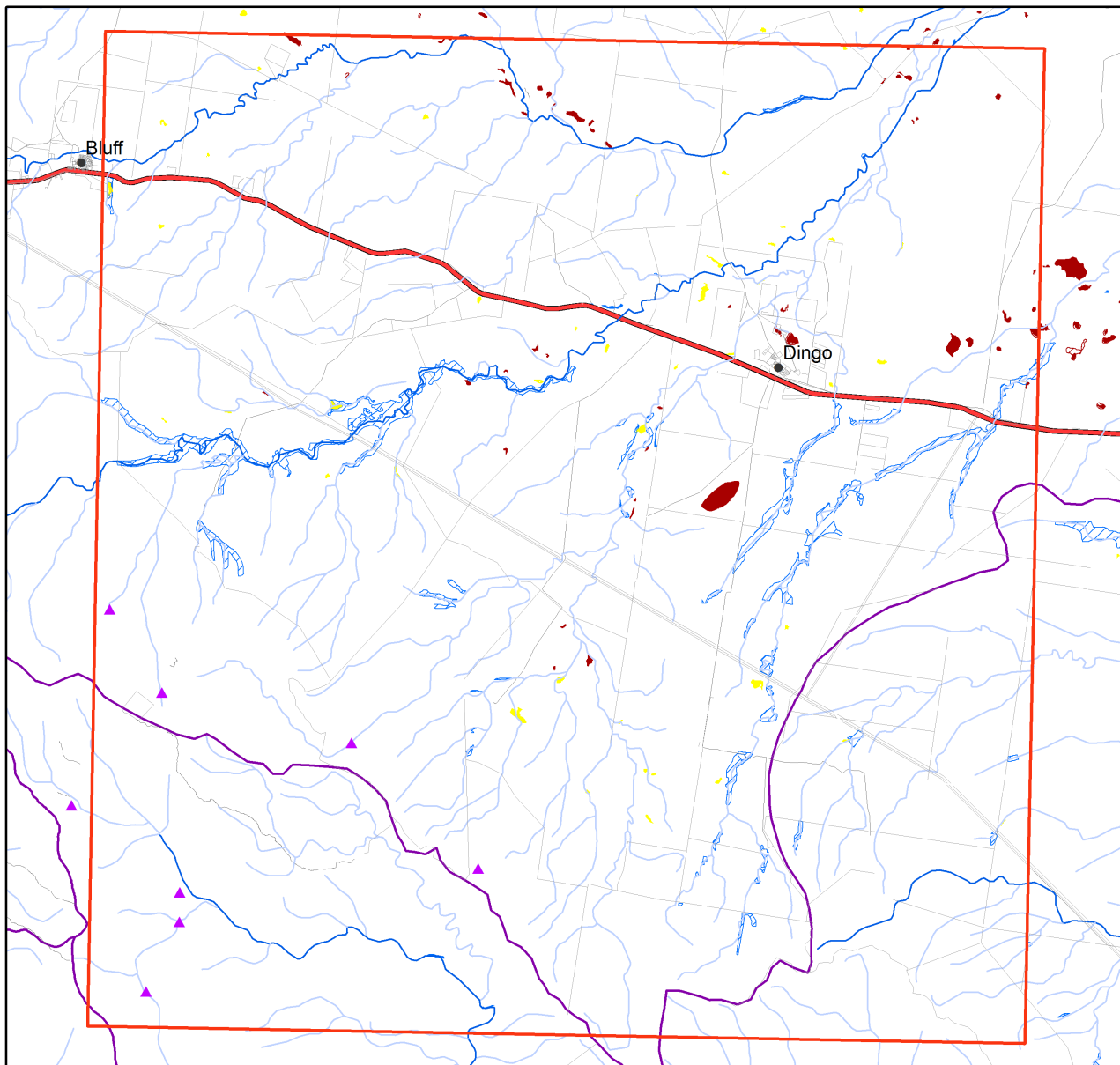
Regional Ecosystem Mapping information: :

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

Aquatic Conservation Assessments: : <https://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca/>

Groundwater Dependant Ecosystems information:

<https://wetlandinfo.des.qld.gov.au/wetlands/ecology/aquatic-ecosystems-natural/groundwater-dependent/>



**Legend**

- polygon
- ▲ Springs
- Dams and weirs
- Towns
- Highways
- Roads
- Cadastral boundaries
- Sub-basin

**Wetland Mapping**

**Wetland System - Water Bodies**

- Marine Waterbodies
- Estuarine Waterbodies
- Riverine Waterbodies
- Lacustrine Waterbodies
- Palustrine Waterbodies

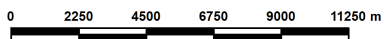
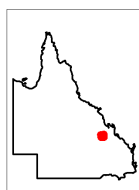
**Wetland System - Regional Ecosystems**

- Marine RE
- Estuarine RE
- Riverine RE
- Lacustrine RE
- Palustrine RE
- RE 51\_80% wetland (mosaic units)

**Riverine System Drainage Lines**

- Major
- Minor

**Queensland Wetland Map**

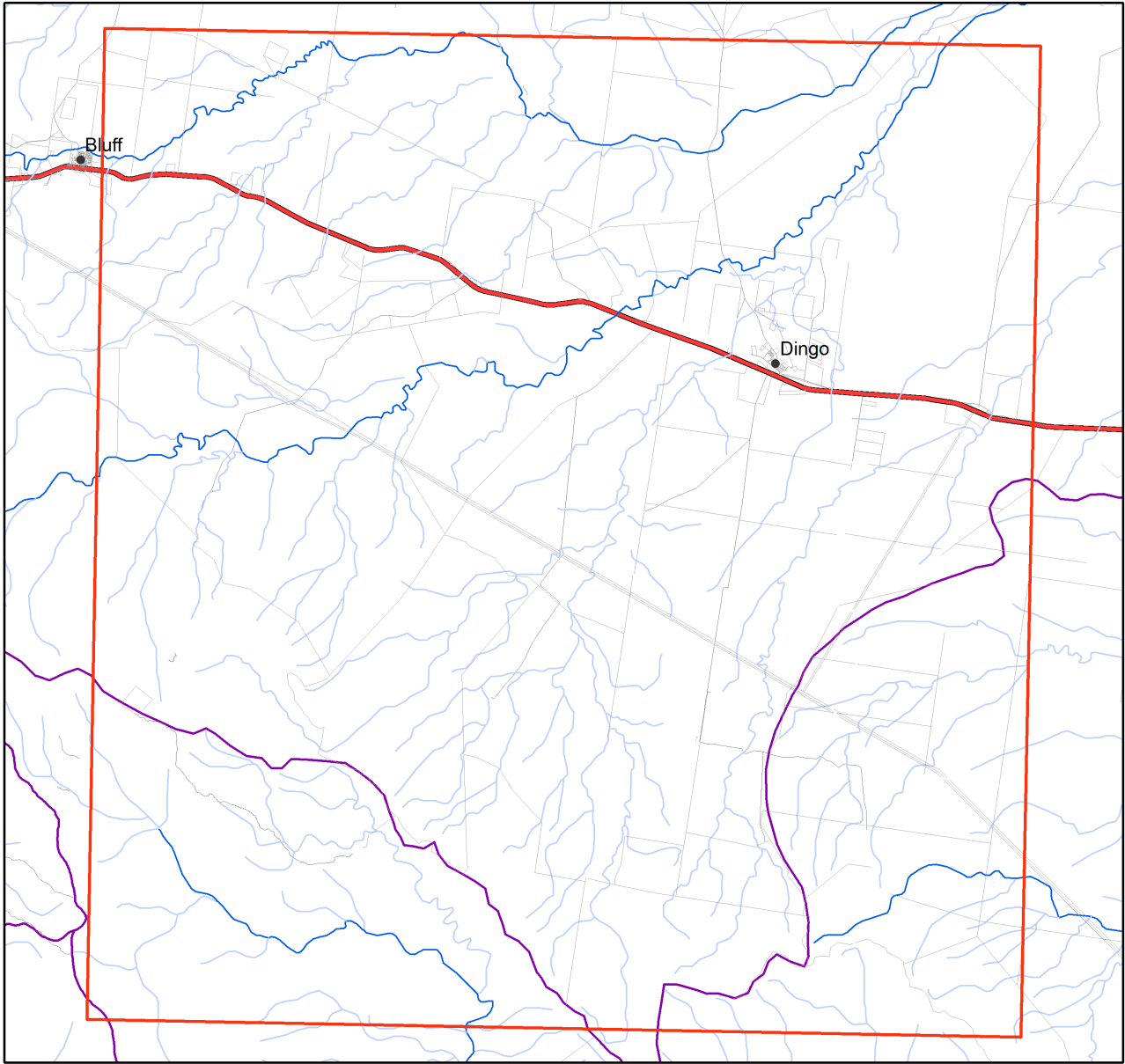


Horizontal Datum: Geographic Datum of Australia 1994 (GDA94)

This map was produced by the Queensland Wetlands Program, Department of Environment and Science, June 2019.

For further information contact: [wetlands@des.qld.gov.au](mailto:wetlands@des.qld.gov.au)

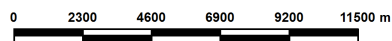
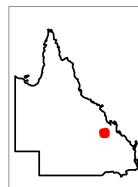
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## Queensland Wetlands of Importance Map

### Legend

- polygon
- Towns
- Cadastral boundaries
- Highways
- Roads
- Sub-basin
- Directory of Important Wetlands
- Ramsar Wetlands
- Riverine System Drainage Lines**
- Major
- Minor

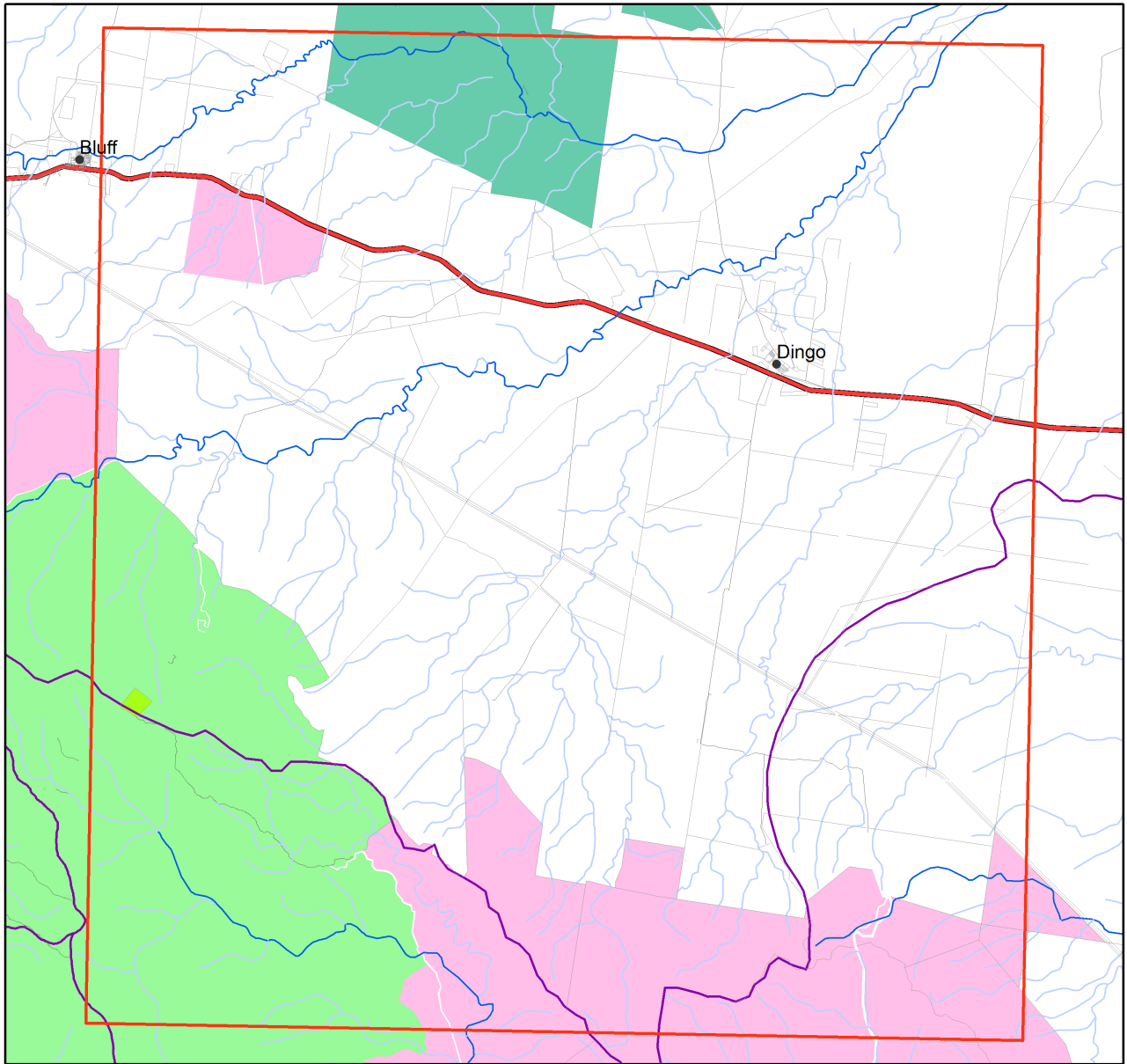


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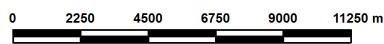
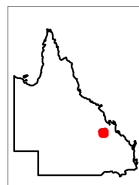
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**Legend**

- polygon
- Towns
- Cadastral boundaries
- Highways
- Roads
- Sub-basin
- Riverine System Drainage Lines**
- Major
- Minor
- Protected Areas**
- National Park
- National Park (Scientific)
- National Park (CYPAL)
- Conservation Park
- Resources Reserve
- Forest Reserve
- State Forest
- Timber Reserve
- Marine Parks**
- General Use Zone
- Habitat Protection Zone
- Estuarine Conservation Zone
- Conservation Park Zone
- Buffer Zone
- Scientific Research Zone
- Marine National Park Zone
- Preservation Zone

**Queensland Protected Area Map**



Horizontal Datum: Geographic Datum of Australia 1994 (GDA94)

This map was produced by the Queensland Wetlands Program, Department of Environment and Science, June 2019.

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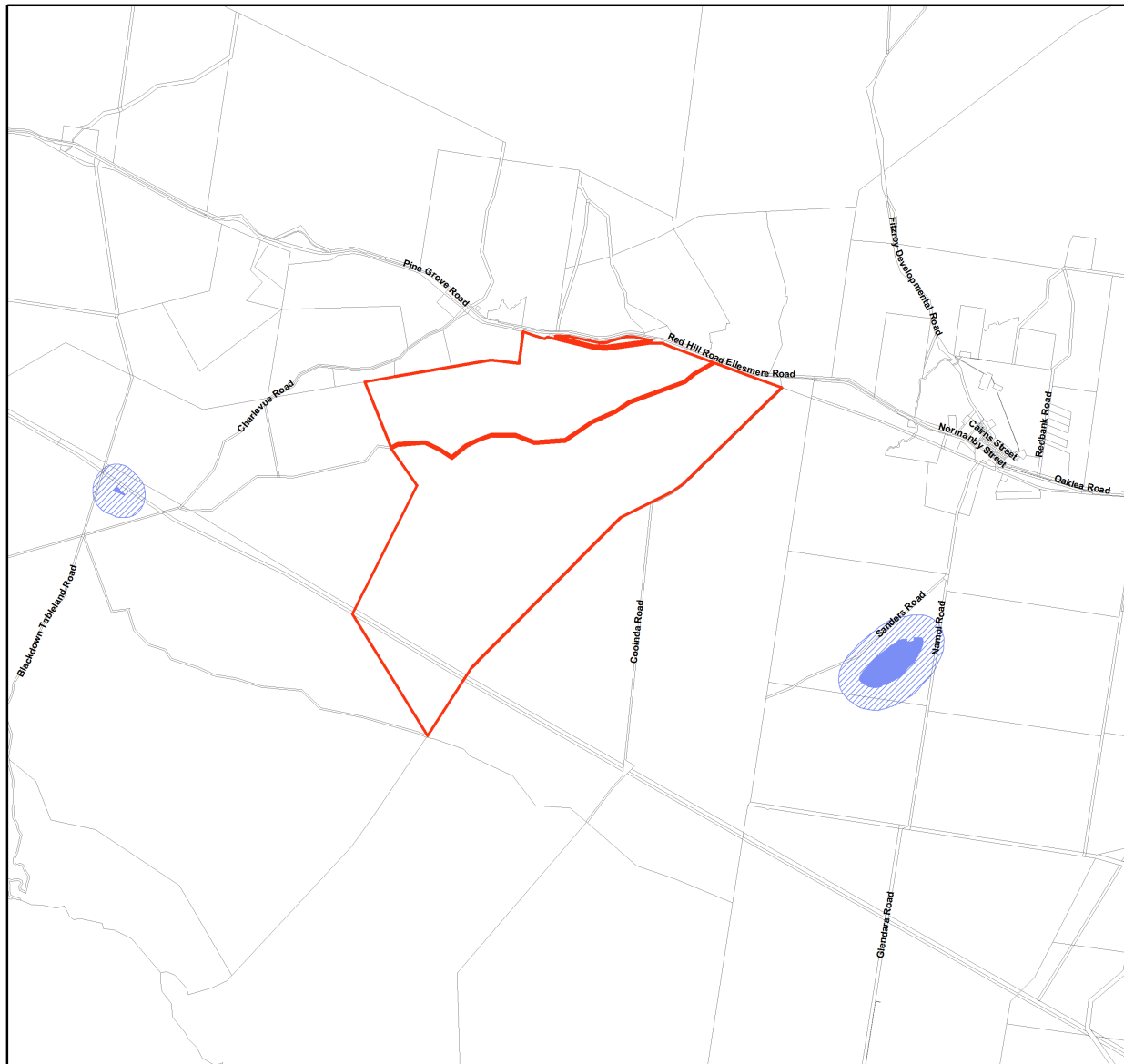
Wetland habitat types in the AOI. Total area: 11468.08ha

Wetland Class	Habitat type	Area (ha)
None	Coastal/ Sub-coastal floodplain tree swamps (Melaleuca and Eucalypt)	8578.24
Riverine	Riverine	1931.53
None	Coastal/ Sub-Coastal non-floodplain tree swamps (Melaleuca and Eucalypt)	530.79
Lacustrine	Artificial/ highly modified wetlands (dams, ring tanks, irrigation channel)	149.53
Palustrine	Coastal/ Sub-coastal floodplain tree swamps (Melaleuca and Eucalypt)	121.24
Palustrine	Coastal/ Sub-Coastal non-floodplain tree swamps (Melaleuca and Eucalypt)	110.62
Palustrine	Coastal/ Sub-coastal floodplain grass, sedge and herb swamps	46.13

**Queensland wetland habitat typology: Major wetland habitat types for wetland conceptual models and wetland management profiles**

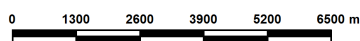
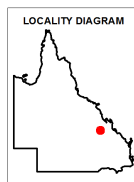
Wetland name	Conceptual model	Wetland profile
Mangrove Wetlands	Not developed	<a href="#">Mangrove Wetlands</a>
Saltmarsh Wetlands	Not developed	<a href="#">Saltmarsh Wetlands</a>
Coastal and subcoastal saline swamps of all substrates, water regimes, topographic types and vegetation communities	<a href="#">Coastal and subcoastal saline swamps</a>	<a href="#">Coastal grass-sedge wetlands</a>
Coastal and subcoastal non-floodplain tree swamps (Melaleuca and Eucalypt) of all substrates and water regimes	<a href="#">Coastal and subcoastal non-floodplain tree swamps - melaleuca and eucalypt</a>	<a href="#">Coastal and subcoastal tree swamps</a>
Coastal and subcoastal non-floodplain wet heath swamps of all substrates and water regimes	<a href="#">Coastal and subcoastal non-floodplain wet heath swamps</a>	<a href="#">Coastal and subcoastal wet heath swamps</a>
Coastal and subcoastal non-floodplain grass, sedge and herb swamps of all substrates and water regimes	<a href="#">Coastal and subcoastal non-floodplain grass, sedge and herb swamps</a>	<a href="#">Coastal grass-sedge wetlands</a>
Coastal and subcoastal spring swamps of all substrates, water types, water regimes and vegetation communities	Coastal and subcoastal spring swamps	<a href="#">Great Artesian Basin spring wetlands</a>
Coastal and subcoastal floodplain tree swamps - melaleuca and eucalypt of all substrates and water regimes	<a href="#">Coastal and subcoastal floodplain tree swamps - melaleuca and eucalypt</a>	<a href="#">Coastal and subcoastal tree swamps</a>
Coastal and subcoastal floodplain wet heath swamps of all substrates and water regimes	<a href="#">Coastal and subcoastal floodplain wet heath swamps</a>	<a href="#">Coastal and subcoastal wet heath swamps</a>
Coastal and subcoastal floodplain, grass, sedge herb swamps of all substrates and water regimes	<a href="#">Coastal and subcoastal floodplain grass, sedge, herb swamps</a>	<a href="#">Coastal grass-sedge wetlands</a>
Coastal and subcoastal tree swamps - palm of all substrates, topographic types and water regimes	<a href="#">Coastal and subcoastal floodplain tree swamps - palm</a>	<a href="#">Coastal Palm Swamps</a>
Coastal and subcoastal Floodplain Lakes of all substrates, water types and water regimes	<a href="#">Coastal and subcoastal Floodplain Lakes</a>	<a href="#">Coastal and subcoastal floodplain lakes and non-floodplain soil lakes</a>
Coastal and subcoastal non-floodplain rock lakes of all water types and water regimes	<a href="#">Coastal and subcoastal non-floodplain rock lakes</a>	<a href="#">Coastal and subcoastal non-floodplain rock lakes</a>

Wetland name	Conceptual model	Wetland profile
Coastal and subcoastal non-floodplain sand lakes (window) of all water types and water regimes	<a href="#">Coastal and subcoastal non-floodplain sand lakes - window</a>	<a href="#">Coastal non-floodplain sand lakes</a>
Coastal and subcoastal non-floodplain sand lakes (perched) of all water types and water regimes	<a href="#">Coastal and subcoastal non-floodplain sand lakes - perched</a>	<a href="#">Coastal non-floodplain sand lakes</a>
Coastal and subcoastal non-floodplain soil lakes of all water types and water regimes	<a href="#">Coastal and subcoastal non-floodplain soil lakes</a>	<a href="#">Coastal and subcoastal floodplain lakes and non-floodplain soil lakes</a>
Arid and semi-arid saline swamps of all substrates, water regimes, topographic types and vegetation communities	<a href="#">Arid and semi-arid saline swamps</a>	<a href="#">Semi-arid swamps</a>
Arid and semi-arid fresh tree swamps of all substrates, and water regimes and topographic types	<a href="#">Arid and semi-arid tree swamps</a>	<a href="#">Arid swamps</a> <a href="#">Semi-Arid swamps</a>
Arid and semi-arid lignum swamps of all substrates, and water regimes and topographic types	<a href="#">Arid and semi-arid lignum swamps</a>	<a href="#">Arid swamps</a> <a href="#">Semi-Arid swamps</a>
Arid and semi-arid grass, sedge, herb swamps of all substrates, water regimes and topographic types	<a href="#">Arid and semi-arid grass, sedge, herb swamps</a>	<a href="#">Arid swamps</a> <a href="#">Semi-Arid swamps</a>
Arid and semi-arid fresh non-floodplain tree swamps of all substrates and water regimes	<a href="#">Arid and semi-arid non-floodplain tree swamps</a>	<a href="#">Arid swamps</a> <a href="#">Semi-Arid swamps</a>
Arid and semi-arid fresh non-floodplain lignum swamps of all substrates and water regimes	<a href="#">Arid and semi-arid non-floodplain lignum swamps</a>	<a href="#">Arid swamps</a> <a href="#">Semi-Arid swamps</a>
Arid and semi-arid fresh non-floodplain grass, sedge, herb swamps of all substrates and water regimes	<a href="#">Arid and semi-arid non-floodplain grass, sedge, herb swamps</a>	<a href="#">Arid swamps</a> <a href="#">Semi-Arid swamps</a>
Arid and semi-arid, non-floodplain swamps - springs of all substrates, water regimes and vegetation communities	Arid and semi-arid spring swamps	<a href="#">Great Artesian Basin spring wetlands</a>
Arid and semi-arid, saline lakes of all substrates, topographic types and water regimes	<a href="#">Arid and semi-arid saline lakes</a>	<a href="#">Arid and semi-arid lakes</a>
Arid and semi-arid, floodplain lakes of all, substrates and water regimes	<a href="#">Arid and semi-arid floodplain lakes</a>	<a href="#">Arid and semi-arid lakes</a>
Arid and semi-arid, non-floodplain Lakes of all substrates and water regimes	<a href="#">Arid and semi-arid non-floodplain lakes</a>	<a href="#">Arid and semi-arid lakes</a>
Arid/ semi-arid, non-floodplain (clay pans) lakes of all substrates and water regimes	<a href="#">Arid and semi-arid fresh non-floodplain lakes (clay pans)</a>	<a href="#">Arid and semi-arid lakes</a>
Arid and semi-arid, Permanent Lakes permanently inundated lakes of all substrates, water types, topographic types and vegetation communities	<a href="#">Arid and semi-arid permanent lakes</a>	<a href="#">Arid and semi-arid lakes</a>



### Map of Referable Wetlands Wetland Protection Areas

- Lot and Plan
- Cadastral Boundary
- Wetland Protection Areas
  - Wetland
  - Trigger Area



Note:  
This map shows the location of wetland protection areas which are defined under the Environmental Protection Regulation 2008. Within wetland protection areas, certain types of development involving high impact earthworks are made assessable under Schedule 3 of the Sustainable Planning Regulation 2009.

The Department of State Development, Manufacturing, Infrastructure and Planning is the State Assessment Referral Agency (SARA) under Schedule 7 of the Sustainable Planning Regulation 2009 for assessable development involving high impact earthworks within wetland protection areas. The Department of Environment and Science is a technical agency.

The policy outcome and assessment criteria for assessing these applications are described in the State Development Assessment Provisions (SDAP) *Module 11: Wetlands and wild rivers*.

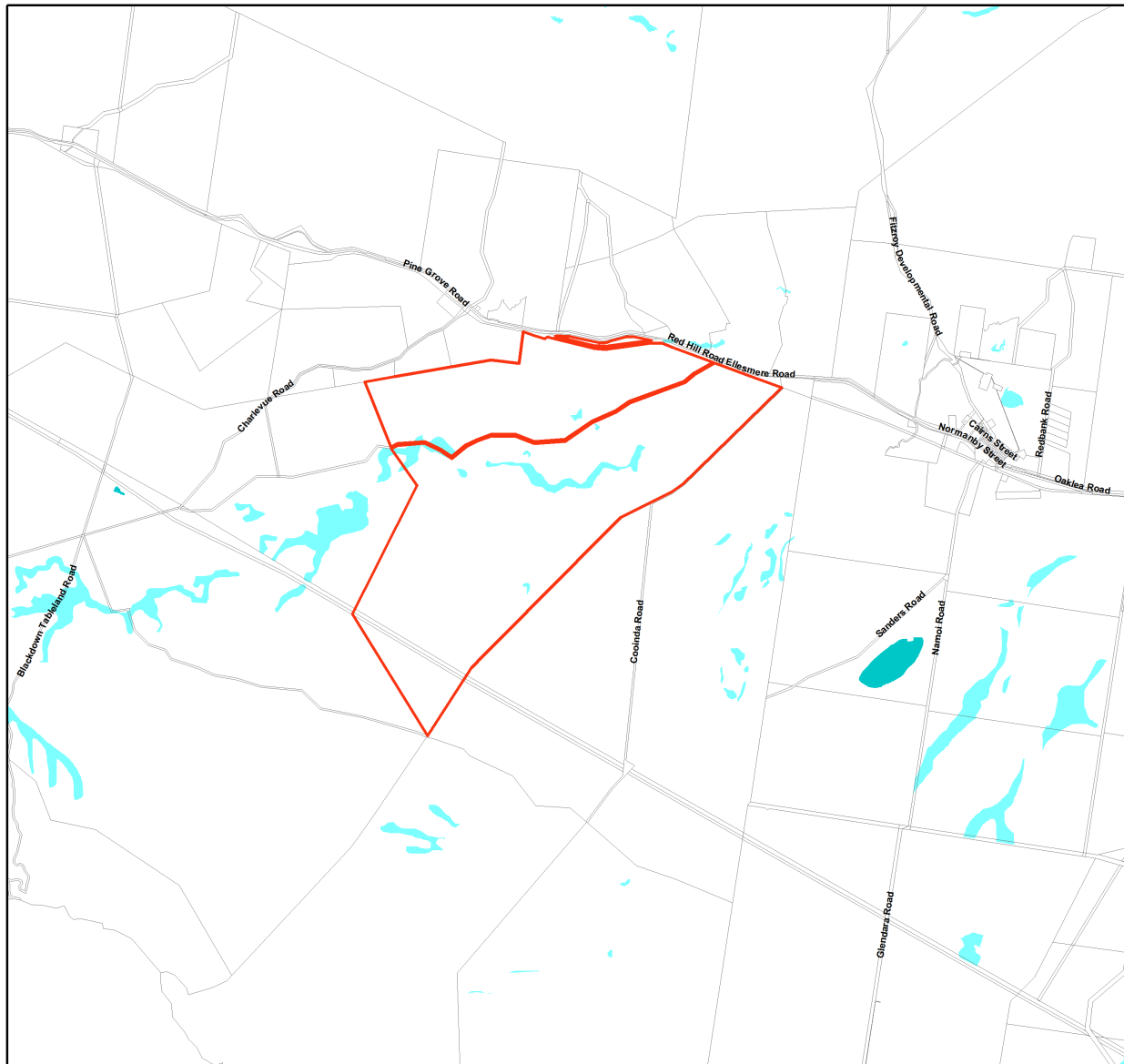
This map is produced at a scale relevant to the size of the lot on plan identified and should be printed at A4 size in portrait orientation. Consideration of the effects of mapped scale is necessary when interpreting data at a large scale.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Science, email [planning.support@des.qld.gov.au](mailto:planning.support@des.qld.gov.au).

This product is projected into GDA 1994 MGA Zone 55

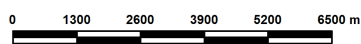
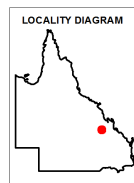
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### Map of Referable Wetlands for the Environmental Protection Act 1994

- Lot and Plan
- Cadastral Boundary
- HES Wetland
- GES Wetland



**Note:**  
This map shows the location of wetlands on the Map of Referable Wetlands which are defined under the Environmental Protection Regulation 2008.

Wetlands are assessed for ecological significance using the environmental values for wetlands in section 81A of the Environmental Protection Regulation 2008. Wetlands are considered either High Ecological Significance (HES) or General Ecological Significance (GES) for the purposes of the environmental values.

This map is produced at a scale relevant to the size of the lot on plan identified and should be printed at A4 size in portrait orientation. Consideration of the effects of mapped scale is necessary when interpreting data at a large scale.

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**Queensland** Government

**Department of Environment and Science**

Environmental Reports

## **Regional Ecosystems**

### ***Biodiversity Status***

For the selected area of interest  
epc: 881

## 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 Natural Resources, Mines and Energy website

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

Please direct queries about these reports to: Queensland.Herbarium@dsiti.qld.gov.au

### Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government 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 the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.



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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: epc: 881**

Size (ha)	7,219.57
Local Government(s)	Central Highlands Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Woorabinda
Catchment(s)	Fitzroy

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	6.41	0.09
Of concern	237.45	3.29
No concern at present	1,842.10	25.52
Total remnant vegetation	2,085.96	28.89

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 2017) 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 Natural Resources, Mines and Energy website.

<https://www.dnrme.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
11.3.1	Acacia harpophylla and/or Casuarina cristata open forest on alluvial plains	Endangered	6.41	0.09
11.3.2	Eucalyptus populnea woodland on alluvial plains	Of concern	125.33	1.74
11.3.25	Eucalyptus tereticornis or E. camaldulensis woodland fringing drainage lines	Of concern	112.12	1.55
11.5.2	Eucalyptus crebra, Corymbia spp., with E. moluccana woodland on lower slopes of Cainozoic sand plains and/or remnant surfaces	No concern at present	1,004.51	13.91
11.5.9b	Eucalyptus crebra and other Eucalyptus spp. and Corymbia spp. woodland on Cainozoic sand plains and/or remnant surfaces	No concern at present	142.87	1.98
11.7.2	Acacia spp. woodland on Cainozoic lateritic duricrust. Scarp retreat zone	No concern at present	694.73	9.62
non-rem	None	None	5,133.61	71.11

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 SOI. 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
11.3.1	Pre-clearing 783000 ha; Remnant 2015 80000 ha	25a	None	High
11.3.2	Pre-clearing 1936000 ha; Remnant 2015 514000 ha	17a	Contains palustrine wetland (e.g. in swales).	Low
11.3.25	Pre-clearing 791000 ha; Remnant 2015 513000 ha	16a	Riverine wetland or fringing riverine wetland.	Low
11.5.2	Pre-clearing 360000 ha; Remnant 2015 190000 ha	18b	None	Low

Regional Ecosystem	Remnant Extent	BVG (1 Million)	Wetland	Representation in protected estate
11.5.9b	Pre-clearing 364000 ha; Remnant 2015 237000 ha	18b	None	Low
11.7.2	Pre-clearing 565000 ha; Remnant 2015 367000 ha	24a	None	Low
non-rem	None	None	None	None

*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
11.3.1	Habitat for threatened fauna species including painted honeyeater, <i>Grantiella picta</i> particularly in subregion 35 (Oliver et al. 2003).
11.3.2	Habitat for threatened flora species <i>Homopholis belsonii</i> .
11.3.25	Shown to be associated with a high fauna species richness in the Taroom area (Venz et al. 2002). Within parts of the Fitzroy catchment, this RE is known habitat for the threatened freshwater turtle <i>Rheodytes leukops</i> . Known to be important habitat for other riparian freshwater turtle species.
11.5.2	None
11.5.9b	None
11.7.2	Habitat for threatened plant species including <i>Acacia wardellii</i> .
non-rem	None

### 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
None	None	5,133.61	71.11



BVG (1 Million)	Description	Area (Ha)	% of AOI
16a	Open forest and woodlands dominated by <i>Eucalyptus camaldulensis</i> (river red gum) (or <i>E. tereticornis</i> (blue gum)) and/or <i>E. coolabah</i> (coolabah) (or <i>E. microtheca</i> (coolabah)) fringing drainage lines. Associated species may include <i>Melaleuca</i> spp., <i>Corymbia tessellaris</i> (carbeen), <i>Angophora</i> spp., <i>Casuarina cunninghamiana</i> (riveroak). Does not include alluvial areas dominated by herb and grasslands or alluvial plains that are not flooded. (land zone 3) (MGD, BRB, GUP, CHC, MUL, DEU, EIU, NWH, SEQ, [NET, WET]) (All bioregions except CYP and CQC)	112.12	1.55
17a	Woodlands dominated by <i>Eucalyptus populnea</i> (poplar box) (or <i>E. brownii</i> (Reid River box)) on alluvium, sand plains and footslopes of hills and ranges. (land zones 3, 5, 10, 9, 4, 11, 12, [8]) (BRB, MUL, DEU, MUL, EIU)	125.33	1.74
18b	Woodlands dominated <i>Eucalyptus crebra</i> (sens. lat.) (narrow-leaved red ironbark) frequently with <i>Corymbia</i> spp. or <i>Callitris</i> spp. on flat to undulating plains. (land zones 5, 3) (BRB, DEU, EIU, GUP, CYP)	1,147.37	15.89
24a	Low woodlands to tall shrublands dominated by <i>Acacia</i> spp. on residuals. Species include <i>A. shirleyi</i> (lancewood), <i>A. catenulata</i> (bendee), <i>A. microsperma</i> (bowyokka), <i>A. clivicola</i> , <i>A. sibirica</i> , <i>A. rhodoxylon</i> (rosewood) and <i>A. leptostachya</i> (Townsville wattle). (land zones 7, 10, 5, 12, 11, [9, 3]) (MUL, CHC, BRB, GUP, EIU, MGD, DEU, NWH, [CYP])	694.73	9.62
25a	Open forests to woodlands dominated by <i>Acacia harpophylla</i> (brigalow) sometimes with <i>Casuarina cristata</i> (belah) on heavy clay soils. Includes areas co-dominated with <i>A. cambagei</i> (gidgee) and/or emergent eucalypts (land zones 4, 9, 3, 11, 7, 12, [5, 8]) (BRB, MUL, MGD, DEU, [SEQ])	6.41	0.09

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. 2012 (PDF)\* section 3.3.1 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/>

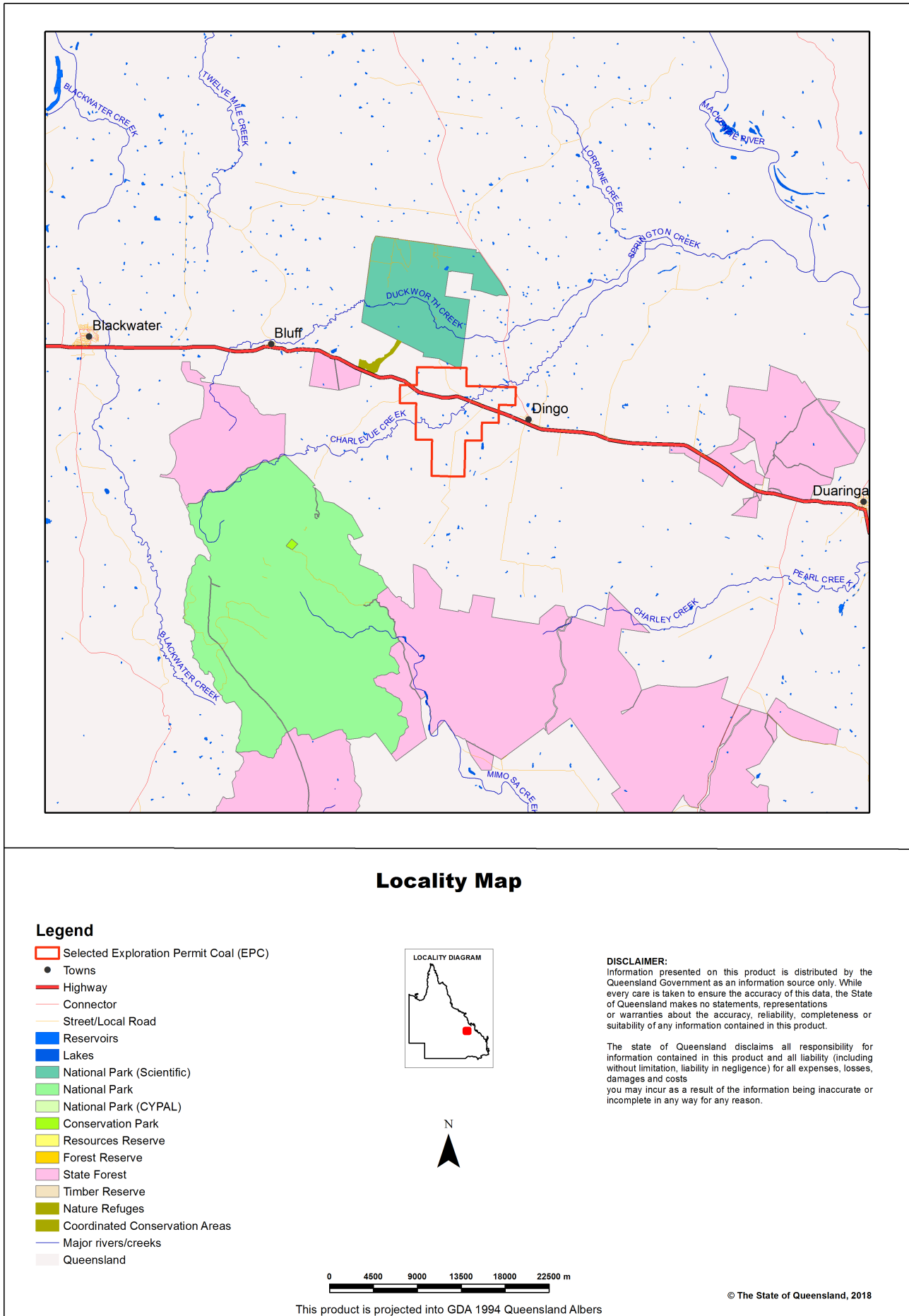
Benchmarks are based on a combination of quantitative and qualitative information and should be used as a guide only. Benchmarks are specific to one regional ecosystem vegetation community, however, the natural variability in structure and floristic composition under a range of climatic and natural disturbance 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**

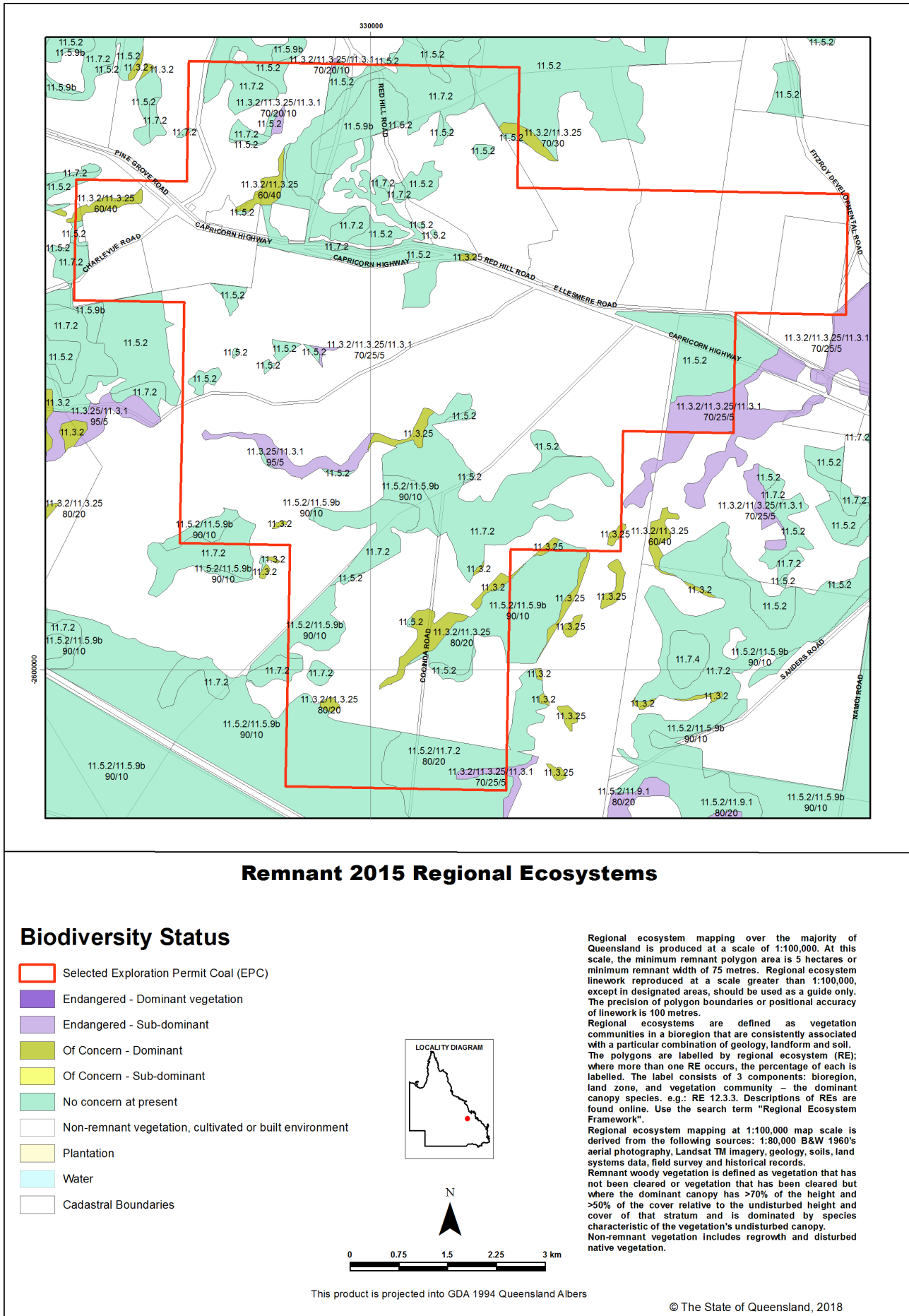
Regional ecosystems mapped as within the AOI	Technical Descriptions	Biocondition Benchmarks
11.3.1	Available	Available
11.3.2	Available	Available
11.3.25	Not currently available	Available
11.5.2	Not currently available	Not currently available
11.5.9b	Not currently available	Not currently available
11.7.2	Not currently available	Available
non-rem	Not currently available	Not currently available

# Maps

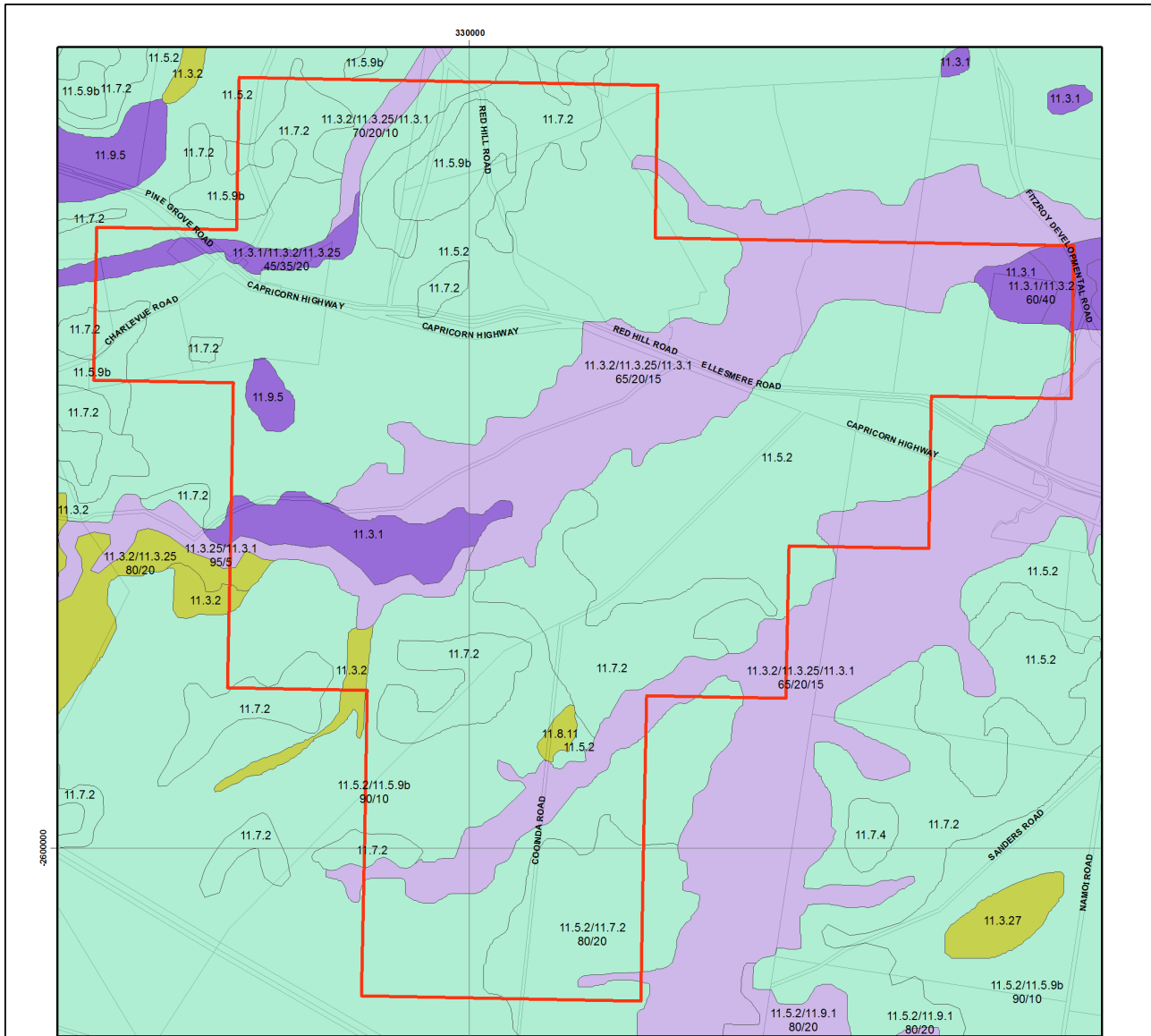
## Map 1 - Location



## Map 2 - Remnant 2015 regional ecosystems



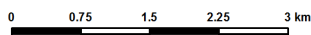
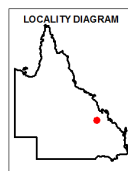
### Map 3 - Pre-clearing regional ecosystems



### Pre-clearing Regional Ecosystems

#### Biodiversity Status

- Selected Exploration Permit Coal (EPC)
- Endangered - Dominant vegetation
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- No concern at present
- Water
- Cadastral Boundaries



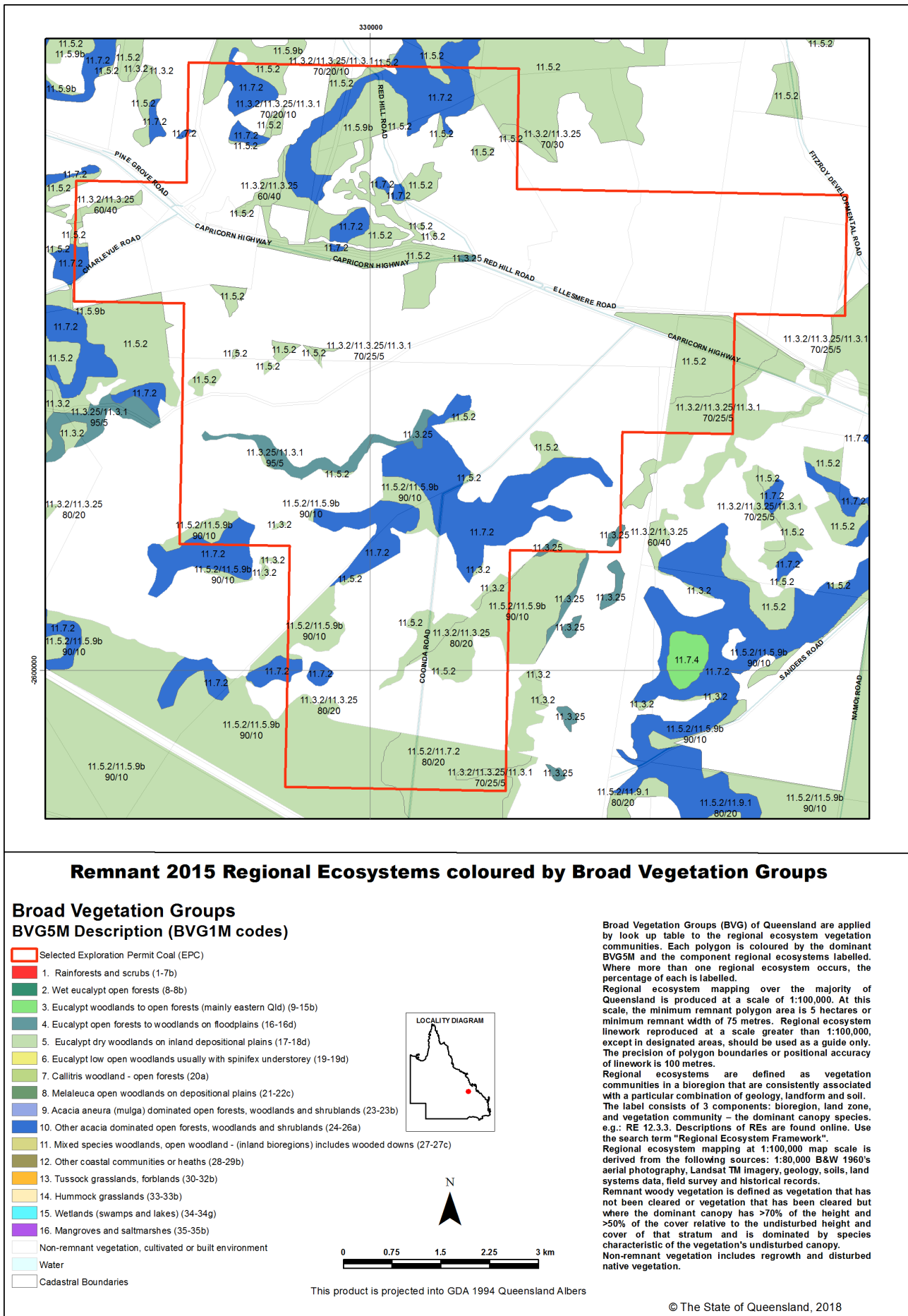
This product is projected into GDA 1994 Queensland Albers

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.

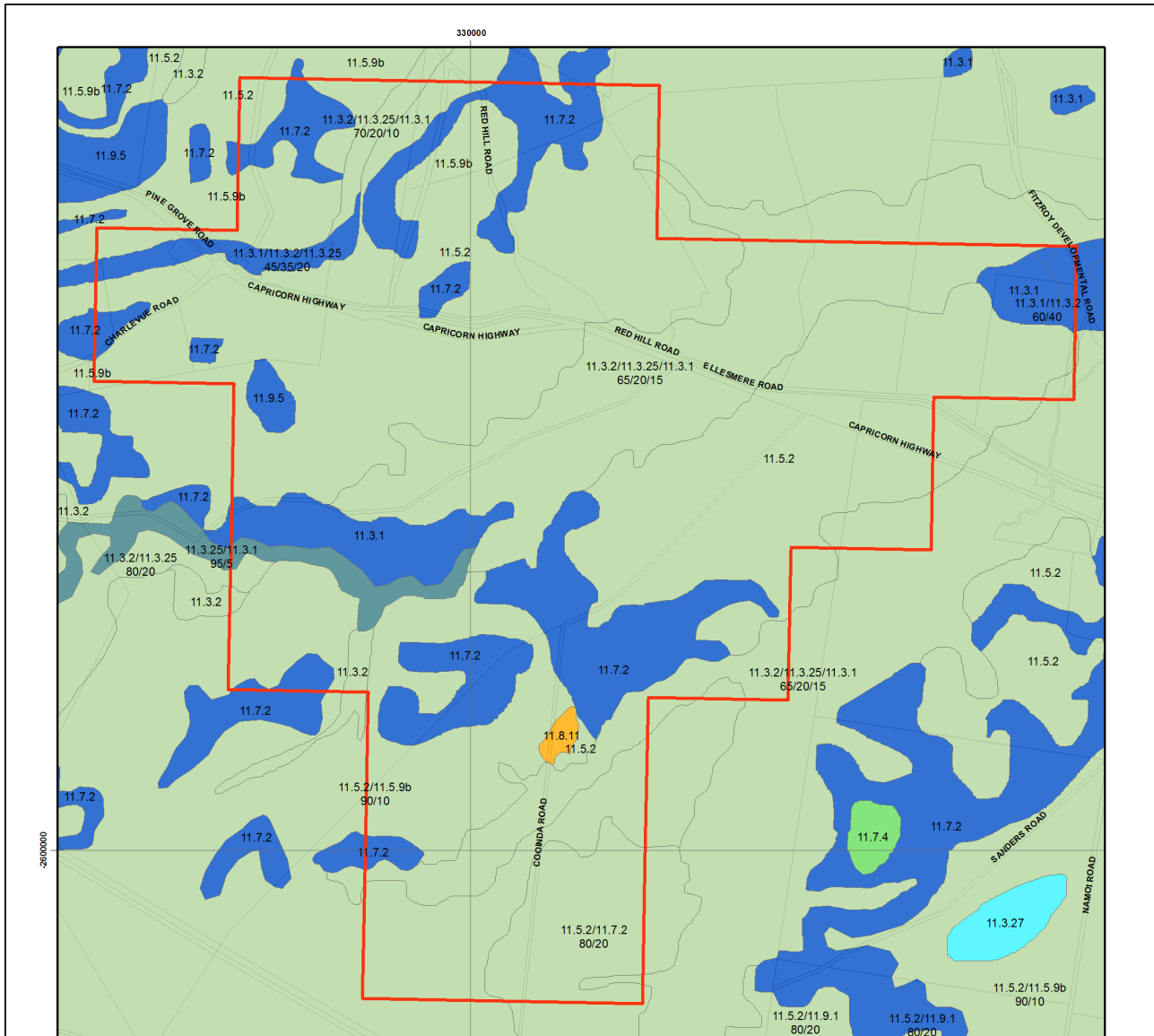
Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. The polygons are labelled by regional ecosystem (RE); where more than one RE occurs, the percentage of each is labelled. The label consists 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.

Map 4 - Remnant 2015 regional ecosystems by BVG (5M)



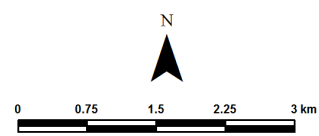
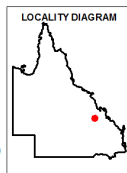
### Map 5 - Pre-clearing regional ecosystems by BVG (5M)



#### Pre-clearing Regional Ecosystems coloured by Broad Vegetation Groups

##### Broad Vegetation Groups BVG5M Description (BVG1M codes)

- Selected Exploration Permit Coal (EPC)
- 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)
- 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.

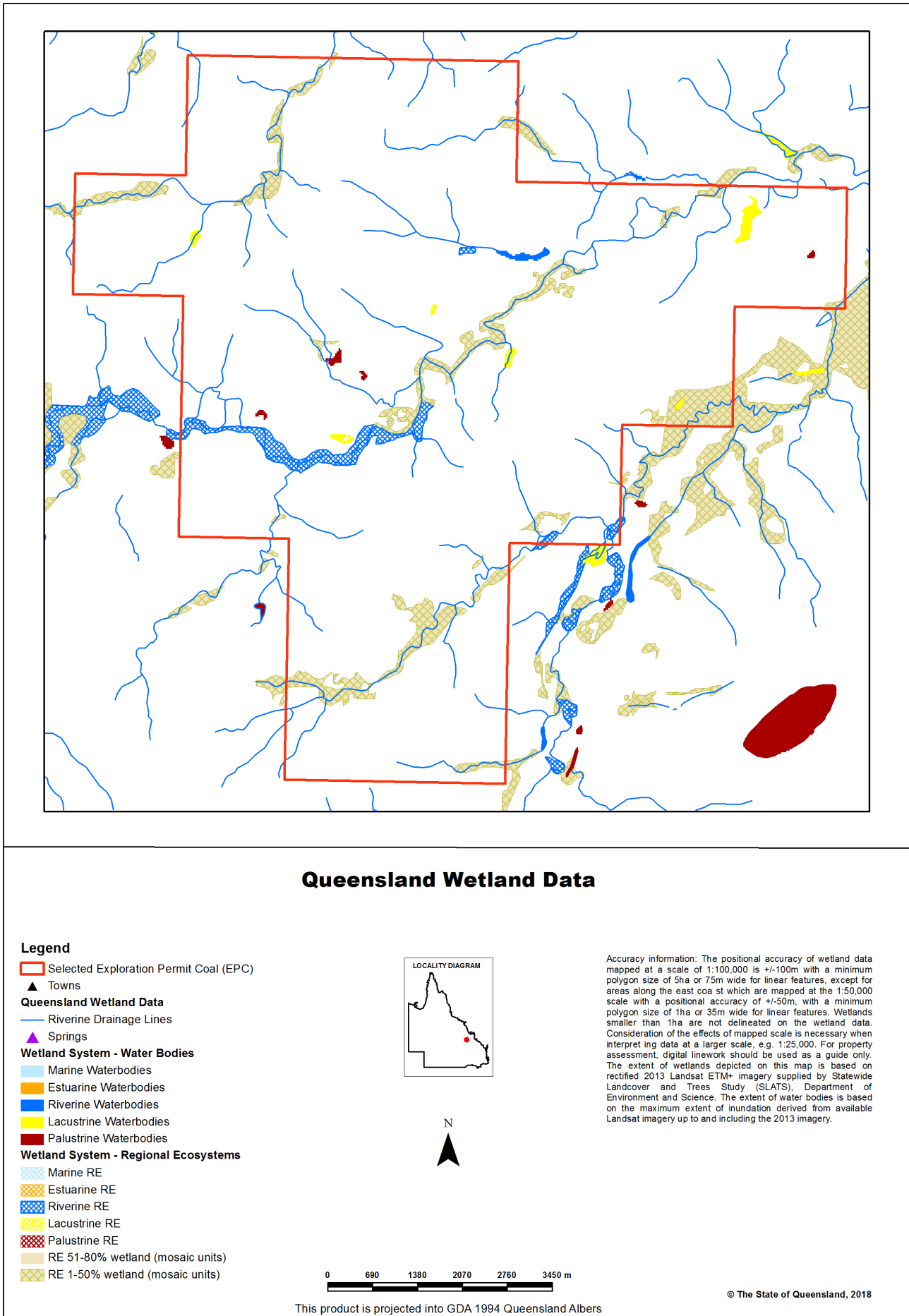
Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should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

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### 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:

<http://www.dnrm.qld.gov.au/mapping-data/queensland-globe>

## References

Neldner, V.J., Niehus R.E., Wilson, B.A. McDonald, W.J.F., Ford, A.J. and Accad, A. (2017) The Vegetation of Queensland. Descriptions of Broad Vegetation Groups. Version 3.0. Queensland Herbarium, Department of Science, Information Technology, Innovation and the Arts.

<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. and Butler, D.W. (2017) *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland*. Version 4.0. Queensland Herbarium, Department of Science, Information Technology, Innovation and the Arts.

<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

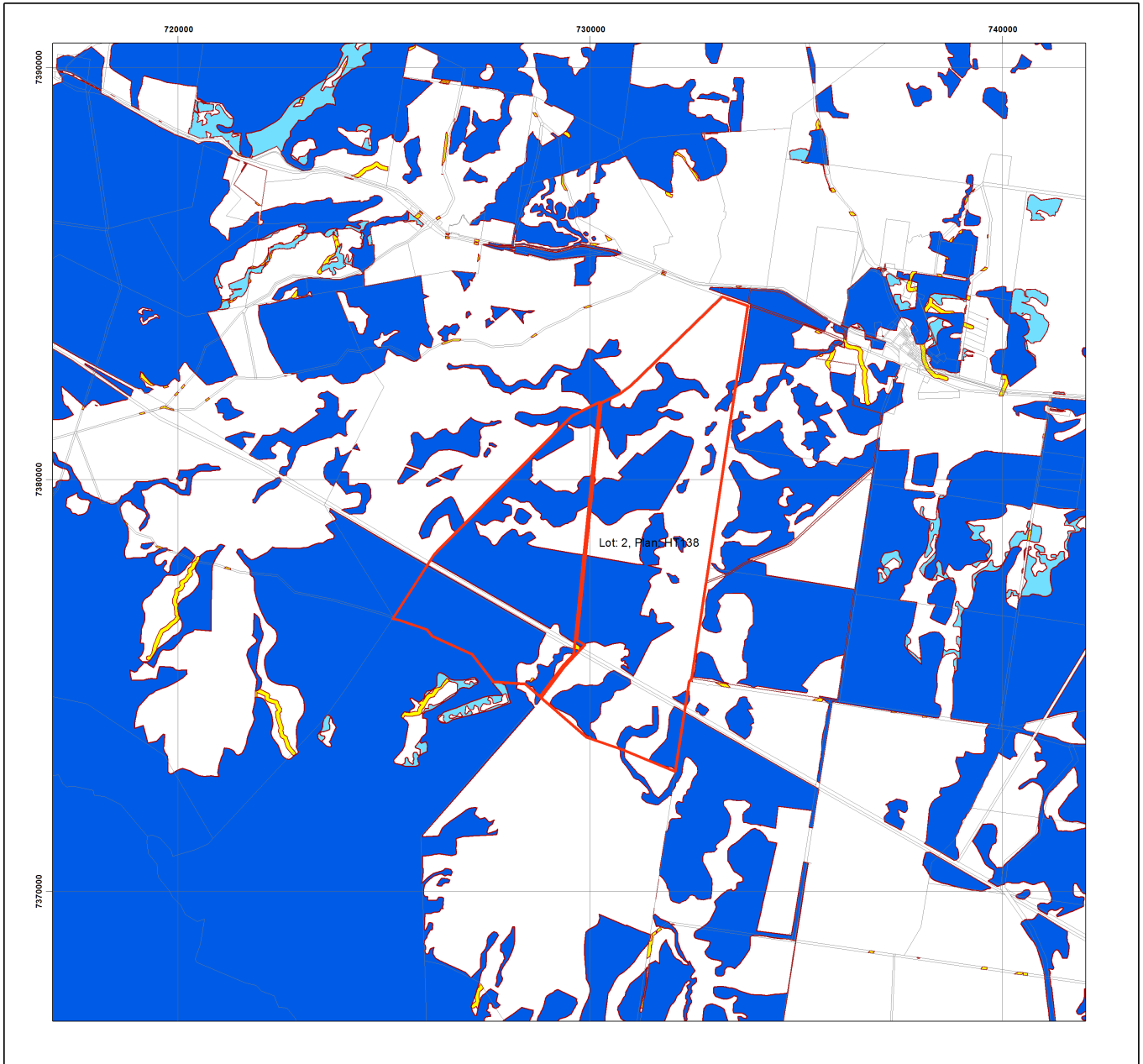
The datasets listed below are available for download from:

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

- Biodiversity status of pre-clearing and 2015 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

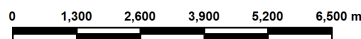
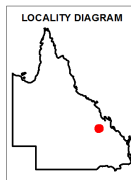
AOI	- Area of Interest
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
VMA	- <i>Vegetation Management Act 1999</i>



## Regulated Vegetation Management Map

### Legend

- 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
- Area not categorised
- Cadastral line
- Property boundaries shown are provided as a locational aid only



### Disclaimer:

While every care is taken to ensure the accuracy of this product, the Department of Natural Resources, Mines and Energy 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.dnrme.qld.gov.au](http://www.dnrme.qld.gov.au) or contact the Department of Natural Resources, Mines and Energy.

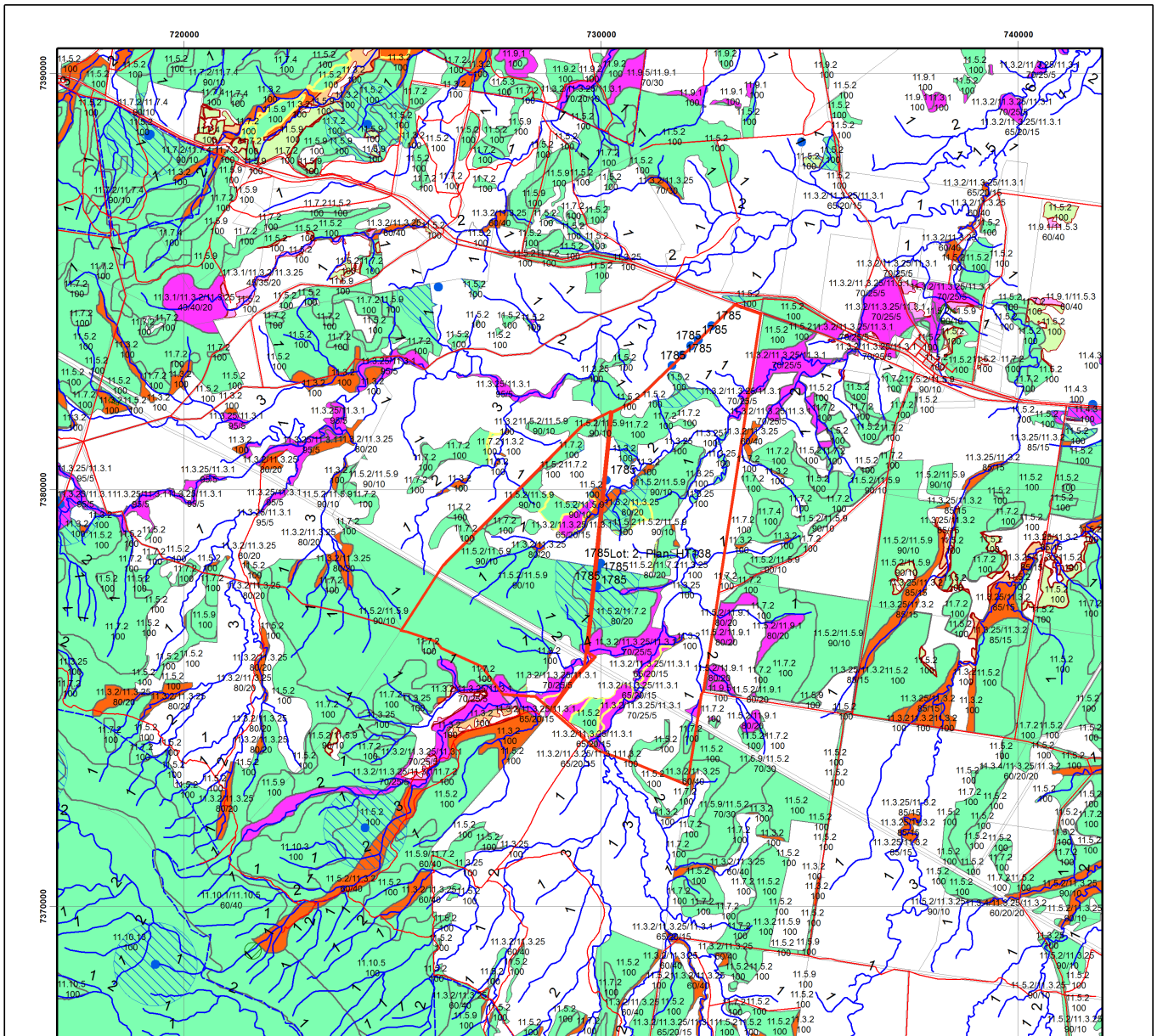
Digital data for the regulated vegetation management map is available from the Queensland Spatial Portal at <http://www.information.qld.gov.au/>

This map is updated on a monthly basis to ensure new PMAVs are included as they are approved.



This product is projected into:  
 GDA 1994 MGA Zone 55

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## Vegetation Management Supporting Map

### Legend

- 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 A or B area under Section 20AH  
These areas are edged in yellow and filled with the remnant RE Status
- Category C area containing endangered regional ecosystems
- Category C area containing of concern regional ecosystems
- Category C area that is a least concern regional ecosystem
- Category C area under Section 20AI  
These areas are edged in purple and filled with the remnant RE Status
- Non Remnant
- 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)
- Roads
- National Parks, State Forest and other reserves
- Cadastral line
- Property boundaries shown as provided as a locational aid only



0 975 1,950 2,925 3,900 4,875 m

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:**  
 While every care is taken to ensure the accuracy of this product, the Department of Natural Resources, Mines and Energy 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 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.dnrme.qld.gov.au](http://www.dnrme.qld.gov.au) or contact the Department of Natural Resources, Mines and Energy.

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/>



# Vegetation Management Act 1999 - Extract from the essential habitat database

Essential habitat is required for assessment under the:

- State Development Assessment Provisions - State Code 16: Native vegetation clearing which sets out the matters of interest to the state for development assessment under the *Planning Act 2016*, and
- Accepted development vegetation clearing codes made under the *Vegetation Management Act 1999*

Essential habitat for one or more of the following species is found on and within 1.1 km of the identified subject lot/s on the accompanying essential habitat map.

This report identifies essential habitat in Category A, B and Category C areas.

The numeric labels on the essential habitat map can be cross referenced with the database below to determine which essential habitat factors might exist for a particular species.

Essential habitat is compiled from a combination of species habitat models and buffered species records.

The Department of Natural Resources, Mines and Energy website (<http://www.dnrme.qld.gov.au>) has more information on how the layer is applied under the State Development Assessment Provisions - State Code 16: Native vegetation clearing and the *Vegetation Management Act 1999*.

Regional ecosystem is a mandatory essential habitat factor, unless otherwise stated.

Essential habitat, for protected wildlife, means a category A area, a category B area or category C area shown on the regulated vegetation management map-

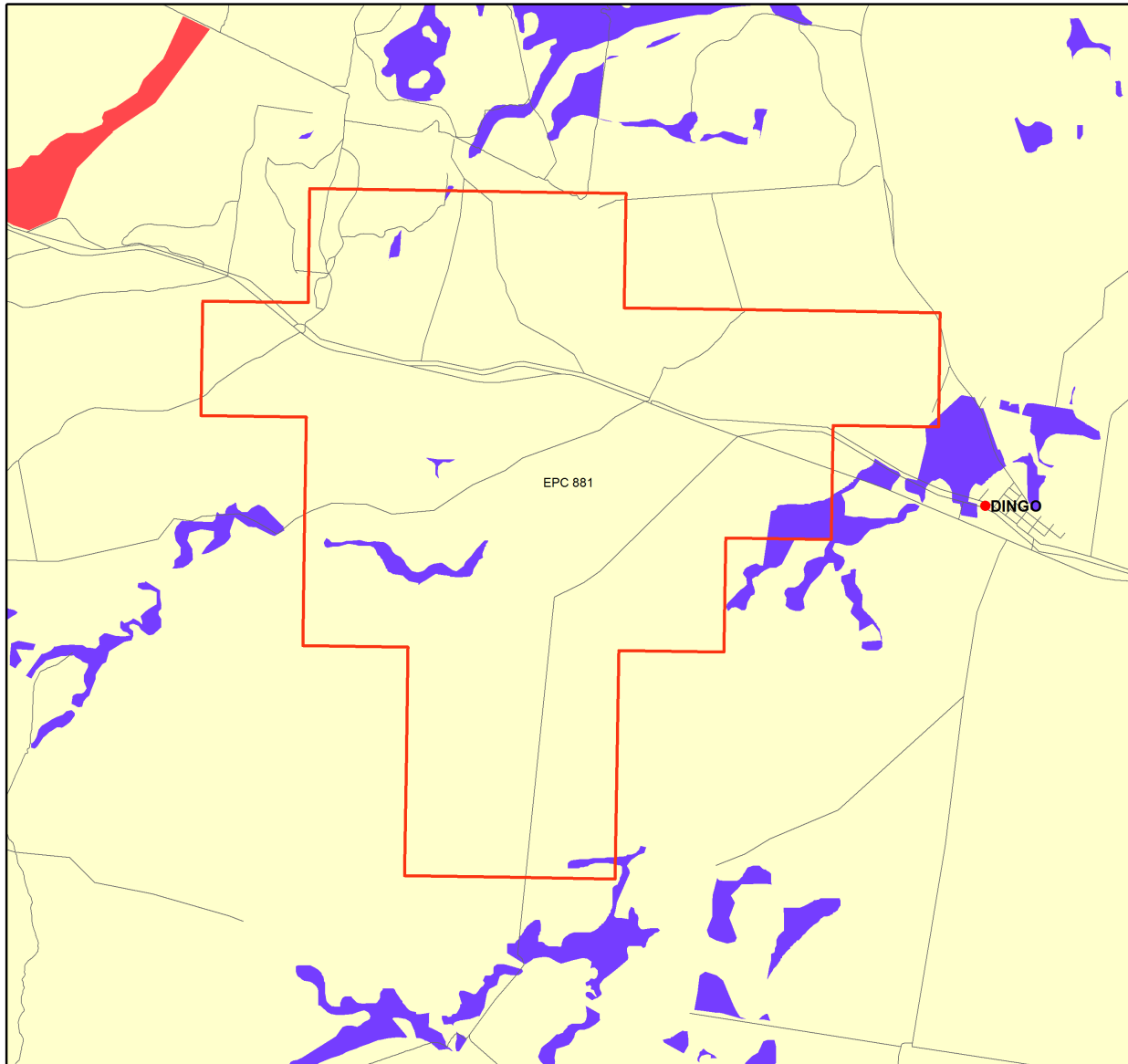
- 1) that has at least 3 essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database; or
- 2) in which the protected wildlife, at any stage of its life cycle, is located.

Protected wildlife includes endangered, vulnerable or near-threatened native wildlife prescribed under the *Nature Conservation Act 1992*.

## Essential habitat in Category A and/or Category B and/or Category C

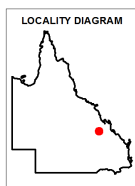
Label	Scientific Name	Common Name	NCA Status	Vegetation Community	Altitude	Soils	Position in Landscape
1785	<i>Geophaps scripta scripta</i>	squatter pigeon (southern subsp.)	V	Dry eucalypt woodland (including poplar box, spotted gum, yellow box, acacia and callitris), with sparse short grass, often on sandy areas near to permanent water, grassy eucalypt woodlands. Nest on ground near or under grass tussock, log or low bush.	None	None	Gravelly ridges, traprock and river flats.

Label	Regional Ecosystem (mandatory unless otherwise specified)
1785	8.2.1, 8.2.7, 8.2.8, 8.2.12, 8.3.2, 8.3.3, 8.3.5, 8.3.6, 8.3.13, 8.5.2, 8.5.3, 8.5.5, 8.5.6, 8.9.1, 8.11.1, 8.11.3, 8.11.4, 8.11.5, 8.11.6, 8.11.8, 8.12.6, 8.12.7, 8.12.9, 8.12.12, 8.12.14, 8.12.20, 8.12.22, 8.12.23, 8.12.25, 9.3.1, 9.3.2, 9.3.3, 9.3.4, 9.3.5, 9.3.6, 9.3.7, 9.3.8, 9.3.9, 9.3.11, 9.3.13, 9.3.14, 9.3.15, 9.3.16, 9.3.17, 9.3.18, 9.3.19, 9.3.20, 9.3.21, 9.3.22, 9.3.23, 9.4.1, 9.4.2, 9.4.3, 9.5.3, 9.5.4, 9.5.5, 9.5.6, 9.5.7, 9.5.8, 9.5.9, 9.5.10, 9.5.11, 9.5.12, 9.5.16, 9.7.1, 9.7.2, 9.7.3, 9.7.5, 9.7.6, 9.8.1, 9.8.2, 9.8.4, 9.8.5, 9.8.6, 9.8.9, 9.8.10, 9.8.11, 9.10.1, 9.10.3, 9.10.6, 9.10.7, 9.10.8, 9.11.1, 9.11.2, 9.11.3, 9.11.4, 9.11.5, 9.11.7, 9.11.10, 9.11.11, 9.11.12, 9.11.13, 9.11.15, 9.11.16, 9.11.17, 9.11.18, 9.11.19, 9.11.23, 9.11.26, 9.11.28, 9.11.29, 9.11.31, 9.11.32, 9.12.1, 9.12.3, 9.12.4, 9.12.5, 9.12.6, 9.12.7, 9.12.10, 9.12.11, 9.12.12, 9.12.13, 9.12.16, 9.12.17, 9.12.18, 9.12.19, 9.12.20, 9.12.21, 9.12.22, 9.12.23, 9.12.24, 9.12.26, 9.12.28, 9.12.30, 9.12.31, 9.12.33, 9.12.35, 9.12.37, 9.12.39, 10.3.1, 10.3.2, 10.3.3, 10.3.4, 10.3.5, 10.3.6, 10.3.9, 10.3.10, 10.3.11, 10.3.12, 10.3.13, 10.3.14, 10.3.15, 10.3.19, 10.3.20, 10.3.27, 10.3.28, 10.3.30, 10.3.31, 10.4.3, 10.5.1, 10.5.2, 10.5.4, 10.5.5, 10.5.7, 10.5.9, 10.5.10, 10.5.11, 10.5.12, 10.7.2, 10.7.3, 10.7.5, 10.7.11, 10.7.12, 10.9.1, 10.9.2, 10.9.3, 10.9.5, 10.10.1, 10.10.3, 10.10.4, 10.10.5, 10.10.7, 11.2.1, 11.2.5, 11.3.1, 11.3.2, 11.3.3, 11.3.4, 11.3.6, 11.3.7, 11.3.8, 11.3.9, 11.3.10, 11.3.12, 11.3.13, 11.3.14, 11.3.15, 11.3.16, 11.3.17, 11.3.18, 11.3.19, 11.3.23, 11.3.25, 11.3.27, 11.3.28, 11.3.29, 11.3.30, 11.3.35, 11.3.36, 11.3.37, 11.3.38, 11.3.39, 11.4.2, 11.4.3, 11.4.5, 11.4.8, 11.4.10, 11.4.12, 11.4.13, 11.5.1, 11.5.2, 11.5.3, 11.5.4, 11.5.5, 11.5.8, 11.5.9, 11.5.12, 11.5.13, 11.5.14, 11.5.17, 11.5.20, 11.5.21, 11.7.1, 11.7.2, 11.7.4, 11.7.6, 11.8.2, 11.8.4, 11.8.5, 11.8.8, 11.8.9, 11.8.11, 11.8.12, 11.8.14, 11.8.15, 11.9.2, 11.9.3, 11.9.7, 11.9.9, 11.9.14, 11.10.1, 11.10.4, 11.10.6, 11.10.7, 11.10.11, 11.10.12, 11.10.13, 11.11.1, 11.11.3, 11.11.4, 11.11.6, 11.11.7, 11.11.8, 11.11.9, 11.11.10, 11.11.11, 11.11.15, 11.11.16, 11.11.19, 11.11.20, 11.12.1, 11.12.2, 11.12.3, 11.12.5, 11.12.6, 11.12.7, 11.12.8, 11.12.9, 11.12.10, 11.12.11, 11.12.12, 11.12.13, 11.12.14, 11.12.17, 11.12.20, 12.2.5, 12.2.6, 12.2.7, 12.2.10, 12.2.11, 12.3.3, 12.3.6, 12.3.10, 12.3.12, 12.3.14, 12.3.18, 12.3.19, 12.5.1, 12.5.2, 12.5.4, 12.5.5, 12.5.7, 12.5.8, 12.5.11, 12.5.12, 12.7.1, 12.7.2, 12.8.14, 12.8.16, 12.8.17, 12.8.19, 12.9.10.5, 12.9.10.7, 12.9.10.8, 12.9.10.12, 12.9.10.13, 12.9.10.25, 12.9.10.26, 12.9.10.28, 12.11.5, 12.11.7, 12.11.8, 12.11.14, 12.11.15, 12.11.20, 12.11.21, 12.11.22, 12.11.24, 12.11.25, 12.11.26, 12.11.27, 12.11.28, 12.12.7, 12.12.8, 12.12.9, 12.12.12, 12.12.14, 12.12.21, 12.12.22, 12.12.23, 12.12.24, 12.12.25, 12.12.27, 13.3.1, 13.3.4, 13.3.7, 13.11.1, 13.11.3, 13.11.4, 13.11.8, 13.12.2, 13.12.3, 13.12.5, 13.12.8, 13.12.9, 13.12.10



### ENVIRONMENTALLY SENSITIVE AREAS - Mining Activities

- |   |   |
|---|---|
| Selected Exploration Permit Coal (EPC)                            | <b>CATEGORY C</b>                           |
| <b>CATEGORY A</b>   | Nature Refuges                              |
| National Parks  | Resources Reserve                           |
| Conservation Parks  | State Forests                               |
| Forest Reserves   | Timber Reserves                             |
| Wet Tropics World Heritage Area                                   | Declared Catchment Areas                    |
| Great Barrier Reef Marine Park Area                               | Declared Irrigation Areas                   |
| Marine Parks other than General Use Zones                         | Drainage Areas                              |
| <b>CATEGORY B</b>   | River Improvement Areas                     |
| World Heritage Areas  | Stanbroke DLA                               |
| Queensland Heritage Register Places                               | Coastal Management District                 |
| Ramsar Sites  | Dams and Weirs                              |
| Cultural Heritage Registered Areas and DLA's other than Stanbroke | <b>OTHERS</b>                               |
| Special Forestry Areas  | Towns                                       |
| Fish Habitat Areas  | Roads                                       |
| Koala Plan  | Repealed Wild River Nominated Waterways     |
| Coordinated Conservation Areas                                    | Repealed Wild River Preservation Areas      |
| Endangered Regional Ecosystems (Biodiversity Status)              | Repealed Wild River High Preservation Areas |
| General Use Zones of Marine Parks                                 | Mahogany Glider Habitat                     |
| Marine Plants   | Directory of Important Wetlands             |
|   | Queensland                                  |



This product is projected into GDA 1994 MGA Zone 55

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External contributors (non-government parties) of the data for this product are: Great Barrier Reef Marine Park Authority

Regional ecosystem mapping (remnant biodiversity status) may incorporate amendments, resulting from property level assessments, to the release version of the mapping available on QSpatial.

**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.



**Queensland** Government

**Department of Environment and Science**

Environmental Reports

# **Matters of State Environmental Significance**

For the selected area of interest  
epc: 881



## 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](mailto:Planning.Support@des.qld.gov.au)

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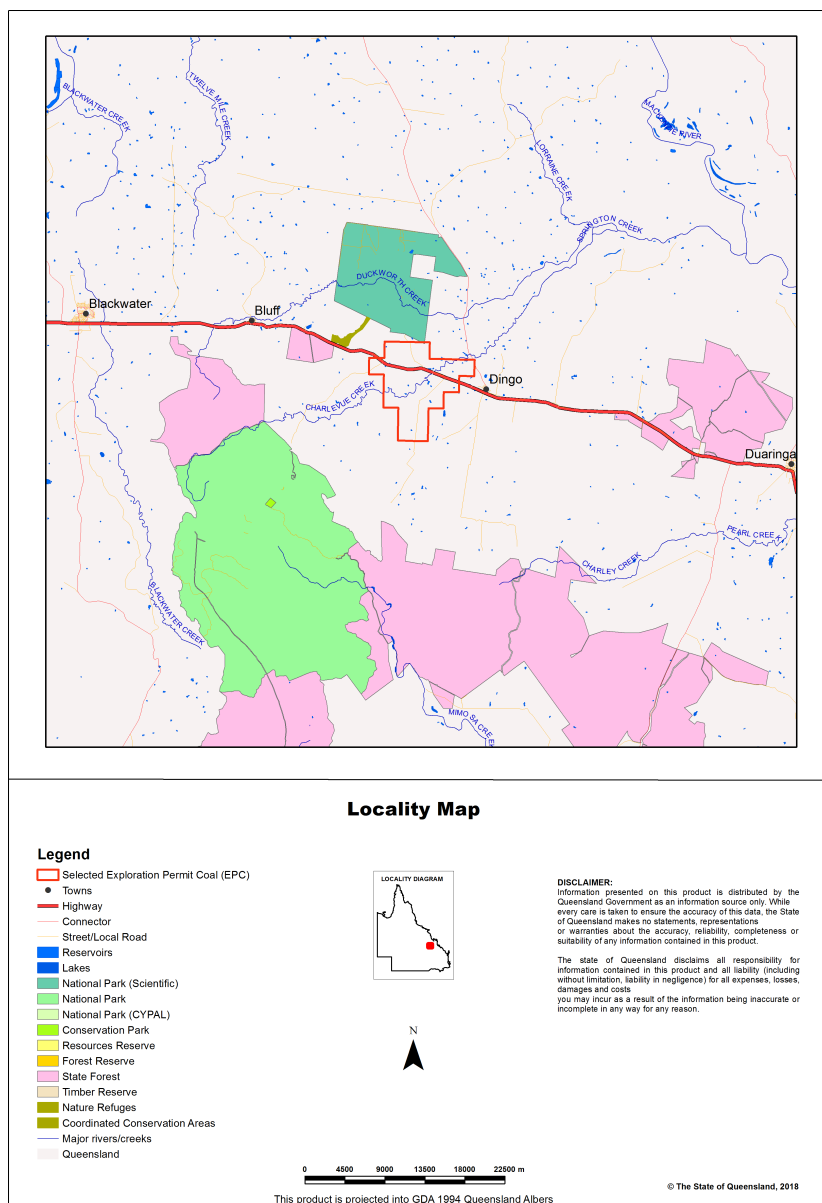
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## Assessment Area Details

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 epc: 881**

Size (ha)	7,219.57
Local Government(s)	Central Highlands Regional
Bioregion(s)	Brigalow Belt
Subregion(s)	Woorabinda
Catchment(s)	Fitzroy



## 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 Referable Wetlands under the Environmental Protection Regulation 2008;
- 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	2.94 ha	0.0%
1b Protected Areas- nature refuges	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	0.0 ha	0.0 %
6a High Ecological Value (HEV) wetlands	0.0 ha	0.0 %
6b High Ecological Value (HEV) waterways **	0.0 km	Not applicable
7 Threatened species and Iconic species	0.0 ha	0.0 %
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	248.85 ha	3.4%
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	3.69 ha	0.1%
8c Regulated Vegetation - Category R (GBR riverine regrowth)	19.17 ha	0.3%
8d Regulated Vegetation - Essential habitat	384.78 ha	5.3%
8e Regulated Vegetation - intersecting a watercourse **	81.4 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	0.0 ha	0.0 %
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

LOTPLAN	Estate name
25HT655	Taunton National Park (Scientific)

#### 1b. Protected Areas - nature refuges

(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 Referable Wetlands

(no results)

#### 6a. High Ecological Value (HEV) waters - wetlands

(no results)

#### 6b. High Ecological Value (HEV) waters - waterways

(no results)

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

### MSES - Species

#### 7. Threatened wildlife and special least concern animal

(no results)

#### Threatened and special least concern species records

(no results)

Note: The Threatened and Special Least Concern Animal (7) layer originates from the previous MSES version (4.1, dated at 2014). The layer does not represent all currently listed species and is subject to review.

*\*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)*

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 3 - MSES - Species** for an overview of the relevant MSES.

## MSES - Regulated Vegetation

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

Regional ecosystem	Vegetation management polygon	Vegetation management status
11.3.2/11.3.25	O-dom	rem_oc
11.3.2/11.3.25/11.3.1	E-subdom	rem_end
11.3.2	O-dom	rem_oc
11.3.25/11.3.1	E-subdom	rem_end

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

Regional ecosystem	Vegetation management polygon	Vegetation management status
11.3.2/11.3.25	O-dom	hvr_oc
11.3.1/11.3.2/11.3.25	E-dom	hvr_end

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/>

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

Regulated vegetation map category	Map number	RVM rule
R	8750	4

### 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

Not applicable

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)

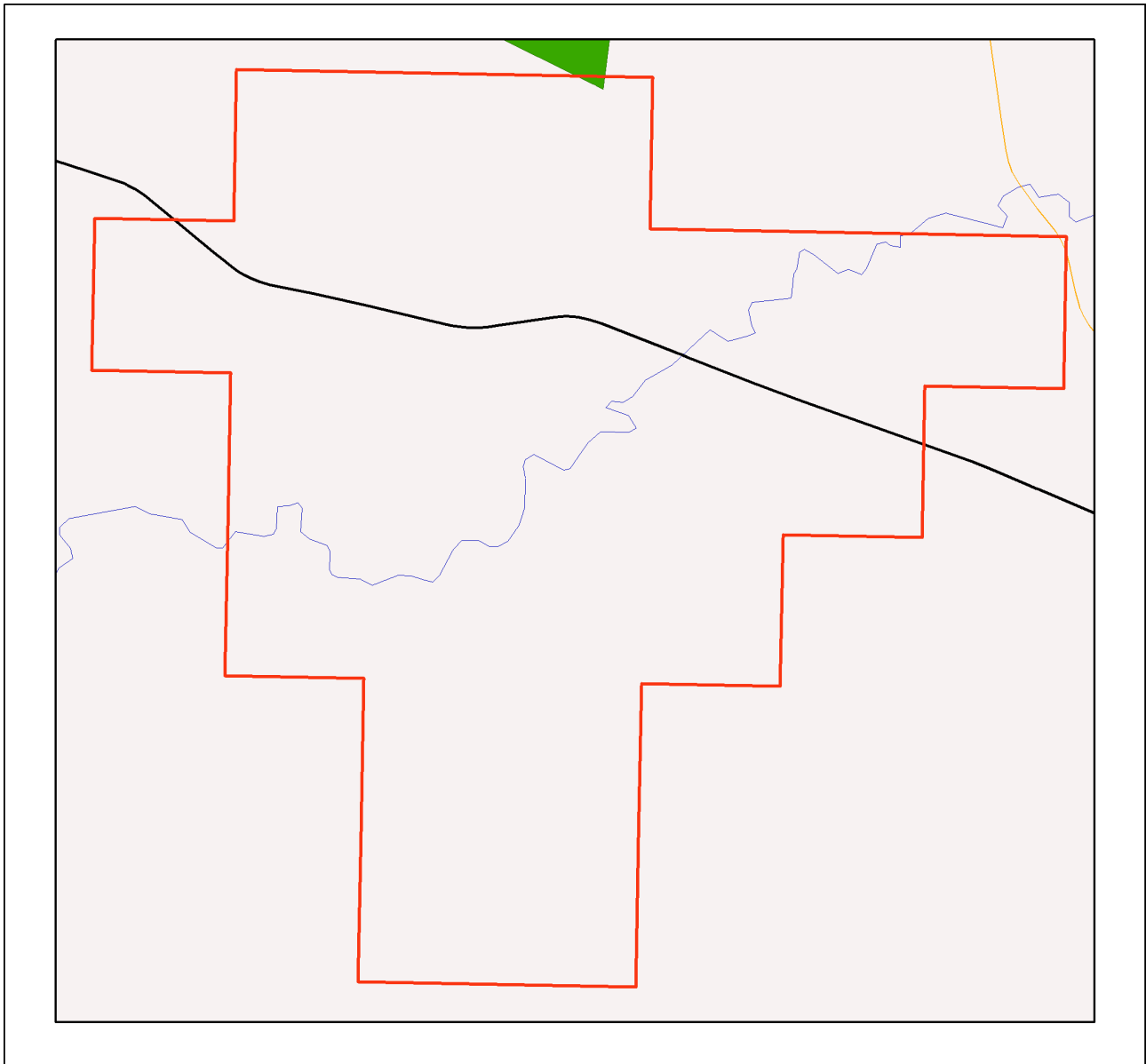
#### **9b. Legally secured offset areas - vegetation offsets through a Property Map of Assessable Vegetation**

(no results)

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



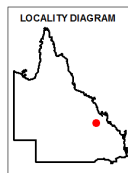
# Map 1 - MSES - State Conservation Areas



## MSES - State Conservation Areas

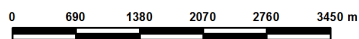
### Area of Interest

- Selected Exploration Permit Coal (EPC)
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Protected area (estates)
- Declared fish habitat area (A and B areas)
- Marine park (highly protected)



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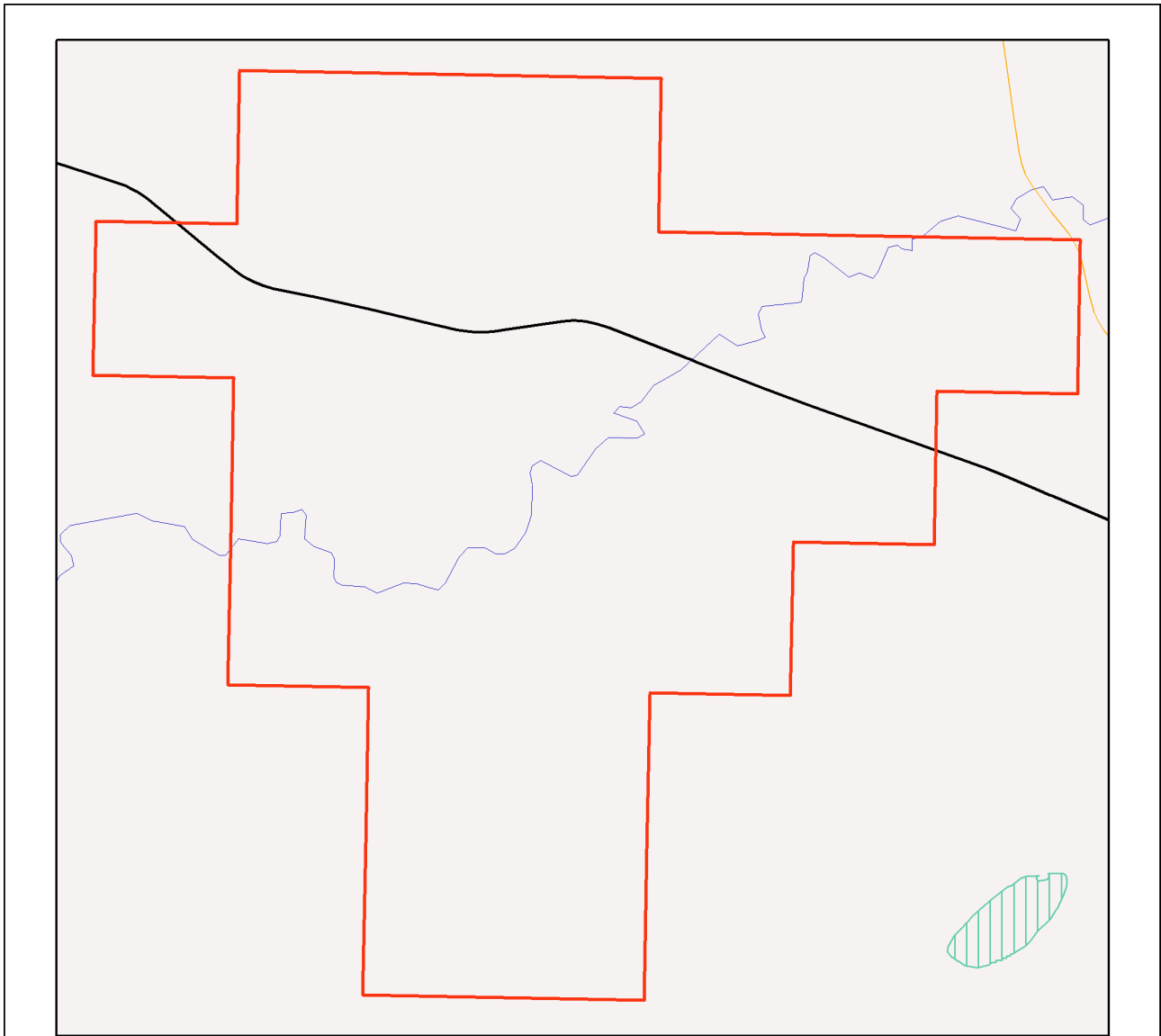
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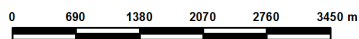
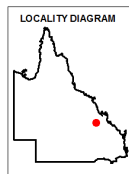
## Map 2 - MSES - Wetlands and Waterways



### MSES - Wetlands and Waterways

**Area of Interest**

- Selected Exploration Permit Coal (EPC)
- 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



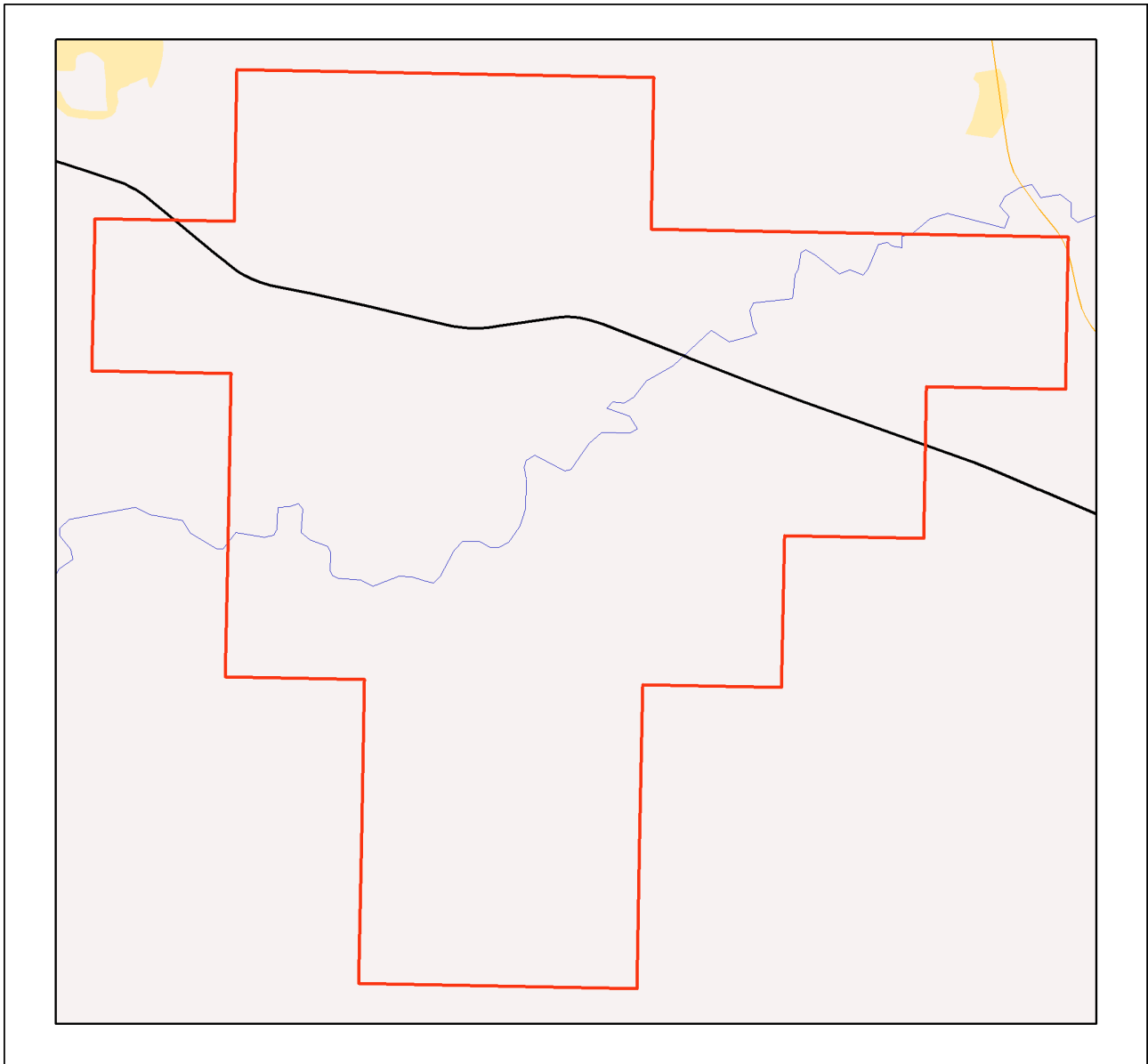
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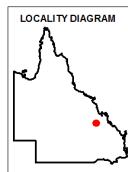
### Map 3 - MSES - Species



### MSES - Species

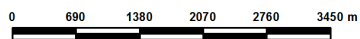
#### Area of Interest

-  Selected Exploration Permit Coal (EPC)
-  Towns
-  Freeways/Highways
-  Secondary roads
-  Major rivers/creeks
-  Threatened wildlife and special least concern animal



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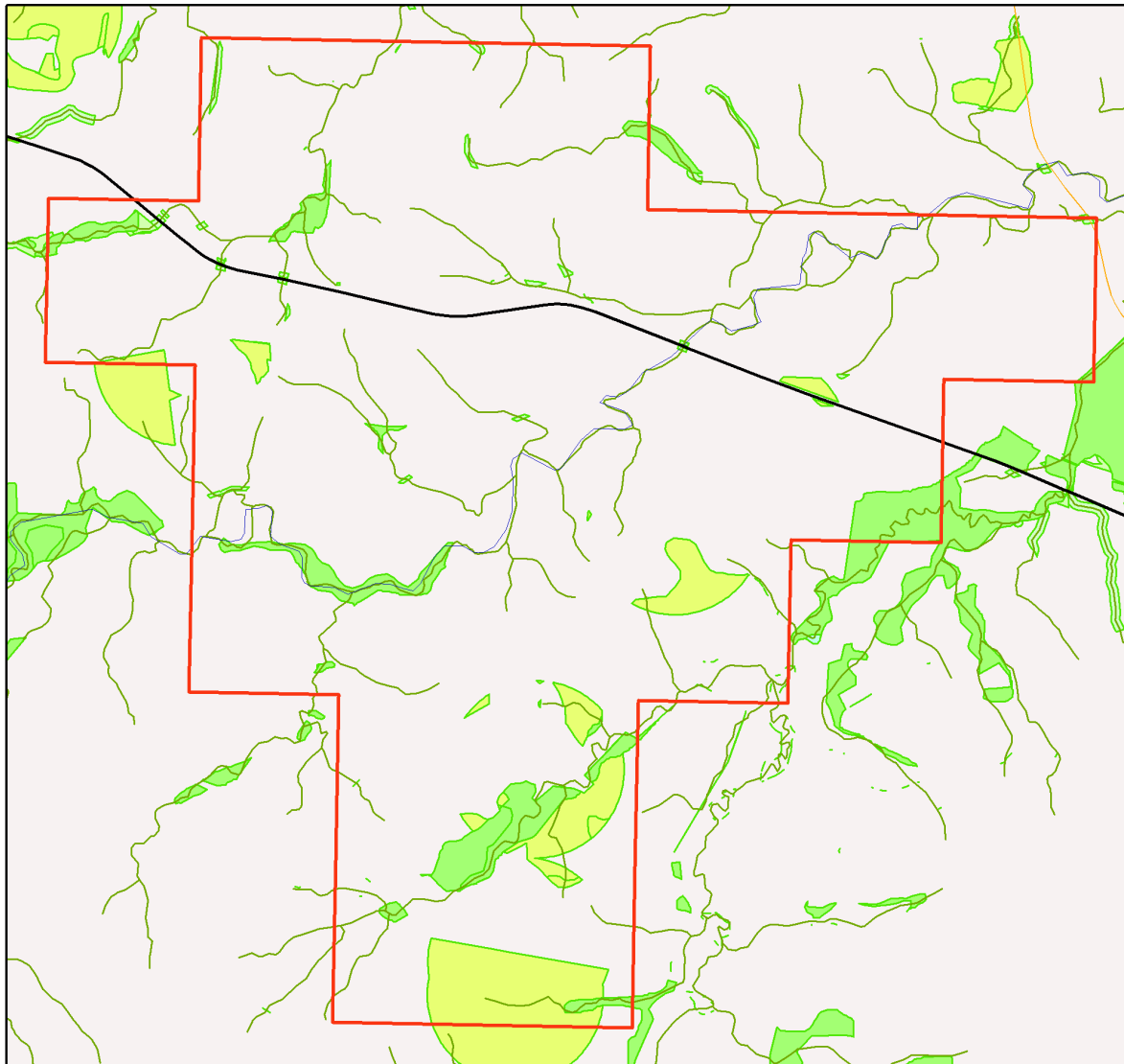
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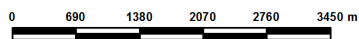
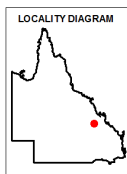
### Map 4 - MSES - Regulated Vegetation



### MSES - Regulated Vegetation

**Area of Interest**

- Selected Exploration Permit Coal (EPC)
- 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)



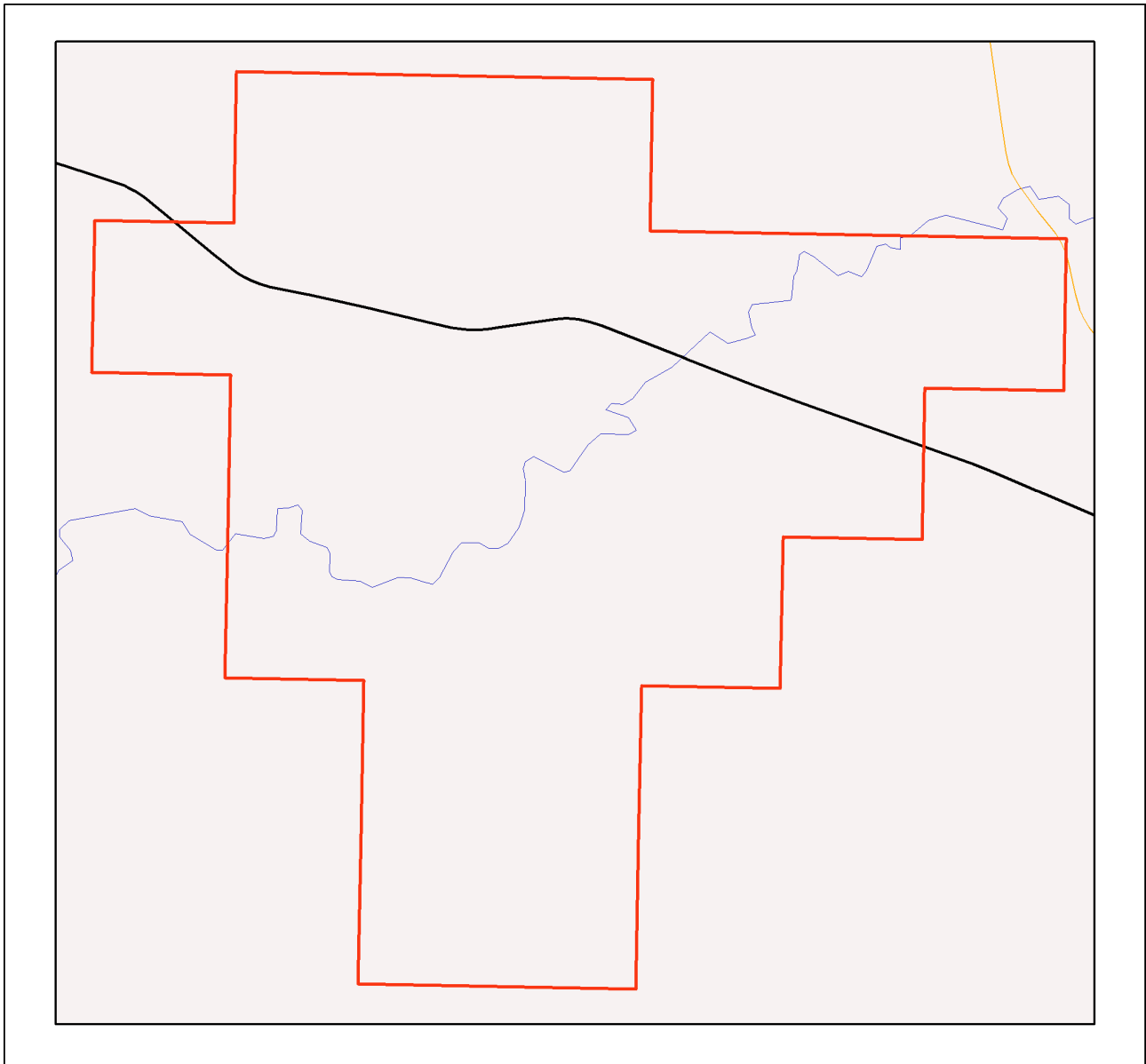
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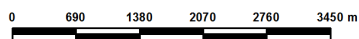
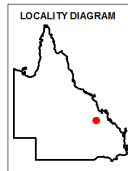
### Map 5 - MSES - Offset Areas



#### MSES - Offsets

**Area of Interest**

- Selected Exploration Permit Coal (EPC)
- 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:

<b>MSES layers</b>	<b>current QSpatial data (<a href="http://qspatial.information.qld.gov.au">http://qspatial.information.qld.gov.au</a>)</b>
Protected Areas-Estates and Nature Refuges	- Protected areas of Queensland - Nature Refuges - 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 Referable Wetland - wetland layers: - Wetland management area wetlands - Wetland protection area wetlands
wetlands in HEV waters	HEV waters: - EPP Water (multiple locations) intent for waters Source Wetlands: - Queensland Wetland Mapping (Current version 4, 2015) Source Watercourses: - Vegetation management watercourse and drainage feature map (1:100000 and 1:250000) - latest version 1.4
Wildlife habitat (threatened and special least concern)	-WildNet database species records - habitat suitability models (various)
VMA regulated regional ecosystems	Vegetation management regional ecosystem and remnant map - latest version 8.0
VMA Essential Habitat	Vegetation management - essential habitat map - latest version 4.41
VMA Wetlands	Vegetation management wetlands map - latest version 2.41
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 - latest version 1.41

---

## 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>





# 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: 03/06/19 10:44:27

[Summary](#)

[Details](#)

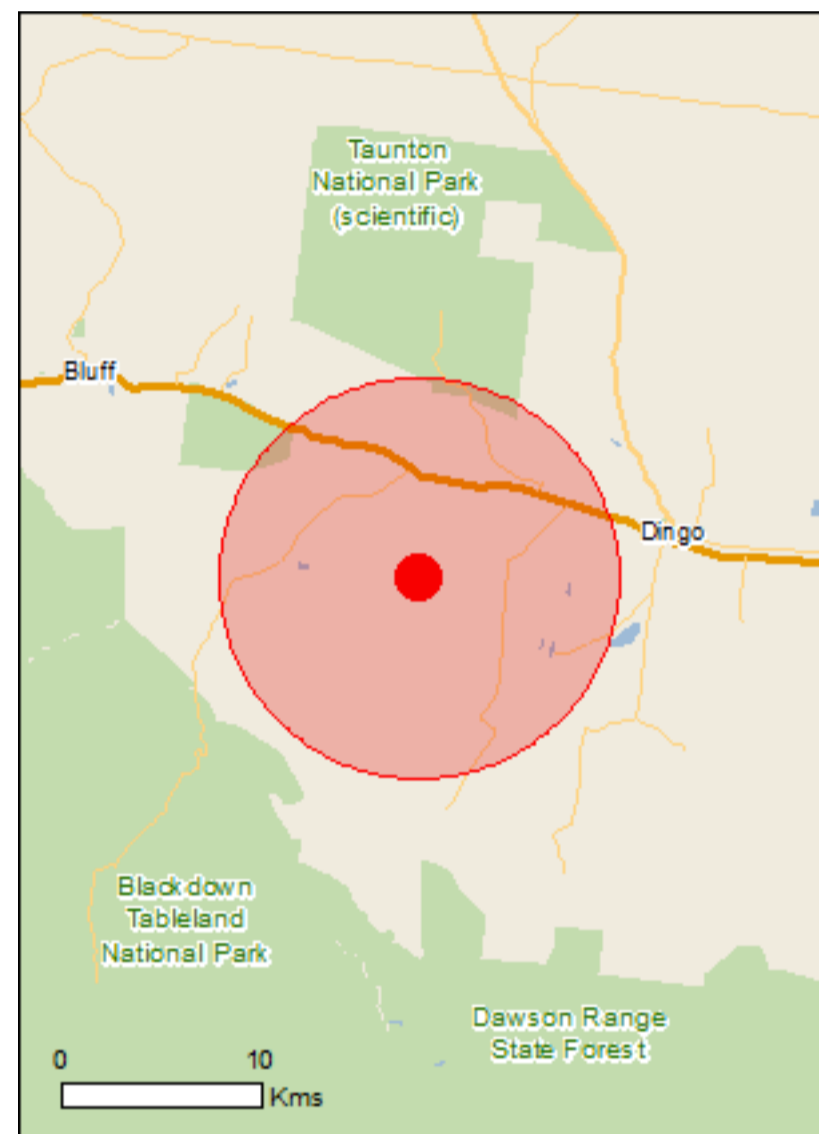
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

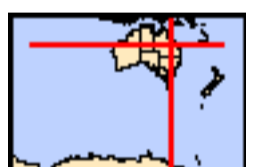
[Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

[Coordinates](#)

[Buffer: 10.0Km](#)



# 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](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	3
<a href="#">Listed Threatened Species:</a>	25
<a href="#">Listed Migratory Species:</a>	12

## 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.

<a href="#">Commonwealth Land:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	18
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	2
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	21
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">Key Ecological Features (Marine)</a>	None

# Details

## Matters of National Environmental Significance

### 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
<a href="#">Brigalow (Acacia harpophylla dominant and co-dominant)</a>	Endangered	Community known to occur within area
<a href="#">Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions</a>	Endangered	Community may occur within area
<a href="#">Weeping Myall Woodlands</a>	Endangered	Community likely to occur within area

### Listed Threatened Species

[\[ Resource Information \]](#)

Name	Status	Type of Presence
<b>Birds</b>		
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Erythrorchis radiatus</a> Red Goshawk [942]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Geophaps scripta scripta</a> Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Grantiella picta</a> Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Neochmia ruficauda ruficauda</a> Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area
<a href="#">Poephila cincta cincta</a> Southern Black-throated Finch [64447]	Endangered	Species or species habitat may occur within area
<a href="#">Rostratula australis</a> Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
<a href="#">Turnix melanogaster</a> Black-breasted Button-quail [923]	Vulnerable	Species or species habitat may occur within area
<b>Fish</b>		
<a href="#">Maccullochella peelii</a> Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
<b>Mammals</b>		

Name	Status	Type of Presence
<a href="#">Chalinolobus dwyeri</a> Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
<a href="#">Dasyurus hallucatus</a> Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area
<a href="#">Macroderma gigas</a> Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Nyctophilus corbeni</a> Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
<a href="#">Onychogalea fraenata</a> Bridled Nail-tail Wallaby, Bridled Naitail Wallaby [239]	Endangered	Species or species habitat known to occur within area
<a href="#">Petauroides volans</a> Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)</a> Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat likely to occur within area
<b>Plants</b>		
<a href="#">Cadellia pentastylis</a> Ooline [9828]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Dichanthium setosum</a> bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Logania diffusa</a> [24159]	Vulnerable	Species or species habitat likely to occur within area
<b>Reptiles</b>		
<a href="#">Delma torquata</a> Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Denisonia maculata</a> Ornamental Snake [1193]	Vulnerable	Species or species habitat may occur within area
<a href="#">Egernia rugosa</a> Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
<a href="#">Elseya albagula</a> Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat likely to occur within area
<a href="#">Furina dunmali</a> Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
<a href="#">Rheodytes leukops</a> Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver [1761]	Vulnerable	Species or species habitat likely to 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
<b>Migratory Marine Birds</b>		

Name	Threatened	Type of Presence
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Cuculus optatus</a> Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat likely to occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat may occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat may occur within area
<b>Migratory Wetlands Species</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat likely to occur within area

## Other Matters Protected by the EPBC Act

Listed Marine Species		[ <a href="#">Resource Information</a> ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
<b>Birds</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Anseranas semipalmata</a> Magpie Goose [978]		Species or species habitat may occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur

Name	Threatened	Type of Presence within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Chrysococcyx osculans</a> Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat likely to occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat may occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat likely to occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat may occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

## Extra Information

### State and Territory Reserves [\[ Resource Information \]](#)

Name	State
Taunton	QLD
Wallaby Lane	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 Resources Audit, 2001.

Name	Status	Type of Presence
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#### Birds

Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area

#### Frogs

Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
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#### Mammals

Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur 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
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		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

Name	Status	Type of Presence
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
<b>Plants</b>		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area
Cryptostegia grandiflora Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913]		Species or species habitat likely to occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		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
Vachellia nilotica Prickly Acacia, Blackthorn, Prickly Mimosa, Black Piquant, Babul [84351]		Species or species habitat likely to occur within area



# 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

-23.66512 149.21782

# 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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[Summary](#)

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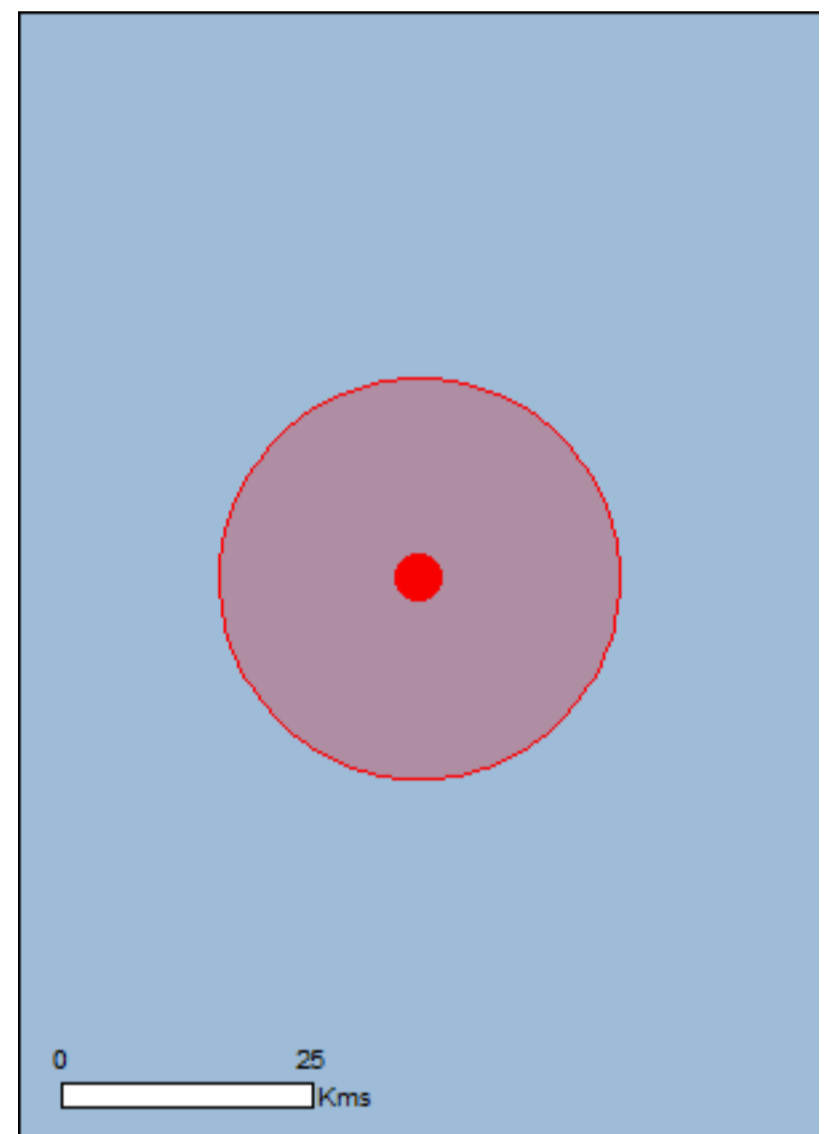
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

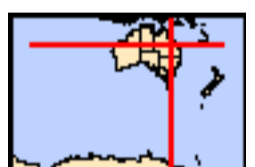
[Acknowledgements](#)



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[Coordinates](#)

Buffer: 20.0Km



# Summary

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<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	4
<a href="#">Listed Threatened Species:</a>	28
<a href="#">Listed Migratory Species:</a>	15

## Other Matters Protected by the EPBC Act

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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.

<a href="#">Commonwealth Land:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	21
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	4
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	21
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">Key Ecological Features (Marine)</a>	None

# Details

## Matters of National Environmental Significance

### 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
<a href="#">Brigalow (Acacia harpophylla dominant and co-dominant)</a>	Endangered	Community known to occur within area
<a href="#">Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions</a>	Endangered	Community may occur within area
<a href="#">Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin</a>	Endangered	Community likely to occur within area
<a href="#">Weeping Myall Woodlands</a>	Endangered	Community likely to occur within area

### Listed Threatened Species

[\[ Resource Information \]](#)

Name	Status	Type of Presence
<b>Birds</b>		
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Erythrotriorchis radiatus</a> Red Goshawk [942]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Geophaps scripta scripta</a> Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Grantiella picta</a> Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Neochmia ruficauda ruficauda</a> Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area
<a href="#">Poephila cincta cincta</a> Southern Black-throated Finch [64447]	Endangered	Species or species habitat may occur within area
<a href="#">Rostratula australis</a> Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
<a href="#">Turnix melanogaster</a> Black-breasted Button-quail [923]	Vulnerable	Species or species habitat likely to occur within area
<b>Fish</b>		
<a href="#">Maccullochella peelii</a> Murray Cod [66633]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence area
<b>Mammals</b>		
<a href="#">Chalinolobus dwyeri</a> Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Dasyurus hallucatus</a> Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area
<a href="#">Macroderma gigas</a> Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Nyctophilus corbeni</a> Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
<a href="#">Onychogalea fraenata</a> Bridled Nail-tail Wallaby, Bridled Naitail Wallaby [239]	Endangered	Species or species habitat known to occur within area
<a href="#">Petauroides volans</a> Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)</a> Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
<b>Plants</b>		
<a href="#">Cadellia pentastylis</a> Ooline [9828]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Daviesia discolor</a> [3567]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Dichanthium setosum</a> bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Homoranthus decumbens</a> a shrub [55186]	Endangered	Species or species habitat may occur within area
<a href="#">Logania diffusa</a> [24159]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Macrozamia platyrhachis</a> cycad [3412]	Endangered	Species or species habitat likely to occur within area
<b>Reptiles</b>		
<a href="#">Delma torquata</a> Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Denisonia maculata</a> Ornamental Snake [1193]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Egernia rugosa</a> Yakka Skink [1420]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Elseya albagula</a> Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
<a href="#">Furina dunmalli</a> Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
<a href="#">Rheodytes leukops</a> Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver [1761]	Vulnerable	Species or species habitat likely to occur within area
<b>Listed Migratory Species</b>		<a href="#">[ Resource Information ]</a>
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
<b>Migratory Marine Birds</b>		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<b>Migratory Marine Species</b>		
<a href="#">Crocodylus porosus</a> Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Cuculus optatus</a> Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat known to occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat likely to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat may occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat may occur within area
<b>Migratory Wetlands Species</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat likely to 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
<b>Birds</b>		

<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
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<a href="#">Anseranas semipalmata</a> Magpie Goose [978]		Species or species habitat may occur within area
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<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
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<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat known to occur within area
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<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area
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<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
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<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
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<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
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<a href="#">Chrysococcyx osculans</a> Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
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<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
--	--	--



Name	Threatened	Type of Presence
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat known to occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat likely to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat may occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat likely to occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat may occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

## Reptiles

<a href="#">Crocodylus porosus</a> Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
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## Extra Information

### State and Territory Reserves [\[ Resource Information \]](#)

Name	State
Blackdown Tableland	QLD
Ghungalu	QLD
Taunton	QLD
Wallaby Lane	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 Resources Audit, 2001.

Name	Status	Type of Presence
<b>Birds</b>		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species

Name	Status	Type of Presence
Streptopelia chinensis		habitat likely to occur within area
Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris		
Common Starling [389]		Species or species habitat likely to occur within area
<b>Frogs</b>		
Rhinella marina		
Cane Toad [83218]		Species or species habitat known to occur within area
<b>Mammals</b>		
Bos taurus		
Domestic Cattle [16]		Species or species habitat likely to occur 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
Lepus capensis		
Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus		
House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus		
Rabbit, European Rabbit [128]		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
Vulpes vulpes		
Red Fox, Fox [18]		Species or species habitat likely to occur within area
<b>Plants</b>		
Acacia nilotica subsp. indica		
Prickly Acacia [6196]		Species or species habitat may occur within area
Cryptostegia grandiflora		
Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913]		Species or species habitat likely to occur within area
Jatropha gossypifolia		
Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Opuntia spp.		
Prickly Pears [82753]		Species or species habitat likely to occur within area
Parkinsonia aculeata		
Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Vachellia nilotica Prickly Acacia, Blackthorn, Prickly Mimosa, Black Piquant, Babul [84351]		Species or species habitat likely to occur within area

# 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

-23.66512 149.21782

# 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.



# 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: 03/06/19 09:45:56

[Summary](#)

[Details](#)

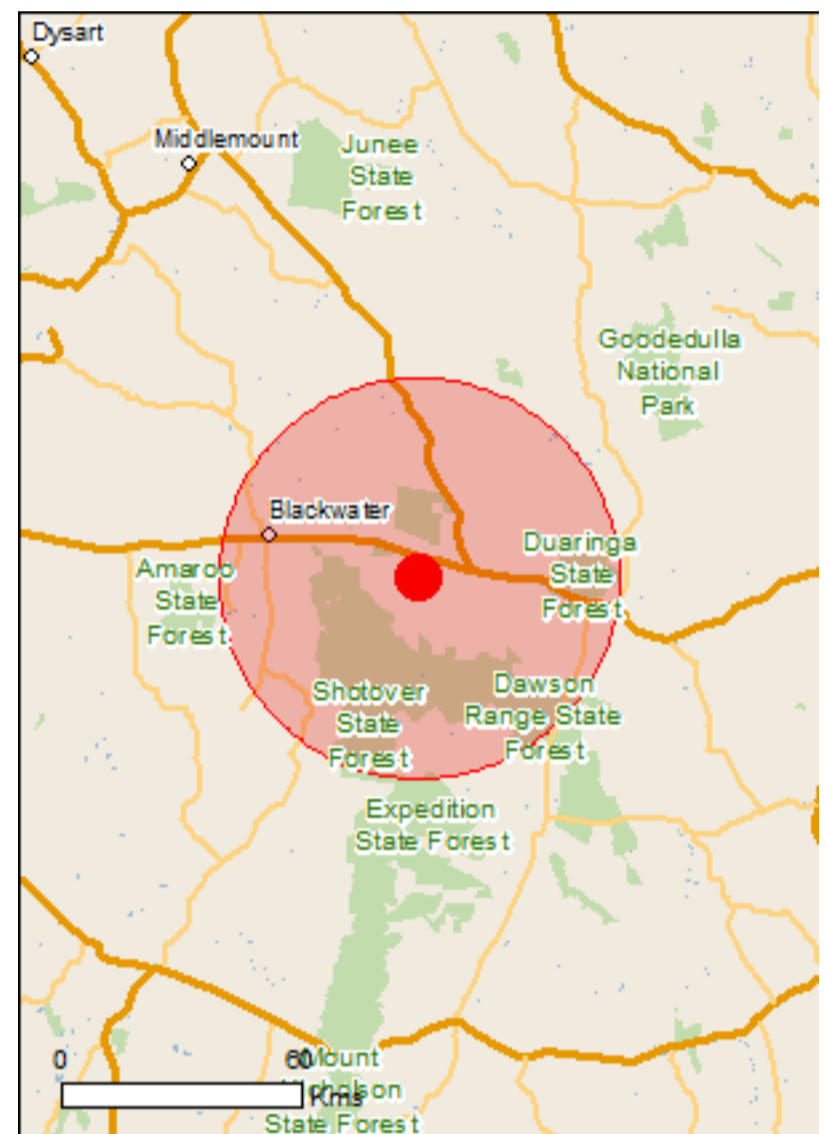
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

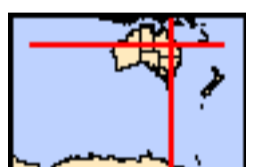
[Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

[Coordinates](#)

Buffer: 50.0Km



# 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](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	5
<a href="#">Listed Threatened Species:</a>	39
<a href="#">Listed Migratory Species:</a>	16

## 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.

<a href="#">Commonwealth Land:</a>	1
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	22
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	5
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	27
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">Key Ecological Features (Marine)</a>	None

# Details

## Matters of National Environmental Significance

### 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
<a href="#">Brigalow (Acacia harpophylla dominant and co-dominant)</a>	Endangered	Community known to occur within area
<a href="#">Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions</a>	Endangered	Community may occur within area
<a href="#">Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin</a>	Endangered	Community likely to occur within area
<a href="#">Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions</a>	Endangered	Community likely to occur within area
<a href="#">Weeping Myall Woodlands</a>	Endangered	Community likely to occur within area

### Listed Threatened Species

[\[ Resource Information \]](#)

Name	Status	Type of Presence
<b>Birds</b>		
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Erythrotriorchis radiatus</a> Red Goshawk [942]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Geophaps scripta scripta</a> Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Grantiella picta</a> Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Neochmia ruficauda ruficauda</a> Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Poephila cincta cincta</a> Southern Black-throated Finch [64447]	Endangered	Species or species habitat may occur within area
<a href="#">Rostratula australis</a> Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
<a href="#">Turnix melanogaster</a> Black-breasted Button-quail [923]	Vulnerable	Species or species



Name	Status	Type of Presence
habitat likely to occur within area		
<b>Fish</b>		
<a href="#">Maccullochella peelii</a> Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
<b>Mammals</b>		
<a href="#">Chalinolobus dwyeri</a> Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Dasyurus hallucatus</a> Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area
<a href="#">Macroderma gigas</a> Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Nyctophilus corbeni</a> Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
<a href="#">Onychogalea fraenata</a> Bridled Nail-tail Wallaby, Bridled Naitail Wallaby [239]	Endangered	Species or species habitat known to occur within area
<a href="#">Petauroides volans</a> Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)</a> Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pteropus poliocephalus</a> Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
<b>Plants</b>		
<a href="#">Acacia grandifolia</a> [3566]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Aristida annua</a> [17906]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Bertya opponens</a> [13792]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Cadellia pentastylis</a> Ooline [9828]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Cycas ophiolitica</a> [55797]	Endangered	Species or species habitat likely to occur within area
<a href="#">Daviesia discolor</a> [3567]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Dichanthium queenslandicum</a> King Blue-grass [5481]	Endangered	Species or species habitat may occur within area
<a href="#">Dichanthium setosum</a> bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
<a href="#">Eucalyptus raveretiana</a> Black Ironbox [16344]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Homoranthus decumbens</a> a shrub [55186]	Endangered	Species or species habitat known to occur within area
<a href="#">Logania diffusa</a> [24159]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Macrozamia platyrhachis</a> cycad [3412]	Endangered	Species or species habitat likely to occur within area
<a href="#">Phaius australis</a> Lesser Swamp-orchid [5872]	Endangered	Species or species habitat known to occur within area
<a href="#">Solanum dissectum</a> [75720]	Endangered	Species or species habitat known to occur within area
<a href="#">Solanum johnsonianum</a> [84820]	Endangered	Species or species habitat may occur within area

## Reptiles

<a href="#">Delma torquata</a> Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Denisonia maculata</a> Ornamental Snake [1193]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Egernia rugosa</a> Yakka Skink [1420]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Elseya albagula</a> Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Furina dunmali</a> Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
<a href="#">Rheodytes leukops</a> Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver [1761]	Vulnerable	Species or species habitat likely to 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
<b>Migratory Marine Birds</b>		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<b>Migratory Marine Species</b>		
<a href="#">Crocodylus porosus</a> Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Cuculus optatus</a> Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat known to occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat likely to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat may occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat may occur within area

#### Migratory Wetlands Species

<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat likely to occur within area

#### Other Matters Protected by the EPBC Act

##### Commonwealth Land

[\[ Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Defence - BLACKWATER TRAINING DEPOT

##### 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		

Name	Threatened	Type of Presence
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Anseranas semipalmata</a> Magpie Goose [978]		Species or species habitat may occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Breeding known to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Chrysococcyx osculans</a> Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat known to occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat likely to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species

Name	Threatened	Type of Presence
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		habitat likely to occur within area  Species or species habitat may occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

## Reptiles

<a href="#">Crocodylus porosus</a> Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
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## Extra Information

### State and Territory Reserves [\[ Resource Information \]](#)

Name	State
Blackdown Tableland	QLD
Blackwater	QLD
Ghungalu	QLD
Taunton	QLD
Wallaby Lane	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 Resources Audit, 2001.

Name	Status	Type of Presence
<b>Birds</b>		
<i>Anas platyrhynchos</i> Mallard [974]		Species or species habitat likely to occur within area
<i>Columba livia</i> Rock Pigeon, Rock Dove, Domestic Pigeon [803]		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 [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
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## Mammals

<i>Bos taurus</i> Domestic Cattle [16]		Species or species habitat likely to occur within area
<i>Canis lupus familiaris</i> Domestic Dog [82654]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
<i>Felis catus</i> Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
<i>Lepus capensis</i> Brown Hare [127]		Species or species habitat likely to occur within area
<i>Mus musculus</i> House Mouse [120]		Species or species habitat likely to occur within area
<i>Oryctolagus cuniculus</i> Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
<i>Rattus rattus</i> Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
<i>Sus scrofa</i> Pig [6]		Species or species habitat likely to occur within area
<i>Vulpes vulpes</i> Red Fox, Fox [18]		Species or species habitat likely to occur within area
<b>Plants</b>		
<i>Acacia nilotica</i> subsp. <i>indica</i> Prickly Acacia [6196]		Species or species habitat may occur within area
<i>Cryptostegia grandiflora</i> Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913]		Species or species habitat likely to occur within area
<i>Hymenachne amplexicaulis</i> Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
<i>Jatropha gossypifolia</i> Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
<i>Lantana camara</i> 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
<i>Opuntia</i> spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
<i>Parkinsonia aculeata</i> Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
<i>Parthenium hysterophorus</i> Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
<i>Prosopis</i> spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
<i>Salvinia molesta</i> Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
<i>Tamarix aphylla</i> Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering		Species or species habitat likely to occur

Name	Status	Type of Presence
Cypress, Salt Cedar [16018] Vachellia nilotica		within area
Prickly Acacia, Blackthorn, Prickly Mimosa, Black Piquant, Babul [84351]		Species or species habitat likely to occur within area

# 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

-23.66512 149.21782



# 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.



# Queensland Government

## Wildlife Online Extract

Search Criteria: Species List for a Specified Point  
Species: All  
Type: Native  
Status: Rare and threatened species  
Records: All  
Date: All  
Latitude: -23.6651  
Longitude: 149.2178  
Distance: 10  
Email: ceales@aarc.net.au  
Date submitted: Monday 03 Jun 2019 10:43:03  
Date extracted: Monday 03 Jun 2019 10:50:02

The number of records retrieved = 9

### **Disclaimer**

As the DSITIA is still in a process of collating and vetting data, it is possible the information given is not complete. The information provided should only be used for the project for which it was requested and it should be appropriately acknowledged as being derived from Wildlife Online when it is used.

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Columbidae	<i>Geophaps scripta scripta</i>	squatter pigeon (southern subspecies)		V	V	15
animals	mammals	Macropodidae	<i>Onychogalea fraenata</i>	bridled nailtail wallaby		E	E	6
animals	mammals	Phascolarctidae	<i>Phascolarctos cinereus</i>	koala		V	V	1
animals	mammals	Pseudocheiridae	<i>Petauroides volans</i>	greater glider		V	V	1
animals	mammals	Pseudocheiridae	<i>Petauroides volans volans</i>	southern greater glider		V	V	1
animals	reptiles	Diplodactylidae	<i>Strophurus taenicauda</i>	golden-tailed gecko		NT		2
plants	Equisetopsida	Apocynaceae	<i>Cerbera dumicola</i>			NT		2/2
plants	Equisetopsida	Orchidaceae	<i>Corunastylis pedersonii</i>			V		1/1
plants	Equisetopsida	Solanaceae	<i>Solanum elachophyllum</i>			E		1

#### 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 in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ( ).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999*. The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).

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

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



# Queensland Government

## Wildlife Online Extract

Search Criteria: Species List for a Specified Point  
Species: All  
Type: Native  
Status: Rare and threatened species  
Records: All  
Date: All  
Latitude: -23.6651  
Longitude: 149.2178  
Distance: 20  
Email: ceales@aarc.net.au  
Date submitted: Monday 03 Jun 2019 10:01:02  
Date extracted: Monday 03 Jun 2019 10:10:11

The number of records retrieved = 32

### **Disclaimer**

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Limnodynastidae	<i>Adelotus brevis</i>	tusked frog		V		9
animals	birds	Accipitridae	<i>Erythrotriorchis radiatus</i>	red goshawk		E	V	1
animals	birds	Cacatuidae	<i>Calyptorhynchus lathami</i>	glossy black-cockatoo		V		2
animals	birds	Cacatuidae	<i>Calyptorhynchus lathami erebus</i>	glossy black-cockatoo (northern)		V		9/1
animals	birds	Columbidae	<i>Geophaps scripta scripta</i>	squatter pigeon (southern subspecies)		V	V	23
animals	mammals	Dasyuridae	<i>Antechinus argentus</i>	silver-headed antechinus		V	E	23
animals	mammals	Macropodidae	<i>Onychogalea fraenata</i>	bridled nailtail wallaby		E	E	37
animals	mammals	Phascolarctidae	<i>Phascolarctos cinereus</i>	koala		V	V	6
animals	mammals	Pseudocheiridae	<i>Petauroides volans</i>	greater glider		V	V	3
animals	mammals	Pseudocheiridae	<i>Petauroides volans volans</i>	southern greater glider		V	V	40
animals	reptiles	Diplodactylidae	<i>Strophurus taenicauda</i>	golden-tailed gecko		NT		10/1
animals	reptiles	Pygopodidae	<i>Delma torquata</i>	collared delma		V	V	1
plants	Equisetopsida	Apocynaceae	<i>Cerbera dumicola</i>			NT		3/3
plants	Equisetopsida	Arecaceae	<i>Livistona fulva</i>			V		9/9
plants	Equisetopsida	Asteraceae	<i>Rutidosia glandulosa</i>			NT		7/7
plants	Equisetopsida	Byttneriaceae	<i>Commersonia pearnii</i>			E		2/2
plants	Equisetopsida	Euphorbiaceae	<i>Bertya pedicellata</i>			NT		2
plants	Equisetopsida	Fabaceae	<i>Daviesia discolor</i>			V	V	3/3
plants	Equisetopsida	Fabaceae	<i>Daviesia quoquoversus</i>			V		2/2
plants	Equisetopsida	Lamiaceae	<i>Plectranthus blakei</i>			NT		9/9
plants	Equisetopsida	Loganiaceae	<i>Logania diffusa</i>			V	V	3/2
plants	Equisetopsida	Mimosaceae	<i>Acacia storyi</i>			NT		8/6
plants	Equisetopsida	Myrtaceae	<i>Melaleuca pearsonii</i>			NT		10/10
plants	Equisetopsida	Myrtaceae	<i>Baekkea trapeza</i>			V		7/7
plants	Equisetopsida	Myrtaceae	<i>Melaleuca groveana</i>			NT		5/4
plants	Equisetopsida	Orchidaceae	<i>Corunastylis pedersonii</i>			V		1/1
plants	Equisetopsida	Orchidaceae	<i>Gastrodia crebriflora</i>			V		1/1
plants	Equisetopsida	Orchidaceae	<i>Corunastylis valida</i>			V		1/1
plants	Equisetopsida	Picrodendraceae	<i>Pseudanthus pauciflorus subsp. arenicola</i>			NT		2/1
plants	Equisetopsida	Solanaceae	<i>Solanum adenophorum</i>			E		9/8
plants	Equisetopsida	Solanaceae	<i>Solanum elachophyllum</i>			E		7/5
plants	Equisetopsida	Zamiaceae	<i>Macrozamia platyrhachis</i>			E	E	19/8

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



# Queensland Government

## Wildlife Online Extract

Search Criteria: Species List for a Specified Point  
Species: All  
Type: Native  
Status: Rare and threatened species  
Records: All  
Date: All  
Latitude: -23.6651  
Longitude: 149.2178  
Distance: 50  
Email: ceales@aarc.net.au  
Date submitted: Monday 03 Jun 2019 10:00:25  
Date extracted: Monday 03 Jun 2019 10:10:03

The number of records retrieved = 49

### **Disclaimer**

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Limnodynastidae	<i>Adelotus brevis</i>	tusked frog		V		10
animals	birds	Accipitridae	<i>Erythrotriorchis radiatus</i>	red goshawk	E		V	15
animals	birds	Cacatuidae	<i>Calyptorhynchus lathami</i>	glossy black-cockatoo		V		4
animals	birds	Cacatuidae	<i>Calyptorhynchus lathami erebus</i>	glossy black-cockatoo (northern)		V		19/2
animals	birds	Columbidae	<i>Geophaps scripta scripta</i>	squatter pigeon (southern subspecies)		V	V	44
animals	birds	Estrildidae	<i>Poephila cincta cincta</i>	black-throated finch (white-rumped subspecies)	E		E	4/1
animals	birds	Meliphagidae	<i>Grantiella picta</i>	painted honeyeater		V	V	3
animals	birds	Pedionomidae	<i>Pedionomus torquatus</i>	plains-wanderer		V	CE	1
animals	birds	Psittacidae	<i>Lathamus discolor</i>	swift parrot	E		CE	1
animals	birds	Psittacidae	<i>Psephotus pulcherrimus</i>	paradise parrot	PE		EX	9/2
animals	birds	Strigidae	<i>Ninox strenua</i>	powerful owl		V		3
animals	birds	Turnicidae	<i>Turnix melanogaster</i>	black-breasted button-quail		V	V	7
animals	insects	Lycaenidae	<i>Jalmenus eubulus</i>	pale imperial hairstreak		V		5
animals	mammals	Dasyuridae	<i>Antechinus argentus</i>	silver-headed antechinus		V	E	23
animals	mammals	Macropodidae	<i>Onychogalea fraenata</i>	bridled nailtail wallaby	E		E	41
animals	mammals	Phascolarctidae	<i>Phascolarctos cinereus</i>	koala		V	V	14
animals	mammals	Potoroidae	<i>Bettongia gaimardi gaimardi</i>	eastern bettong	PE		EX	4
animals	mammals	Pseudocheiridae	<i>Petauroides volans volans</i>	southern greater glider		V	V	71
animals	mammals	Pseudocheiridae	<i>Petauroides volans</i>	greater glider		V	V	3
animals	mammals	Vespertilionidae	<i>Chalinolobus dwyeri</i>	large-eared pied bat		V	V	2
animals	reptiles	Chelidae	<i>Elseya albagula</i>	southern snapping turtle	E		CE	2
animals	reptiles	Chelidae	<i>Rheodytes leukops</i>	Fitzroy River turtle		V	V	1
animals	reptiles	Diplodactylidae	<i>Strophurus taenicauda</i>	golden-tailed gecko		NT		10/1
animals	reptiles	Elapidae	<i>Denisonia maculata</i>	ornamental snake		V	V	2
animals	reptiles	Pygopodidae	<i>Delma torquata</i>	collared delma		V	V	1
plants	Equisetopsida	Apocynaceae	<i>Cerbera dumicola</i>			NT		6/6
plants	Equisetopsida	Arecaceae	<i>Livistona fulva</i>			V		16/12
plants	Equisetopsida	Asteraceae	<i>Rutidosia glandulosa</i>			NT		7/7
plants	Equisetopsida	Byttneriaceae	<i>Commersonia pearnii</i>			E		2/2
plants	Equisetopsida	Euphorbiaceae	<i>Bertya pedicellata</i>			NT		3
plants	Equisetopsida	Fabaceae	<i>Daviesia quoquoversus</i>			V		7/2
plants	Equisetopsida	Fabaceae	<i>Daviesia discolor</i>			V	V	8/6
plants	Equisetopsida	Lamiaceae	<i>Plectranthus blakei</i>			NT		10/10
plants	Equisetopsida	Loganiaceae	<i>Logania diffusa</i>			V	V	4/2
plants	Equisetopsida	Mimosaceae	<i>Acacia storyi</i>			NT		21/17
plants	Equisetopsida	Myrtaceae	<i>Melaleuca pearsonii</i>			NT		13/12
plants	Equisetopsida	Myrtaceae	<i>Baeckea trapeza</i>			V		7/7
plants	Equisetopsida	Myrtaceae	<i>Sannantha brachypoda</i>			V		1/1
plants	Equisetopsida	Myrtaceae	<i>Melaleuca groveana</i>			NT		6/4
plants	Equisetopsida	Orchidaceae	<i>Phaius australis</i>			E	E	5/3
plants	Equisetopsida	Orchidaceae	<i>Corunastylis pedersonii</i>			V		1/1
plants	Equisetopsida	Orchidaceae	<i>Gastrodia crebriflora</i>			V		1/1
plants	Equisetopsida	Orchidaceae	<i>Corunastylis valida</i>			V		1/1
plants	Equisetopsida	Picrodendraceae	<i>Pseudanthus pauciflorus subsp. arenicola</i>			NT		2/1
plants	Equisetopsida	Solanaceae	<i>Solanum dissectum</i>			E	E	3/3

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	Equisetopsida	Solanaceae	<i>Solanum adenophorum</i>			E		12/10
plants	Equisetopsida	Solanaceae	<i>Solanum elachophyllum</i>			E		17/14
plants	Equisetopsida	Surianaceae	<i>Cadellia pentastylis</i>	ooline		V	V	5/4
plants	Equisetopsida	Zamiaceae	<i>Macrozamia platyrhachis</i>			E	E	55/30

#### 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 in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ( ).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999*. The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).

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

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



Appendix B    AARC AusRivAS Physical Assessment Results

Characteristic	DWR1				
	<b>Bank Shape</b>	<b>Left Bank</b>		<b>Right Bank</b>	
	Concave		Concave		
<b>Bank Slope</b>	<b>Left Bank</b>		<b>Right Bank</b>		
	30°		35°		
<b>Associated Watercourse</b>	Stanley Creek				
<b>Factors Affecting Bank Stability</b>	High presence of weeds, low tree density				
<b>Artificial Bank Stability Features</b>	Highway culvert, rocks added to stream bed, fence line				
<b>Large Woody Debris</b>	1%				
<b>Turbidity, Water and Sediment Oils and Odours</b>	<b>Turbidity</b>	<b>Sediment Oils</b>	<b>Water Oils</b>	<b>Sediment Odours</b>	<b>Water Odours</b>
	NA	None	NA	None	NA
<b>Water Level</b>	Dry at time of survey				
<b>Bare Ground</b>	Low (1-10%)				
<b>Exposed Tree Roots</b>	Low (1-10%), primarily at the base of trees at fence line				
<b>Gully Erosion</b>	Low (1-10%)				
<b>Bank Slumping</b>	None				
<b>Local Catchment Erosion</b>	None				



Characteristic	DWR4				
	<b>Bank Shape</b>	<b>Left Bank</b>		<b>Right Bank</b>	
	Concave		Concave		
<b>Bank Slope</b>	<b>Left Bank</b>		<b>Right Bank</b>		
	flat		flat		
<b>Associated Watercourse</b>	Charlevue Creek				
<b>Factors Affecting Bank Stability</b>	Bank highly stable, small depression area				
<b>Artificial Bank Stability Features</b>	None				
<b>Large Woody Debris (%)</b>	2%				
<b>Turbidity, Water and Sediment Oils and Odours</b>	<b>Turbidity</b>	<b>Sediment Oils</b>	<b>Water Oils</b>	<b>Sediment Odours</b>	<b>Water Odours</b>
	NA	None	NA	None	NA
<b>Water Level</b>	Dry at time of survey				
<b>Bare Ground</b>	None				
<b>Exposed Tree Roots</b>	None				
<b>Gully Erosion</b>	None				
<b>Bank Slumping</b>	None				
<b>Local Catchment Erosion</b>	None				



Characteristic	DWR5				
	<b>Bank Shape</b>	<b>Left Bank</b>		<b>Right Bank</b>	
	Concave		Concave		
<b>Bank Slope</b>	<b>Left Bank</b>		<b>Right Bank</b>		
	65°		50°		
<b>Associated Watercourse</b>	Charlevue Creek				
<b>Factors Affecting Bank Stability</b>	Low ground cover on edges, high cattle traffic, cleared area, high weed presence				
<b>Artificial Bank Stability Features</b>	None				
<b>Large Woody Debris (%)</b>	10%				
<b>Turbidity, Water and Sediment Oils and Odours</b>	<b>Turbidity</b>	<b>Sediment Oils</b>	<b>Water Oils</b>	<b>Sediment Odours</b>	<b>Water Odours</b>
	Turbid	None	None	None	None
<b>Water Level</b>	0.3 m				
<b>Bare Ground</b>	Low (1-10%)				
<b>Exposed Tree Roots</b>	Low (1-10%)				
<b>Gully Erosion</b>	Low (1-10%)				
<b>Bank Slumping</b>	Some (10-50%)				
<b>Local Catchment Erosion</b>	Moderate (50-75%) primarily in areas of high				



Characteristic	DWR6				
Bank Shape	Left Bank		Right Bank		
	Concave		Concave		
Bank Slope	Left Bank		Right Bank		
	flat		flat		
Associated Watercourse	Springton Creek				
Factors Affecting Bank Stability	-				
Artificial Bank Stability Features	None				
Large Woody Debris (%)	2%				
Turbidity, Water and Sediment Oils and Odours	Turbidity	Sediment Oils	Water Oils	Sediment Odours	Water Odours
	NA	None	NA	None	NA
Water Level	Dry at time of survey				
Bare Ground	Low (1-10%)				
Exposed Tree Roots	None				
Gully Erosion	Low (1-10%)				
Bank Slumping	None				
Local Catchment Erosion	Low (1-10%)				



Characteristic	DWI1				
	Bank Shape	Left Bank		Right Bank	
Convex		Concave			
Bank Slope	Left Bank		Right Bank		
	30°		20°		
Associated Watercourse	Stanley Creek				
Factors Affecting Bank Stability	Low ground cover on edges, high weed presence				
Artificial Bank Stability Features	Farmer dam, access tracks, fence line				
Large Woody Debris (%)	0%				
Turbidity, Water and Sediment Oils and Odours	Turbidity	Sediment Oils	Water Oils	Sediment Odours	Water Odours
	NA	None	NA	None	NA
Water Level	Dry at time of survey				
Bare Ground	Low (1-10%)				
Exposed Tree Roots	None				
Gully Erosion	None				
Bank Slumping	None				
Local Catchment Erosion	Some (10-50%)				



Characteristic	DWI3				
	Left Bank		Right Bank		
<b>Bank Shape</b>	Convex		Convex		
<b>Bank Slope</b>	85°		85°		
<b>Associated Watercourse</b>	Charlevue Creek				
<b>Factors Affecting Bank Stability</b>	Low ground cover on edges, steep banks, high cattle traffic, low presence of mature trees				
<b>Artificial Bank Stability Features</b>	Creek crossing				
<b>Large Woody Debris (%)</b>	5%				
<b>Turbidity, Water and Sediment Oils and Odours</b>	<b>Turbidity</b>	<b>Sediment Oils</b>	<b>Water Oils</b>	<b>Sediment Odours</b>	<b>Water Odours</b>
	NA	None	NA	None	NA
<b>Water Level</b>	Dry at time of survey				
<b>Bare Ground</b>	Low (1-10%)				
<b>Exposed Tree Roots</b>	Low (1-10%)				
<b>Gully Erosion</b>	Some (10-50%)				
<b>Bank Slumping</b>	Moderate (50-75%)				
<b>Local Catchment Erosion</b>	Moderate (50-75%)				



Characteristic	DWI6				
	Left Bank		Right Bank		
<b>Bank Shape</b>	Convex		Convex		
<b>Bank Slope</b>	80°		75°		
<b>Associated Watercourse</b>	Springton Creek				
<b>Factors Affecting Bank Stability</b>	Low ground cover on edges				
<b>Artificial Bank Stability Features</b>	Located at highway crossing, large bridge, concrete base in areas				
<b>Large Woody Debris (%)</b>	0%				
<b>Turbidity, Water and Sediment Oils and Odours</b>	<b>Turbidity</b>	<b>Sediment Oils</b>	<b>Water Oils</b>	<b>Sediment Odours</b>	<b>Water Odours</b>
	Turbid	None	None	None	None
<b>Water Level</b>	0.8 m				
<b>Bare Ground</b>	Low (1-10%)				
<b>Exposed Tree Roots</b>	Some (10-50%)				
<b>Gully Erosion</b>	Moderate (50-75%)				
<b>Bank Slumping</b>	Moderate (50-75%)				
<b>Local Catchment Erosion</b>	Some (10-50%)				





Characteristic	DWI8				
	Bank Shape	Left Bank		Right Bank	
Convex		Convex			
Bank Slope	Left Bank		Right Bank		
	75°		85°		
Associated Watercourse	Springton Creek				
Factors Affecting Bank Stability	Low vegetation cover on edges, steep bank edges, heavy clearing in surrounding areas, high cattle traffic				
Artificial Bank Stability Features	None				
Large Woody Debris (%)	30%				
Turbidity, Water and Sediment Oils and Odours	Turbidity	Sediment Oils	Water Oils	Sediment Odours	Water Odours
	NA	None	NA	None	NA
Water Level	Dry at time of survey				
Bare Ground	Moderate (50-75%)				
Exposed Tree Roots	Moderate (50-75%)				
Gully Erosion	Extensive (>75%)				
Bank Slumping	Moderate (50-75%)				
Local Catchment Erosion	Some (10-50%)				



Characteristic	DWI9				
	Left Bank		Right Bank		
Bank Shape	Concave		Concave		
Bank Slope	35°		15°		
Associated Watercourse	Springton Creek				
Factors Affecting Bank Stability	Weed presence, low ground cover presence, signs of water logging				
Artificial Bank Stability Features	None				
Large Woody Debris (%)	10%				
Turbidity, Water and Sediment Oils and Odours	Turbidity	Sediment Oils	Water Oils	Sediment Odours	Water Odours
	Turbid	None	None	None	None
Water Level	0.4 m				
Bare Ground	Low (1-10%)				
Exposed Tree Roots	None				
Gully Erosion	Low (1-10%)				
Bank Slumping	Low (1-10%)				
Local Catchment Erosion	Some (10-50%)				



Characteristic	DAR1				
	<b>Bank Shape</b>	<b>Left Bank</b>		<b>Right Bank</b>	
	Concave		Convex		
<b>Bank Slope</b>	<b>Left Bank</b>		<b>Right Bank</b>		
	45°		60°		
<b>Associated Watercourse</b>	Charlevue Creek				
<b>Factors Affecting Bank Stability</b>	Low ground cover on edges, steep bank, exposed roots, signs of flooding, cattle access, high weed presence				
<b>Artificial Bank Stability Features</b>	None				
<b>Large Woody Debris (%)</b>	20%				
<b>Turbidity, Water and Sediment Oils and Odours</b>	<b>Turbidity</b>	<b>Sediment Oils</b>	<b>Water Oils</b>	<b>Sediment Odours</b>	<b>Water Odours</b>
	Turbid	None	None	None	None
<b>Water Level</b>	0.4 m				
<b>Bare Ground</b>	Moderate (50-75%)				
<b>Exposed Tree Roots</b>	Low (1-10%)				
<b>Gully Erosion</b>	None				
<b>Bank Slumping</b>	Some (10-50%)				
<b>Local Catchment Erosion</b>	Low (1-10%)				



Characteristic	DAI1				
	Left Bank		Right Bank		
<b>Bank Shape</b>	Concave		Convex		
<b>Bank Slope</b>	55°		70°		
<b>Associated Watercourse</b>	Charlevue Creek				
<b>Factors Affecting Bank Stability</b>	Low ground cover on edges, steep banks, high weed presence				
<b>Artificial Bank Stability Features</b>	None				
<b>Large Woody Debris (%)</b>	40%				
<b>Turbidity, Water and Sediment Oils and Odours</b>	<b>Turbidity</b>	<b>Sediment Oils</b>	<b>Water Oils</b>	<b>Sediment Odours</b>	<b>Water Odours</b>
	Turbid	None	None	None	None
<b>Water Level</b>	0.4 m				
<b>Bare Ground</b>	Moderate (50-75%)				
<b>Exposed Tree Roots</b>	Low (1-10%)				
<b>Gully Erosion</b>	Low (1-10%)				
<b>Bank Slumping</b>	Low (1-10%)				
<b>Local Catchment Erosion</b>	Extensive (>75%)				



Characteristic	DAI2				
	Left Bank		Right Bank		
<b>Bank Shape</b>	Concave		Concave		
<b>Bank Slope</b>	35°		25°		
<b>Associated Watercourse</b>	Charlevue Creek				
<b>Factors Affecting Bank Stability</b>	Low ground cover on edges, cattle access				
<b>Artificial Bank Stability Features</b>	None				
<b>Large Woody Debris (%)</b>	10%				
<b>Turbidity, Water and Sediment Oils and Odours</b>	<b>Turbidity</b>	<b>Sediment Oils</b>	<b>Water Oils</b>	<b>Sediment Odours</b>	<b>Water Odours</b>
	Turbid	None	None	None	None
<b>Water Level</b>	0.4 m				
<b>Bare Ground</b>	Low (1-10%)				
<b>Exposed Tree Roots</b>	Moderate (50-75%)				
<b>Gully Erosion</b>	Some (10-50%)				
<b>Bank Slumping</b>	Some (10-50%)				
<b>Local Catchment Erosion</b>	Low (1-10%)				



Characteristic	DAI3				
	Left Bank		Right Bank		
<b>Bank Shape</b>	Convex		Concave		
<b>Bank Slope</b>	30°		70°		
<b>Associated Watercourse</b>	Charlevue Creek				
<b>Factors Affecting Bank Stability</b>	Low ground cover on edges, cattle access				
<b>Artificial Bank Stability Features</b>	None				
<b>Large Woody Debris (%)</b>	20%				
<b>Turbidity, Water and Sediment Oils and Odours</b>	<b>Turbidity</b>	<b>Sediment Oils</b>	<b>Water Oils</b>	<b>Sediment Odours</b>	<b>Water Odours</b>
	Turbid	None	Slick	Algal	None
<b>Water Level</b>	0.3 m				
<b>Bare Ground</b>	Low (1-10%)				
<b>Exposed Tree Roots</b>	Some (10-50%)				
<b>Gully Erosion</b>	Some (10-50%)				
<b>Bank Slumping</b>	Moderate (50-75%)				
<b>Local Catchment Erosion</b>	Some (10-50%)				



Characteristic	DAI4				
	Left Bank		Right Bank		
<b>Bank Shape</b>	Concave		Concave		
<b>Bank Slope</b>	45°		30°		
<b>Associated Watercourse</b>	Charlevue Creek				
<b>Factors Affecting Bank Stability</b>	Low ground cover on edges, cattle access, flooding, high exposed roots, access tracks				
<b>Artificial Bank Stability Features</b>	None				
<b>Large Woody Debris (%)</b>	10%				
<b>Turbidity, Water and Sediment Oils and Odours</b>	<b>Turbidity</b>	<b>Sediment Oils</b>	<b>Water Oils</b>	<b>Sediment Odours</b>	<b>Water Odours</b>
	Turbid	None	None	None	None
<b>Water Level</b>	0.4 m				
<b>Bare Ground</b>	Some (10-50%)				
<b>Exposed Tree Roots</b>	Moderate (50-75%)				
<b>Gully Erosion</b>	Some (10-50%)				
<b>Bank Slumping</b>	Moderate (50-75%)				
<b>Local Catchment Erosion</b>	Some (10-50%)				



Characteristic	DAI5				
	<b>Bank Shape</b>	<b>Left Bank</b>		<b>Right Bank</b>	
	Concave		Concave		
<b>Bank Slope</b>	<b>Left Bank</b>		<b>Right Bank</b>		
	85°		85°		
<b>Associated Watercourse</b>	Springton Creek				
<b>Factors Affecting Bank Stability</b>	Steep bank edges, bank slumping				
<b>Artificial Bank Stability Features</b>	None				
<b>Large Woody Debris (%)</b>	20%				
<b>Turbidity, Water and Sediment Oils and Odours</b>	<b>Turbidity</b>	<b>Sediment Oils</b>	<b>Water Oils</b>	<b>Sediment Odours</b>	<b>Water Odours</b>
	Turbid	None	None	None	None
<b>Water Level</b>	0.6 m				
<b>Bare Ground</b>	Low (1-10%)				
<b>Exposed Tree Roots</b>	Low (1-10%)				
<b>Gully Erosion</b>	Some (10-50%)				
<b>Bank Slumping</b>	Low (1-10%)				
<b>Local Catchment Erosion</b>	Some (10-50%)				





## Appendix C Macroinvertebrate Sampling Results

Class/Order	Family/Sub-family	SIGNAL 2 Value	DAI4	DAI1	DAI2	DAI3	DAI5	DAR1	DRW5	DWI9	DWI6
Cladocera	sp.	N/A	16	12	60	1	17	27	200		66
Coleoptera	Dytiscidae	2		3	3			3	4	2	1
Coleoptera	Gyrinidae	4		1							
Coleoptera	Hydraenidae	3						1	1	1	
Coleoptera	Scirtidae	6		5	2				1	6	
Coleoptera	Nanophyidae	3			1						
Copepoda	sp.	N/A	16	15	60		23	46	350	113	24
Decapoda	Atyidae	3			2						
Decapoda	Palaemonidae	4			2						
Decapoda	Parastacidae	4							1		1
Decapoda	Parathelphusidae	3		3						1	
Diptera	Chaoboridae	2	4	13	10			4		2	3
Diptera	Culicidae	1	6	8	20		2		12	22	12
Diptera	Ceratopogonidae	4				1					
Diptera	Dolichopodidae	3									1
Diptera	Tanypodinae	4			2						
Diptera	Chironominae	3			2			4			1
<b>Ephemeroptera</b>	<b>Baetidae</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>2</b>			<b>1</b>			
Gastropoda	Planorbidae	2			4						
Hemiptera	Veliidae	3	18	1	2			1	47	14	6
Hemiptera	Gerridae	4									2
Hemiptera	Nepidae	3			1						
Hemiptera	Notonectidae	1			1				2	1	1
Hemiptera	Micronectidae	2			3				5		2
Nematoda	sp.	3	1	1					1	25	3
Odonata	Isostictidae	3				1					
Oligochaeta	sp.	2	2		1		2	1		2	
Ostracoda	sp.	N/A						1	1		2
Turbellaria	Temnocephalidae	5								1	

## Appendix D     Riparian and Aquatic Vegetation Species List

Scientific Name	Common Name	NC Act/ Biosecurity Act Status	EPBC Act Status	DWR1	DWR4	DWR5	DWR6	DWI1	DWI3	DWI6	DWI8	DWI9	DAR1	DAI1	DAI2	DAI3	DAI4	DAI5
<i>Acacia cretata</i>		LC	-	x		x	x	x		x		x						x
<i>Acacia excelsa</i>	Ironwood	LC	-			x			x									
<i>Acacia salicina</i>		LC	-			x				x	x							
<i>Acacia tetragonophylla</i>	Dead finish	LC	-			x												
<i>Acalypha eremorum</i>	Soft acalypha	LC	-												x			
<i>Acanthospermum hispidum</i>	Starrburr	I	-					x										
<i>Afrohybanthus enneaspermus</i>		LC	-									x						
<i>Agave americana</i>	Agave	I	-							x								
<i>Ageratum houstonianum</i>	Billy goat weed	LC	-					x			x							
<i>Alectryon diversifolius</i>	Hollybush	LC	-										x	x				
<i>Allocasuarina leuhmanii</i>	Bulloak	LC	-								x							
<i>Alphitonia excelsa</i>	Soap tree	LC	-	x			x	x	x		x	x	x					
<i>Aristida calycina</i>	Dark wire grass	LC	-			x			x		x							
<i>Aristida latifolia</i>		LC	-										x					x
<i>Atalaya hemiglauca</i>	Whitewood	LC	-										x	x		x	x	x
<i>Bauhinia carronii</i>		LC	-										x	x	x	x	x	
<i>Bidens pilosa</i>	Cobblers pegs	I	-										x	x	x			
<i>Bothriochloa pertusa</i>		I	-			x	x	x		x			x		x	x		x
<i>Bryophyllum daigremontianum</i>	Mother of thousands	RI	-					x										
<i>Bryophyllum delagoense</i>	Mother of millions	RI	-													x		
<i>Bulbostylis barbata</i>	Dainty sedge	LC	-			x					x		x		x	x	x	x
<i>Capparis laisantha</i>	Nipan	LC	-						x	x								x
<i>Capparis mitchellii</i>		LC	-			x												
<i>Carissa spinarum</i>	Currant bush	LC	-			x		x		x			x			x	x	x
<i>Cassia brewsteri</i>		LC	-					x						x			x	

D

Scientific Name	Common Name	NC Act/ Biosecurity Act Status	EPBC Act Status	DWR1	DWR4	DWR5	DWR6	DWI1	DWI3	DWI6	DWI8	DWI9	DAR1	DAI1	DAI2	DAI3	DAI4	DAI5
<i>Casuarina cunninghamiana</i>		LC	-										x	x	x			
<i>Cenchrus ciliaris</i>	Buffel grass	I	-			x		x	x		x		x		x		x	
<i>Cheilanthes sieberi subsp sieberi</i>	Poison rock fern	LC	-						x									
<i>Chloris gayana</i>	Rhodes grass	I	-				x		x	x		x						
<i>Chloris inflata</i>		I	-				x			x								
<i>Chrysocephalum apiculatum</i>	Yellow button	LC	-						x		x							
<i>Commelina diffusa</i>	Native wandering jew	LC	-				x							x	x			x
<i>Coreopsis lanceolata</i>	Coreopsis	I	-					x										
<i>Corymbia clarksoniana</i>		LC	-				x		x		x							x
<i>Corymbia tessellaris</i>		LC	-	x					x				x					x
<i>Crotalaria pallida</i>		I	-		x			x										
<i>Crotalaria montana</i>		LC	-							x								
<i>Cryptostegia grandiflora</i>	Rubber vine	RI	WoNS							x			x		x			
<i>Cyanthillium cinereum</i>		LC	-													x		
<i>Cynodon dactylon</i>	Couch grass	I	-		x													
<i>Cyperus rotundus</i>	Nut grass	I	-													x		
<i>Dactyloctenium radulans</i>	Button grass	LC	-		x													
<i>Desmodium variance</i>	Small leaved ebony	LC	-								x							
<i>Diospyros humilis</i>		LC	-														x	
<i>Echinochloa colona</i>	Awnless barnyard grass	I	-		x													
<i>Enneapogon lindleyanus</i>		LC	-						x									
<i>Enteropogon acicularis</i>	Curly windmill grass	LC	-					x	x	x	x	x			x	x	x	
<i>Eragrostis elongata</i>		LC	-		x						x							
<i>Eragrostis trichophora</i>		I	-							x								x
<i>Erythrina vespertilio</i>	Batwing coral tree	LC	-												x			

D

Scientific Name	Common Name	NC Act/ Biosecurity Act Status	EPBC Act Status	DWR1	DWR4	DWR5	DWR6	DWI1	DWI3	DWI6	DWI8	DWI9	DAR1	DAI1	DAI2	DAI3	DAI4	DAI5
<i>Erythroxylum australe</i>	Cocaine bush	LC	-			x										x		
<i>Eucalyptus camaldulensis</i>	River red gum	LC	-	x		x	x	x	x	x		x	x	x	x	x	x	x
<i>Eucalyptus crebra</i>		LC	-			x	x											
<i>Eucalyptus dallachiana</i>		LC	-			x				x								
<i>Euphorbia drumondii</i>		LC	-		x													
<i>Eustrephus latifolius</i>	Wombat berry	LC	-										x		x	x	x	x
<i>Everstia vacciniifolia</i>		LC	-														x	
<i>Evolvulus alsinoides</i>		LC	-			x												
<i>Ficus opposita</i>	Sandpaper fig	LC	-										x	x		x		
<i>Galactia tenuiflora</i>		LC	-				x			x	x				x	x		x
<i>Glinus lotoides</i>	Hairy carpet weed	LC	-		x		x				x							
<i>Glycine sp.</i>		LC	-													x		x
<i>Gomphrena celosioides</i>	Gomphrena weed	I	-		x	x				x								
<i>Grewia retusifolia</i>	Dogs balls	LC	-						x						x	x		x
<i>Harrisia martinii</i>		RI	-														x	
<i>Heteropogon contortus</i>	Black spear grass	LC	-				x	x	x	x	x	x						
<i>Hibiscus heterophyllus</i>		LC	-										x					
<i>Imperata cylindrica</i>	Blady grass	LC	-						x	x								
<i>Indigofera tinctoria</i>	True indigo	I	-															x
<i>Ipomoea plebeia</i>	Bellvine	LC	-								x							
<i>Lantana camara</i>	Lantana	RI	WoNS									x						
<i>Lobelia concolor</i>	Poison pratia	LC	-												x			
<i>Lomandra longifolia</i>		LC	-	x						x			x	x	x		x	x
<i>Lophostemon grandiflorus</i>		LC	-							x			x	x	x	x	x	x
<i>Ludwigia octovalvis</i>	Willow primrose	LC	-		x													

D

Scientific Name	Common Name	NC Act/ Biosecurity Act Status	EPBC Act Status	DWR1	DWR4	DWR5	DWR6	DWI1	DWI3	DWI6	DWI8	DWI9	DAR1	DAI1	DAI2	DAI3	DAI4	DAI5
<i>Macroptilium atropurpureum</i>	Siratro	I	-	x				x						x	x			x
<i>Malvastrum americanum</i>	Malvastrum	I	-									x	x					
<i>Megathyrus maximus</i>		I	-	x				x		x		x	x	x	x	x	x	x
<i>Melaleuca nervosa</i>		LC	-				x		x		x	x						
<i>Melinis repens</i>	Red natal grass	I	-								x	x						
<i>Mimosa pigra</i>	Mimosa	I	WoNS												x			
<i>Mimosa pudica</i>	Sensitive plant	I	-												x	x		
<i>Murdannia gramenea</i>		LC	-				x											
<i>Opuntia tomentosa</i>	Velvety Tree Pear	RI	WoNS	x			x									x		x
<i>Oxalis sp</i>		-	-								x							
<i>Parthenium hysterophorus</i>	Parthenium	RI	WoNS									x	x	x	x	x		
<i>Passiflora foetida</i>	Stinking passionflower	I	-	x									x	x	x	x		x
<i>Perotis rara</i>	Comet grass	LC	-						x		x							
<i>Petalostigma pubescens</i>	Quinine tree	LC	-						x		x							
<i>Phyllanthus virgatus</i>		LC	-						x									
<i>Plumbago zeylanica</i>		LC	-												x			
<i>Portulaca pilosa</i>		I	-			x					x							
<i>Rhynchosia minima</i>	Ryncho	LC	-		x								x					
<i>Riccinis communis</i>	Casteroil bush	I	-											x				
<i>Rostellularia adscendacea</i>		LC	-			x												
<i>Santalatum lanceolatum</i>		LC	-					x										
<i>Scleroleana lanicuspis</i>	Woolly copper burr	LC	-						x									x
<i>Scoparia dulcis</i>		I	-						x		x							
<i>Sida acuta</i>	Narrow leaved sida	I	-	x				x			x							
<i>Sida cordifolia</i>	Flannel weed	I	-	x														

D

Scientific Name	Common Name	NC Act/ Biosecurity Act Status	EPBC Act Status	DWR1	DWR4	DWR5	DWR6	DWI1	DWI3	DWI6	DWI8	DWI9	DAR1	DAI1	DAI2	DAI3	DAI4	DAI5
<i>Sida rhombifolia</i>		I	-							x			x					
<i>Sida subspicata</i>		LC	-	x		x	x	x	x	x	x	x			x	x	x	x
<i>Sporobolus sp</i>			-				x	x		x			x					
<i>Stachytarpheta cayennensis</i>	Purple snake weed	I	-	x				x		x								
<i>Stylosanthes scabra</i>	Smooth stylo	I	-			x	x	x	x	x		x						
<i>Stylosanthes viscosa</i>	Sticky stylo	I	-	x		x	x	x		x	x	x	x			x		x
<i>Terminalia oblongata</i>		LC	-												x	x	x	
<i>Themeda triandra</i>	Kangaroo grass	LC	-				x			x		x	x					x
<i>Urochloa mosambicensis</i>	Sabi grass	LC	-		x	x	x			x			x	x	x	x	x	x
<i>Verbena rigida</i>	Veined verbana	I	-												x			
<i>Xanthium occidentale</i>	Noogoora burr	I	-	x				x					x	x	x			
	Orchid sp		-				x											

LC - Least Concern

I - Introduced

WoNS – Weed of National Significance

RI – Restricted Invasive Species



Appendix E     Riparian Zone Vertebrate Fauna Species List

Family	Scientific Name	Common Name	NC Act/Biosecurity Act Status	EPBC Act status	DAR1	DAI1	DAI2	DAI3	DAI4	DAI5	Total
<b>Reptiles</b>											
Colubridae	<i>Tropidonophis mairii</i>	Keelback snake	LC	-		1					1
Agamidae	<i>Diporiphora australis</i>	Tommy roundhead	LC	-					1		1
Gekkonidae	<i>Gehyra dubia</i>	Dubious dtella	LC	-		3	1				4
Scincidae	<i>Carlia rubigo</i>	Orange-flanked rainbow-skink	LC	-	2	3	1	2	2	1	11
Scincidae	<i>Morethia boulengeri</i>	South-eastern morethia Skink	LC	-				1			1
Scincidae	<i>Cryptoblepharus virgatus</i>	Wall skink	LC	-					1		1
Scincidae	<i>Menetia greyii</i>	Common dwarf skink	LC	-			1	2		1	4
Scincidae	<i>Carlia vivax</i>	Lively rainbow skink	LC	-		1		1			2
<b>LIZARDS</b>					<b>2</b>	<b>7</b>	<b>3</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>24</b>
<b>SNAKES</b>					<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>TOTAL REPTILES</b>					<b>2</b>	<b>8</b>	<b>3</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>25</b>
<b>Amphibians</b>											
Bufoidea	<i>Rhinella marina</i>	Cane toad	I	-		3					3
Hylidae	<i>Litoria inermis</i>	Bumpy rocket frog	LC	-						1	1
<b>TOTAL AMPHIBIANS</b>					<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>4</b>
<b>Birds</b>											
Acanthizidae	<i>Gerygone albogularis</i>	White-throated gerygone	LC	-	3						3
Acanthizidae	<i>Smicronis brevirostris</i>	Weebill	LC	-	2		1	1			4
Accipitridae	<i>Aquila audax</i>	Wedge-tailed eagle	LC	-				1			1
Accipitridae	<i>Haliastur sphenurus</i>	Whistling kite	LC	-			3		1		4
Accipitridae	<i>Accipiter fasciatus</i>	Brown goshawk	LC	-					2		2
Alcedinidae	<i>Dacelo leachii</i>	Blue-winged kookaburra	LC	-				2			2
Artamidae	<i>Cracticus nigrogularis</i>	Pied butcherbird	LC	-		3	1		4	4	12
Artamidae	<i>Cracticus tibicen</i>	Australian magpie	LC	-	5	1	4	2	4	5	21

E

Family	Scientific Name	Common Name	NC Act/Biosecurity Act Status	EPBC Act status	DAR1	DA11	DA12	DA13	DA14	DA15	Total
Artamidae	<i>Strepera graculina</i>	Pied currawong	LC	-	5		1				6
Cacatuidae	<i>Cacatua galerita</i>	Sulphur-crested cockatoo	LC	-	2	2		1		4	9
Cacatuidae	<i>Calyptorhynchus banksii</i>	Red-tailed black-cockatoo	LC	-	1	3					4
Cacatuidae	<i>Eolophus roseicapilla</i>	Galah	LC	-	4		2	2	1	1	10
Campephagidae	<i>Coracina novaehollandiae</i>	Black-faced cuckoo-shrike	LC	-	2	2					4
Campephagidae	<i>Coracina papuensis</i>	White-bellied cuckoo-shrike	LC	-	1						1
Charadriidae	<i>Vanellus miles</i>	Masked lapwing	LC	-						2	2
Columbidae	<i>Geopelia humeralis</i>	Bar-shouldered dove	LC	-		2					2
Columbidae	<i>Geopelia striata placida</i>	Peaceful dove	LC	-	1		2		1		4
Columbidae	<i>Ocyphaps lophotes</i>	Crested pigeon	LC	-			1				1
Coraciidae	<i>Eurystomus orientalis</i>	Dollarbird	LC	-	2						2
Corcoracidae	<i>Struthidea cinerea</i>	Apostlebird	LC	-	1	9		4		4	18
Corvidae	<i>Corvus orru</i>	Torresian crow	LC	-	4		4	7	6	3	24
Dicruridae	<i>Dicrurus bracteatus</i>	Spangled drongo	LC	-	2						2
Estrildidae	<i>Taeniopygia bichenovii</i>	Double-barred finch	LC	-					3		3
Falconidae	<i>Falco cenchroides</i>	Nankeen kestrel	LC	-				1			1
<b>Birds</b>											
Gruidae	<i>Grus rubicunda</i>	Brolga	LC	-					2		2
Halcyonidae	<i>Dacelo novaeguineae</i>	Laughing kookaburra	LC	-	3	9		1		1	14
Maluridae	<i>Malurus leucopterus</i>	White winged fairywren	LC	-					1	2	3
Maluridae	<i>Malurus melanocephalus</i>	Red-backed fairywren	LC	-	5		1				6
Megaluridae	<i>Cincloramphus cruralis</i>	Brown songlark	LC	-			1			1	2
Meliphagidae	<i>Entomyzon cyanotis</i>	Blue-faced honeyeater	LC	-		3		1			4
Meliphagidae	<i>Lichenostomus virescens</i>	Singing honeyeater	LC	-	1				3	2	6
Meliphagidae	<i>Lichmera indistincta</i>	Brown honeyeater	LC	-				1			1

E

Family	Scientific Name	Common Name	NC Act/Biosecurity Act Status	EPBC Act status	DAR1	DA1	DA2	DA3	DA4	DA5	Total
Meliphagidae	<i>Manorina melanocephala</i>	Noisy miner	LC	-	1	13	1	2		2	19
Meliphagidae	<i>Melithreptus albugularis</i>	White-throated honeyeater	LC	-		1	2				3
Meliphagidae	<i>Philemon corniculatus</i>	Noisy friarbird	LC	-	2						2
Meliphagidae	<i>Philemon citreogularis</i>	Little friarbird	LC	-						1	1
<b>Meropidae</b>	<b><i>Merops ornatus</i></b>	<b>Rainbow bee-eater</b>	<b>LC</b>	<b>Ma</b>	<b>1</b>						<b>1</b>
Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-lark	LC	-		2	1	2	3	4	12
Monarchidae	<i>Myiagra inquieta</i>	Restless flycatcher	LC	-				1			1
Monarchidae	<i>Myiagra rubecula</i>	Leaden flycatcher	LC	-	1				2		3
Oriolidae	<i>Sphecotheres vieilloti</i>	Australasian figbird	LC	-	3						3
Pachycephalidae	<i>Colluricincla harmonica</i>	Grey shrike-thrush	LC	-	2	1	3	1			7
Pachycephalidae	<i>Pachycephala pectoralis</i>	Golden whistler	LC	-	1						1
Pardalotidae	<i>Pardalotus striatus</i>	Striated pardalote	LC	-	2	2	2	2	2	1	11
Pomatostomidae	<i>Pomatostomus temporalis</i>	Grey-crowned babbler	LC	-	2			1			3
Psittacidae	<i>Aprosmictus erythropterus</i>	Red-winged parrot	LC	-				1		1	2
Psittacidae	<i>Platycercus adscitus</i>	Pale-headed rosella	LC	-	4	1	3	1		3	12
Psittacidae	<i>Trichoglossus moluccanus</i>	Rainbow lorikeet	LC	-	11	1				4	16
<b>Birds</b>											
Ptilonorhynchidae	<i>Chlamydera maculata</i>	Spotted bowerbird	LC	-			1				1
Rhipiduridae	<i>Rhipidura albiscapa</i>	Grey fantail	LC	-		1					1
Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie wagtail	LC	-	1	1		4		1	7
Strigidae	<i>Ninox boobook</i>	Southern boobook	LC	-	1						1
Threskiornithidae	<i>Threskiornis spinicollis</i>	Straw-necked ibis	LC	-						1	1
Tytonidae	<i>Tyto alba</i>	Barn owl	LC	-		1					1
<b>TOTAL BIRDS</b>					<b>76</b>	<b>58</b>	<b>34</b>	<b>39</b>	<b>35</b>	<b>47</b>	<b>289</b>
<b>Mammals</b>											

E

Family	Scientific Name	Common Name	NC Act/Biosecurity Act Status	EPBC Act status	DAR1	DAI1	DAI2	DAI3	DAI4	DAI5	Total
Phalangeridae	<i>Trichosurus vulpecula</i>	Common brushtail possum	LC	-			1		1		2
<b>Pseudocheiridae</b>	<b><i>Petauroides volans volans</i></b>	<b>Greater glider</b>	<b>V</b>	<b>V</b>		4	2				6
<b>TOTAL MAMMALS</b>					<b>0</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>8</b>

LC - Least Concern

V – Vulnerable

Ma - Marine

I - Introduced

Appendix F Fish and Crustacean Species List

Family	Scientific Name	Common Name	NC Act/Biosecurity Act Status	EPBC Act status	DAR1	DAI1	DAI2	DAI3	DAI4	DAI5	Total
<b>Aquatic Life</b>											
Atyidae	<i>Paratya australiensis</i>	Freshwater shrimp	LC	-					2		2
Parastacidae	<i>Cherax destructor</i>	Blue claw crayfish	LC	-	1	5	7		20	21	54
Parathelphusidae	<i>Austrothelphusa transversa</i>	Freshwater crab	LC	-	5	10	5			1	21
Ambassidae	<i>Ambassis agassizii</i>	Agassiz's glassfish	LC	-					2	3	5
Terapontidae	<i>Leiopotherapon unicolor</i>	Spangled perch	LC	-			2		1		3
<b>CRUSTACEANS</b>					<b>6</b>	<b>15</b>	<b>12</b>	<b>0</b>	<b>22</b>	<b>22</b>	<b>77</b>
<b>FISH</b>					<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>8</b>
<b>TOTAL AQUATIC LIFE</b>					<b>6</b>	<b>15</b>	<b>14</b>	<b>0</b>	<b>25</b>	<b>25</b>	<b>85</b>

LC - Least Concern

## Appendix G Queensland Herbarium Identification Results





Queensland  
Government

Department of  
Environment and Science

## Queensland Herbarium

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<http://www.qld.gov.au/herbarium>

Enquiries            Tony Bean  
Telephone            07 3896 9318  
Your reference        ARB:mh 252/19  
Our reference

29 April 2019

Caitlin Eales  
AARC Environmental Solutions  
Suite 5a, 1 Swann Road  
TARINGA Qld 4068

Dear Caitlin

The botanical specimens received by the Queensland Herbarium on 11 April 2019 have been identified as:

DWI 6    \**Eragrostis trichophora*  
DWR 4    *Ammannia multiflora*  
DWR 4    *Cyperus difformis*  
DA 12    *Lobelia concolor*  
DWR 4    *Glinus lotoides*  
DA 15    *Arundinella nepalensis*  
DWR 6    *Murdannia graminea*  
DAR 1    *Arundinella nepalensis*  
DAI 5    \**Indigofera tinctoria*

\*Naturalised, non-native species

There is a charge of \$228.80 (2 hrs @ \$114.40 per hr incl GST) for these identifications.

You can contribute to Queensland's biodiversity information by submitting this/these plant identification(s) and associated information to the Atlas of Living Australia using the 'Report a sighting' template at (<https://www.ala.org.au/>)

Yours sincerely



G.P. Guymer  
Director

Download a full version of Census of the Queensland Flora 2018  
<https://data.qld.gov.au/dataset/census-of-the-queensland-flora-2018>