SARAJI EAST MINING LEASE PROJECT

Environmental Impact Statement

Appendix C-1
Terrestrial Ecology Technical Report

BHP

AECOM Imagine it. Delivered.

BM Alliance Coal Operations Pty Ltd
06-Nov-2020

Saraji East Mining Lease Project Baseline Environmental Studies

Terrestrial Ecology Technical Report

Saraji East Mining Lease Project Baseline Environmental Studies

Terrestrial Ecology Technical Report

Client: BM Alliance Coal Operations Pty Ltd

ABN: 67096412752

Prepared by

AECOM Australia Pty Ltd
Level 8, 540 Wickham Street, PO Box 1307, Fortitude Valley QLD 4006, Australia
T +61 7 3553 2000 F +61 7 3553 2050 www.aecom.com
ABN 20 093 846 925

06-Nov-2020

Quality Information

Document	Saraji East Mining Lease Project Baseline Environmental Studies
Ref	Terrestrial Ecology Technical Report
Date	06-Nov-2020
Prepared by	Sebastian Knight
Reviewed by	Chris Todd

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
0	02-Mar-2018	Draft	David Curwen Associate Director - Environment	Original signed
1	06-Jun-2018	Draft	Gabriel Wardenburg Project Manager	Original signed
2	03-Dec-2018	Draft	Gabriel Wardenburg Project Manager	Original signed
3	13-Feb-2019	Draft	Gabriel Wardenburg Project Manager	Original signed
4	23-October-2020	Draft	Gabriel Wardenburg Project Manager	Original signed
5	06-Nov-2020	Final	Gabriel Wardenburg Project Manager	

Table of Contents

List of Tables

List of Figures

Executive Summary

BM Alliance Coal Operations Pty Ltd (BMA) has commissioned AECOM Australia Pty Ltd (AECOM) to undertake ecological assessments to support environmental approvals for the Saraji East Mining Lease Project (the Project).

The Project Site (bounded by Exploration Permit for Coal (EPC) 837, EPC 2103, MLA 70383, MLA 70459, ML 1775, ML 70142 and ML 1782) is located to the north of Dysart in Queensland's Bowen Basin and encompasses approximately 11,427.42 hectares (ha) of land. The Project Site is located adjacent to the existing Saraji Mine, operated by BMA.

Mining and the infrastructure required to support the Project is not proposed within the full extent of the Project Site; impacts are constrained to a smaller area of some 3,425.13 ha within MLA 70383, MLA 70459, ML 70142 and ML 1775. This area is referred to as the Project Footprint.

The baseline environmental studies assess, describe and document the existing environmental values relevant to the Project. The baseline assessment will provide a platform to assess the impact of the Project on the existing environment as part of the Project's environmental impact statement (EIS).

Terrestrial flora and fauna studies for this assessment were undertaken by SKM in 2007, 2008, 2010 and 2011, and by AECOM in 2016, 2017 and 2020. The purpose of these studies was to determine terrestrial ecological values present within the Project Site, to enable an impact assessment to be carried out and to propose mitigation strategies. The studies involved a review of existing flora and fauna data and identification of potential conservation significant species and habitat, followed by field surveys. This report combines data from the 2007, 2008, 2010, 2011, 2016, 2017 and 2020 desktop and field investigations.

The ecological values of the Project Site are considered typical for the northern Bowen Basin with large areas of land historically cleared for grazing. Although some large areas of remnant vegetation remain, most have been modified to some extent by historical and current land management practices. The most common modification across the Project Site has been the removal of the shrub and ground layers and replacement with pasture grass species and effects of cattle grazing.

Flora

The literature review identified four threatened ecological communities (TECs) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) as potentially present within the Project Site. The presence of two of these communities was confirmed within the Project Site during field surveys: *Natural grasslands of the Queensland Central Highlands* and *the northern Fitzroy Basin* and *Brigalow (Acacia harpophylla dominant and co-dominant)*. The flora survey identified a total of ten Regional Ecosystems (REs), including three listed as endangered, six listed as of concern and one listed as 'no concern at present' as per their Biodiversity Status. The Biodiversity Status is used to determine environmentally sensitive areas through provisions in the *Environmental Protection Act 1994* (EP Act).

The literature review identified five flora species of conservation significance as potentially occurring within the Project Site. Of the five species, field surveys confirmed the presence of one: *Dichanthium setosum* (bluegrass) listed as vulnerable under the EPBC Act. Additional species of conservation significance; *Aristida annua, Cerbera dermicola* and *Dichanthium queenslandicum* (King Bluegrass) were identified as possibly being present given the habitat available.

Of the 40 exotic species recorded during the vegetation surveys, 11 species were identified as being of management concern. These are listed as a 'Restricted Matter' under the *Biosecurity Act 2014*.

Approximately 1,952.97 ha of remnant vegetation communities and 8 ha of high value regrowth (HVR) may be impacted by the Project. This includes the indirect disturbance of remnant vegetation associated with subsidence from underground mining operations.

Clearing will cause direct loss of some remnant and HVR native vegetation, as well as fragmentation of some vegetation communities. Approximately 246.07 ha of the *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC may be impacted with 0.075 ha of *Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin* TEC with potential to be impacted by development of a powerline easement and powerline at the south of the Project Site.

Subsidence and gas drainage infrastructure may also impact on remnant native vegetation, particularly taller trees where ground movements and tension cracking may affect root zones. Grasses (native and introduced) and smaller shrubs are expected to survive subsidence without intervention; however, taller trees may be affected and will need to be managed to maintain riparian zones. Following subsidence, some areas may become ponded and this will change the nature of vegetation in these areas.

Disturbance to key biodiversity values including TECs, and endangered and of concern REs will be avoided and managed wherever possible. Where impacts to this significant remnant vegetation cannot be avoided, offsets are proposed in accordance with the EPBC Act Environmental Offsets Policy 2012 and Queensland Environmental Offsets Framework.

Fauna

The fauna studies identified a total (including exotic fauna) of 188 fauna species as occurring within the Project Site. This includes 117 bird, 33 mammal, 14 amphibian and 24 reptile species. Eleven conservation significant species were identified during ecological surveys including six endangered, vulnerable or near threatened species (EVNT) , one special least concern species and four migratory species (also listed as special least concern). These species and their status under the *Nature Conservation Act 1992* (NC Act) and EPBC Act are listed in Table 1 . An additional four species listed as threatened or migratory under the EPBC Act and or the NC Act have been identified as potentially occurring within the Project Site due to the availability of suitable habitat.

Table 1 Conservation significant species recorded within the Project Site

Common Name	Scientific Name	EPBC Act[1]	NC Act[2]
Ornamental Snake	*Denisonia maculata*	Vulnerable	Vulnerable
Australian Painted Snipe	*Rostratula australis*	Endangered	Vulnerable
Squatter Pigeon (Southern)	*Geophaps scripta scripta*	Vulnerable	Vulnerable
Greater Glider	*Petauroides volans*	Vulnerable	-
Grey Falcon	*Falco hypoleucos*	-	Vulnerable
Koala	*Phascolarctos cinereus*	Vulnerable	Vulnerable
Short-beaked Echidna	*Tachyglossus aculeatus*	-	Special Least Concern
Caspian Tern	*Hydroprogne caspia*	Migratory	-
Fork-tailed Swift	*Apus pacificus*	Migratory	Special Least Concern
Latham's Snipe	*Gallinago hardwickii*	Migratory	Special Least Concern
White-throated Needletail	*Hirundapus caudacutus*	Migratory	Special Least Concern

[1] Conservation status under the EPBC Act

[2] Conservation status under the NC Act

Essential Habitat is mapped for two species within the Project Site. In the north-east corner of the Project Site, Essential Habitat for Squatter Pigeon (*Geophaps scripta scripta*) is mapped based on suitable habitat surrounding a previous record for this species (77.62 ha in the Project Site and 24.79 ha in the Project Footprint). Essential Habitat has also been mapped for Ornamental Snake (*Denisonia maculata*) in *Acacia harpophylla* (Brigalow) with *Casuarina cristata* or *Eucalyptus cambageana* (Dawson Gum) open woodlands, regrowth *Acacia harpophylla* (Brigalow) woodland and woodland communities on alluvium (1,985.44 ha in the Project Site and 811.01 ha in the Project Footprint). Ground-truthing confirmed habitat for both species within the Project Site and identified similar extents of habitat to the Essential Habitat mapping.

The Brigalow Belt Bioregion Biodiversity Planning Assessment identifies wildlife corridors within the Project Site associated with major creeks. These wildlife corridors provide east–west fauna movement opportunities through the landscape and provide suitable habitat for a range of fauna species including the threatened species Koala (*Phascolarctos cinereus*) and Greater Glider (*Petauroides volans*).

Habitats on the Project Site were generally degraded by land clearing, introduced pasture grasses and grazing. Nine broad habitat types were identified: River Red Gum Riparian woodland, *Eucalyptus* and/or *Corymbia* Open Woodland, Dawson Gum and Brigalow Woodland, Brigalow or Belah Woodland, Oxbow Wetland, Natural Grasslands, Modified Grasslands, Shrubby Brigalow regrowth with Gilgai and Dams.

Impacts on native animals using the Project Site may include habitat loss and fragmentation from direct vegetation clearing, as well as disturbance to animals using remnant habitat from noise, light and general activity, and possible mortality during vegetation clearing or from vehicle strikes. Mitigation measures are proposed to address these impacts. These measures are expected to be effective in avoiding or minimising impacts.

In the longer term, some habitat modification will also occur due to subsidence and ponding in some areas. The majority of fauna species using the Project Site are generally resilient to disturbance and do not have highly specialised habitat requirements. It is envisaged that these animals will be able to adapt reasonably well to the habitat changes by utilising adjacent similar habitat. However, it is considered possible that the Project may have a significant impact on four fauna species, Koala (*Phascolarctos cinereus*), Ornamental Snake (*Denisonia maculata*), Greater Glider (*Petauroides volans*) and Squatter Pigeon (*Geophaps scripta scripta*) due to the loss and degradation of habitat. Species specific mitigation measures and offsets will be required to reduce impacts on these species.

Offsets are proposed where significant residual impacts to threatened fauna are likely in accordance with the EPBC Act Environmental Offsets Policy 2012 and Queensland Environmental Offsets Framework. Subsidence management and rehabilitation will include a focus on retaining riparian corridors so that they can continue to provide opportunities for fauna dispersal.

Environmentally sensitive areas

The *Environmental Protection Act 1994* (EP Act) and its subordinate legislation, the *Environmental Protection Regulation 2019* (EP Regulation), place environmentally sensitive areas (ESAs) into two categories: Category A and Category B. Category A and B ESAs are protected under Queensland legislation and are easily identified as they are typically based on land tenure. Category C ESAs are defined in the Code of Environmental Compliance for Exploration and Mineral Development Projects – Version 1.1 (DEHP, 2014).

The review of ESAs determined that no Category A or Category C ESAs are present within the Project Site; however Category A and Category C ESAs do occur within 100 kilometres (km) of the Project Site. Category B ESAs do occur within the Project Site; desktop searches and field surveys undertaken by AECOM determined that three endangered REs are present within the Project Site and the Project may have direct and indirect impacts on these ESAs. The total potential impact to EREs and hence Category B ESAs, is 275.17 ha. This is based on a combination of 49.64 ha of potential direct impact and an additional 225.53 ha of potential indirect impact. Mitigation measures are proposed to reduce the potential impacts on ESAs.

Matters of State Environmental Significance

A review of Matters of State Environmental Significance (MSES) determined that a number of values that relate to terrestrial ecology are found within the Project Site and may be affected by the Project (Table 1). After all reasonable avoidance and on-site mitigation measures for the Project have been or will be undertaken, the Project may still impact on MSES. Therefore, the Significant Residual Impact Guideline prepared by the Department of the Environment and Heritage Protection (2014) was used to determine the significance of the residual impact. The outcome of these assessments was that significant impacts are expected to five of the six MSES as outlined in Table 1.

Table 1 MSES within the Project Site

MSES Present within the Project Site	Significant Impact Expected
Regulated vegetation (Endangered and/or Of Concern REs)	Yes
Regulated vegetation (within the defined distance of a watercourse)	Yes
Regulated vegetation (within a Vegetation Management wetland area)	Yes
Connectivity areas	Yes
Protected wildlife habitat	No
Waterways providing for fish passage	No

1.0 Introduction

BM Alliance Coal Operations Pty Ltd (BMA) has commissioned AECOM Australia Pty Ltd (AECOM) to undertake ecological assessments to support environmental approvals for the Saraji East Mining Lease Project (the Project).

Located to the north of Dysart in Queensland's Bowen Basin, the Project Site is primarily bounded by Exploration Permit for Coal (EPC) 837, EPC 2103, MLA 70383, MLA 70459, ML 1775, ML 70142 and ML 1782, except where the southern extent of the powerline connection intersects Lot 10 on CNS83 and Lot 11 on CNS373. The Project Site encompasses 11,427.42 hectares (ha) of land adjacent to the existing Saraji Mine, operated by BMA. Regional context is presented in Figure 1 and the Project Site is mapped in Figure 2.

Mining and the infrastructure required to support the Project is not proposed within the full extent of the Project Site, with impacts constrained to a smaller area of some 3,425.13 ha within MLA 70383, MLA 70459, ML 70142 and ML 1775. This area is referred to as the Project Footprint.

The Project is a greenfield single-seam underground mine development primarily on MLA 70383 commencing from within the existing Saraji Mine (ML 1775). It has been designed to utilise the existing approved Saraji Mine infrastructure, wherever practical. The Project will require upgrades to existing and new mine infrastructure, including proposed rail loading balloon loop, proposed coal handling preparation plant (CHPP), mine infrastructure area (MIA), water storage, product stockpiles and conveyor in the north-west of the Project Site as well as incidental mine gas (IMG) drainage networks (Figure 2).

The Project's Environmental Impact Statement (EIS) assesses the potential environmental impacts associated with the underground layout (optimised) and associated FY 2023 to 2042 production schedule. The optimised underground layout was developed based on consideration of a range of factors including resource recovery, coal quality, production rates and site constraints including social and environmental considerations. The optimised underground layout is designed to provide a generally consistent coal quality and production output.

The baseline environmental studies describe and document the existing environmental values relevant to the Project. The baseline assessment will provide a platform to assess the impact of the Project on the existing environment as part of the EIS.

However, to provide a conservative assessment, technical investigations (including this assessment) have considered a Project Footprint based on the potential ground and surface disturbance associated with a maximised underground layout where relevant (Figure 2).

Terrestrial flora and fauna studies for this assessment were undertaken by SKM in 2007, 2008, 2010 and 2011, and by AECOM in 2016, 2017 and 2020. The purpose of these studies was to determine terrestrial ecological values present within the Project Site, to undertake an impact assessment and propose mitigation strategies. The studies involved a review of existing flora and fauna data, identification of potential conservation significant species and habitat, and field surveys. This report combines data from the 2007, 2008, 2010, 2011, 2016, 2017 and 2020 desktop and field investigations.

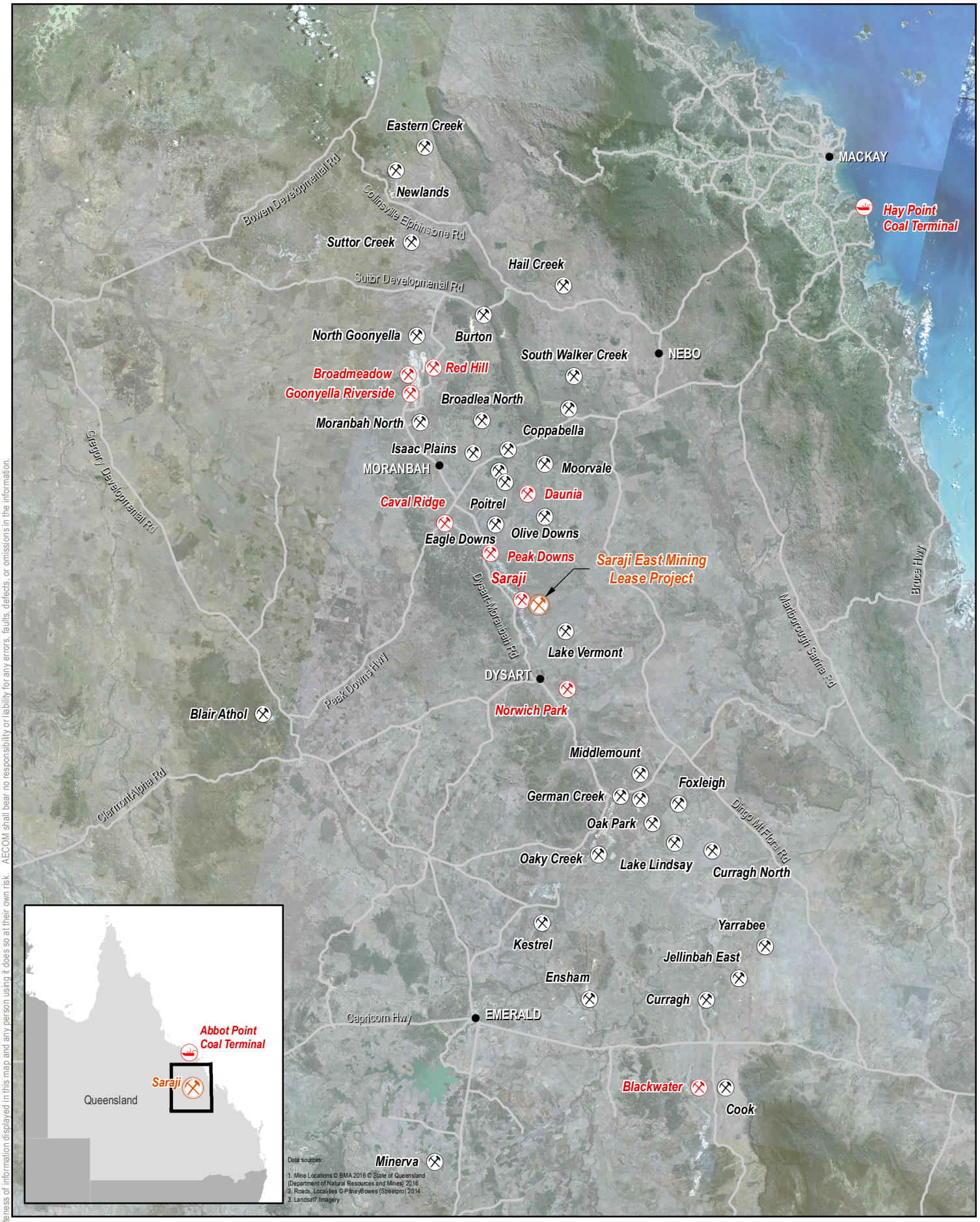
1.1 Study aim and objectives

The aim of the study was to address requirements of Sections 8.1.13 to 8.1.19 of the Terms of Reference (ToR) issued by the Queensland Department of Environment and Heritage Protection (DEHP) (now the Department of Environment and Science (DES)) on 2 June 2017. This includes the requirements to document the floral and faunal assemblages, habitat types and vegetation communities present within the Project Site, with particular focus on the occurrence of conservation significant species and communities. The objectives of the study were to:

- complete flora field surveys to ascertain the distribution, composition, condition and conservation values of regional ecosystems (REs) and threatened ecological communities (TECs) within the Project Site, and confirm the presence of conservation significant flora species
- complete fauna field surveys to census terrestrial fauna assemblages within the Project Site, with an emphasis on targeted searches for threatened species and listed migratory species potentially present

- compile a description of the REs and fauna habitats of the Project Site, including an inventory of flora and fauna species recorded
- confirm the occurrence or potential occurrence of conservation significant species within the Project Site and Environmentally Sensitive Areas (ESAs) (as listed under relevant Commonwealth and State legislation)
- address potential impacts to Matters of State Environmental Significance (MSES)
- identify feral and exotic animals as well as weed species within the Project Site
- assess the potential impacts from the Project on terrestrial flora and fauna values, in particular values of conservation significance
- recommend measures to avoid or mitigate adverse impacts on significant terrestrial flora and fauna at the design, construction and operational phases.

This report does not address potential project impacts specifically on Commonwealth Matters of National Environmental Significance (MNES). This is addressed in a standalone assessment within the EIS document.



LEGEND

- Saraji East Mining Lease Project
- Locality
- Major Road
- BMA Coal Terminal
- BMA Mine
- Other Mine

Figure 1
Regional Context

N

Saraji East Mining Lease Project

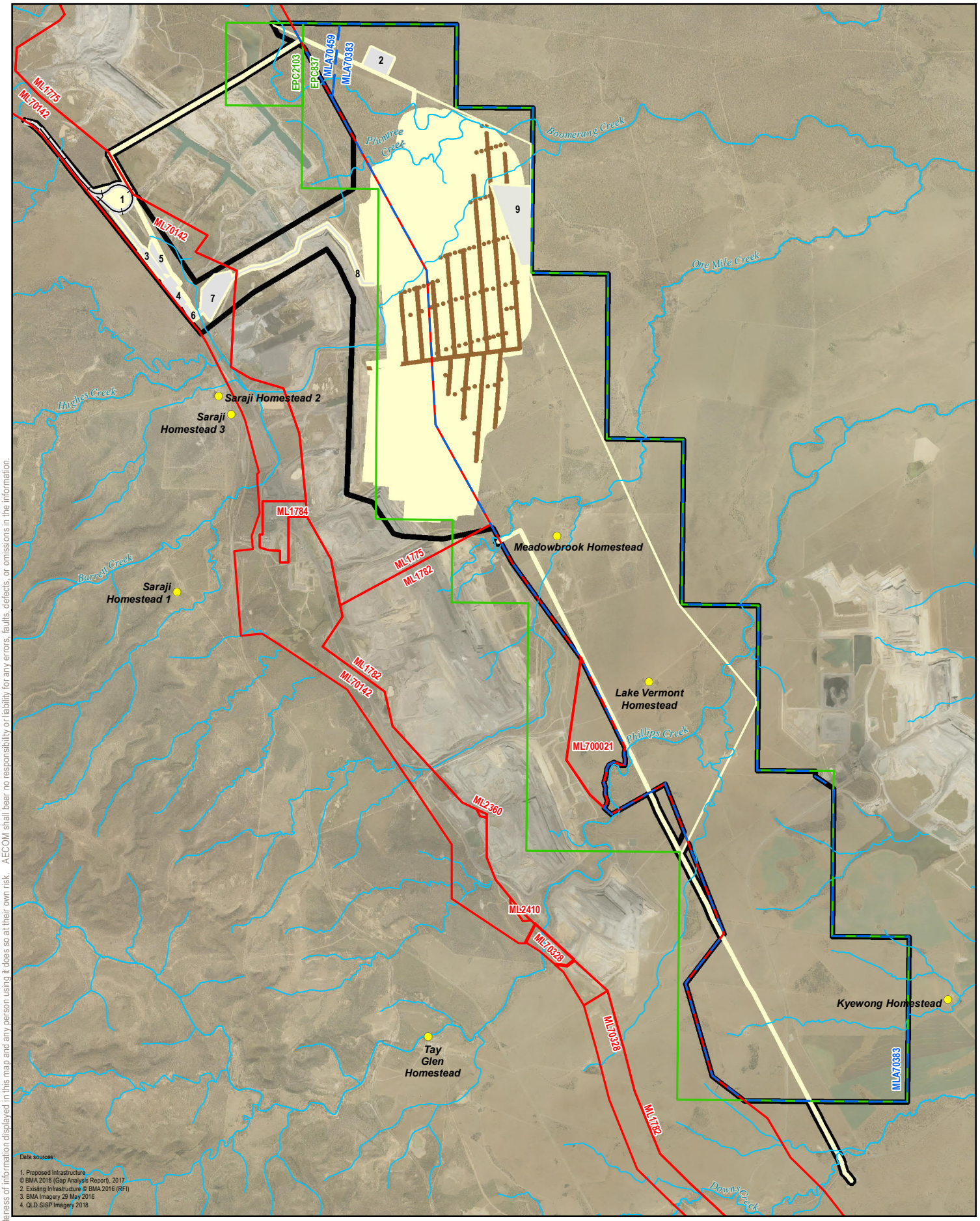
0 5 10 20
Kilometres

Scale: 1:1,500,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 10/11/2020 VERSION: 4



Data sources:

1. Proposed Infrastructure © BMA 2016 (Gap Analysis Report), 2017
2. Existing Infrastructure © BMA 2016 (RFI)
3. BMA Imagery 29 May 2016
4. QLD SISP Imagery 2018

LEGEND

- Project Site
- Project Footprint
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- IMG Drainage Network
- Homestead
- Surface infrastructure
- Rail loop
- Watercourse

Surface Infrastructure

1 Rail Loading Balloon Loop
2 Process Water Dam
3 Product Stockpiles
4 CHPP
5 Raw Water Dam
6 ROM Pad
7 Future MIA
8 Conveyor
9 Construction Village

N

Figure 2
Project Site

Saraji East Mining Lease Project

0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 10/11/2020 VERSION: 5

Filename: \\aubne1fp003\Projects\605X\60507031\4. Tech Work Area\4.99 GIS\02_MXDs\06 Environmental Impact Statement\C-1 Ecology\60507031_G090_v5_A4P.mxd

2.0 Regulatory Framework

The nature conservation legislation relevant to terrestrial ecology values within the Project Site are described below.

2.1 Commonwealth legislation

Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is administered by the Department of Agriculture, Water and Environment (DAWE). Amongst other matters, the EPBC Act provides the legal framework to protect and manage MNES. Nine MNES are currently prescribed and include:

- declared World Heritage properties
- national Heritage places
- declared RAMSAR wetland
- listed threatened species and ecological communities
- listed migratory species
- Commonwealth marine areas
- the Great Barrier Reef Marine Park (GBRMP)
- nuclear actions
- a water resource, in relation to coal seam gas development or large coal mining development.

Under the EPBC Act, a project or activity that may have an impact on an MNES is deemed to be an 'action'. Actions that have or are likely to have a significant impact on an MNES require approval from the Minister for the Environment. Whether or not an action is likely to have a significant impact depends on the sensitivity, value, and quality of the environment that is impacted, and the intensity, duration, magnitude and geographic extent of the impact. If the action consists of a series of activities or a number of related activities, the impacts of each activity must be considered as well as the combined (cumulative) impacts of the series of activities. Consideration is also to be given to all impacts that could reasonably be predicted to follow or be facilitated by the action. Impacts may also be directly or indirectly associated with the action.

On 5 October 2016, BMA referred the Project to the Department of Environment and Energy (DoEE; now DAWE) (for a decision as to whether the Project constitutes a 'controlled action' under the EPBC Act (Referral No. 2016/7791). On 18 October 2016, the Project was determined to be a controlled action under the EPBC Act due to the potential impacts on MNES.

The relevant controlling provisions under the EPBC Act were determined as being:

- nationally-listed threatened species and communities (Section 18 and 18A)
- a water resource, in relation to coal seam gas development and a large coal mining development (Section 24D and 24E).

The Project therefore requires assessment and approval under the EPBC Act. The Minister determined that the assessment be conducted in accordance with the bilateral agreement to which both the Australian and Queensland Governments are signatories which accredits the EIS assessment process under the *Environmental Protection Act 1994* (EP Act). This has been acknowledged within the ToR issued by the Queensland Department of Environment and Heritage Protection (DEHP) (now the Department of Environment and Science (DES)) on 2 June 2017.

When deciding whether or not a proposed action is likely to have a significant impact on an MNES, the precautionary principle is required to be applied. A lack of scientific evidence as to whether an impact will occur, or to what extent, cannot be used to support or approve an application under the EPBC Act. In addition, beneficial impacts cannot be considered or used to justify other adverse impacts or an approval under the EPBC Act. Through the *Matters of National Environmental Significance Significant*

Impact Guidelines, this principle has been used to determine whether the Project will significantly impact an MNES.

Ecology values recognised as MNES are outlined in this report. However this report does not address potential project impacts and potential significant impacts on MNES. This is addressed in a standalone assessment within the EIS document.

Commonwealth Offsets Policy

In October 2012, the EPBC Act Environmental Offsets Policy 2012 was published (DSEWPC, 2012). The Environmental Offsets Policy will be applicable to the Project.

There are five key aims of the policy:

1. ensure the efficient, effective, timely, transparent, proportionate, scientifically robust and reasonable use of offsets under the EPBC Act
2. provide proponents, the community and other stakeholders with greater certainty and guidance on how offsets are determined and when they may be considered under the EPBC Act
3. deliver improved environmental outcomes by consistently applying the policy
4. outline the appropriate nature and scale of offsets and how they are determined
5. provide guidance on acceptable delivery mechanisms for offsets.

An Environmental Offset Strategy has been developed for the Project and is provided in **Appendix C-2 Offsets Strategy** and is also discussed in Section 11.0**.** All final offset requirements are subject to the final clearing footprint and assessment and approval from the DAWE.

2.2 Queensland legislation

Planning Act 2016

The *Planning Act 2016* regulates development in Queensland that is made assessable under the Planning Regulation 2017 or the local government planning scheme and is administered by the Department of State Development, Tourism and Innovation. Development within a mining lease (or other resource tenure as stated in the Planning Regulation 2017) is exempt from provisions of the *Planning Act 2016*. If the development is not associated with the mining activity this exemption does not apply.

Nature Conservation Act 1992

The NC Act prohibits the taking or destruction, without authorisation, of protected flora and fauna species in the wild. All native plants and animals in Queensland are protected under Section 71 of the Act. This Act also provides for an integrated and comprehensive approach to conserving nature. It provides a legislative basis for research, community education, dedicating, declaring and managing protected areas, and protecting native wildlife and its habitat.

The Nature Conservation (Animals) Regulation 2020 (NC (Animals) Regulation) and the Nature Conservation (Plants) Regulation 2020 (NC (Plants) Regulation) lists the plants and animals considered presumed extinct in the wild, critically endangered, endangered, vulnerable, near threatened, least concern, international and prohibited. The NC Regulation discusses their significance and states the declared management intent and the principles to be observed in any taking and use for each group.

Appropriate authorisations or permits under the NC Act are required prior to clearing of listed conservation significant plant species, interfering with an animal breeding place, or removing protected animals unless the activity is exempt. Fauna and flora species identified during field surveys were assessed against threatened species listed in the NC Regulations. This ensured any impacts from the construction and operation of the Project could be quantified in relation to significant species requirements.

Vegetation Management Act 1999

The *Vegetation Management Act 1999* (VM Act) regulates the clearing of native vegetation, including remnant (termed Regional Ecosystems (REs)), high-value regrowth (HVR) (as of May 2018), reef regrowth watercourse vegetation (as of May 2018) and non-remnant on certain tenures, except for exemptions under the NC Act, the *Land Act 1994*, and the *Forestry Act 1959*. In Queensland, the VM Act does not apply to mining leases. Although mining is exempt development, the VM Act provides useful guidelines on management including mapping.

Amendments to the VM Act in May 2018 reinstated the regulation of HVR and reef regrowth watercourse vegetation. HVR areas are those which have not been cleared for over 15 years if the area is an endangered, of concern or least concern regional ecosystem. Reef regrowth watercourse vegetation is native regrowth vegetation on watercourse areas within the Great Barrier Reef Catchments. The clearing of this vegetation has been regulated to increase wetland and watercourse bank stability, and maintain water quality, habitat and landscape stability.

The status of REs and HVRs is based on their pre-clearing and remnant extent, as gazetted under the VM Act and listed in the Regional Ecosystem Description Database (REDD) maintained by the Queensland Department of Natural Resources and Mines and Energy (DNRME). An RE considered to have “Vegetation Management Status” is described as an:

- **Endangered** regional ecosystem:
  - less than 10% of its pre-clearing extent remaining, or
  - 10% to 30% of its pre-clearing extent remaining and the remnant vegetation remaining is less than 10,000 ha.
- **Of Concern** regional ecosystem:
  - 10% to 30% of its pre-clearing extent remaining, or
  - more than 30% of its pre-clearing extent remaining and the remnant vegetation remaining is less than 10,000 ha.
- **Least Concern** regional ecosystem:
  - more than 30% of its pre-clearing extent remaining and the remnant vegetation remaining is more than 10,000 ha.

Environmental Protection Act 1994

Under the *Environmental Protection Act 1994* (EP Act) and the Environmental Protection Regulation 2019 (EP Regulation) certain environmental features are protected within mining lease areas. These are termed ‘environmentally sensitive areas’ and include such features as national parks, conservation reserves, wetlands of international importance, heritage places and endangered regional ecosystems (ERE).

All mining and exploration activities in Queensland are conducted under an Environmental Authority (EA) as set out under Section 183 of the EP Act. The EA lists conditions with which the activity must comply in order to mitigate impacts to the environment.

Biosecurity Act 2014

The *Biosecurity Act 2014* commenced on 1 July 2016. It ensures a consistent, risk-based approach to biosecurity in Queensland.

The Act provides biosecurity measures to safeguard Queensland’s economy, agricultural and tourism industries and environment from:

- pests (e.g. wild dogs and weeds)
- diseases (e.g. foot-and-mouth disease)
- contaminants (e.g. lead on grazing land).

The Act replaced the many separate pieces of legislation that were previously used to manage biosecurity. Decisions made under the Act will depend on the likelihood and consequences of the risk. The Biosecurity Regulation 2016 sets out how the Act is implemented and applied.

Under the Act, all persons have a general biosecurity obligation to take all reasonable and practical measures to prevent or minimise the biosecurity risk. This includes:

- preventing or minimising adverse effects of a biosecurity risk
- minimising the likelihood of causing a biosecurity event and deal with a biosecurity matter by limiting the consequences of a biosecurity event should one arise
- not exacerbating the effects of a biosecurity matter.

Nature Conservation (Koala) Conservation Plan 2017

The Nature Conservation (Koala) Conservation Plan 2017 provides for the conservation of the Koala (*Phascolarctos cinereus*) in Queensland and includes provisions for the assessment and management of Koalas (*Phascolarctos cinereus*) during the development approval processes and implementation of projects. Different levels of provisions apply to the three Koala districts that have been mapped across Queensland. The Project is located with Koala District C. This district includes areas where Koalas (*Phascolarctos cinereus*) are found; however, provisions for clearing in Koala District C are less stringent than those in Koala Districts A and B (for example, Districts A and B are subject to sequential clearing conditions).

Environmental Offsets Act 204 and Environmental Offsets Regulation 2014

The *Environmental Offsets Act 2014* (EO Act) coordinates the delivery of environmental offsets across jurisdictions and provides a single point-of-truth for offsets in Queensland.

The Environmental Offsets Regulation 2014 (EO Reg) provides details of the prescribed activities regulated under existing legislation and prescribed environmental matters to which the EO Act applies. These matters are:

- Matters of National Environmental Significance (MNES)
- Matters of State Environmental Significance (MSES)
- Matters of Local Environmental Significance (MLES).

Environmental Offsets Policy

The Environmental Offsets Policy 2020 Version 1.9 (EO Policy) provides a single, consistent, whole-of-government policy for the assessment of offset proposals to satisfy offset conditions.

The EO Policy outlines seven principles that environmental offsets must meet:

- offsets will not replace or undermine existing environmental standards or regulatory requirements, or be used to allow development in areas otherwise prohibited through legislation or policy
- environmental impacts must first be avoided, then minimised, before considering the use of offsets for any remaining impact
- offsets must achieve a conservation outcome that achieves an equivalent environmental outcome
- offsets must provide environmental values as similar as possible to those being lost
- offset provision must minimise the time-lag between the impact and delivery of the offset
- offsets must provide additional protection to environmental values at risk, or additional management actions to improve environmental values
- where legal security is required, offsets must be legally secured for the duration of the impact on the prescribed environmental matter.

For land-based offsets, the suitability of the offset site relative to the impact site and the prescribed environmental matters is measured through undertaking a habitat quality analysis. The Guide to Determining Terrestrial Habitat Quality (Department of Environment and Heritage Protection, 2017) must be used for REs and species offsets (including advanced offsets) to undertake this analysis, unless an alternative approach is approved by DES as being able to measure a conservation outcome.

An Environmental Offset Strategy has been developed for the Project and is provided in **Appendix C-2 Offsets Strategy** and is also discussed in Section 11.0**.** All final offset requirements are subject to the final clearing footprint and assessment and approval from the DES.

2.3 Isaac Regional Council Biosecurity Plan

The Isaac Regional Council Biosecurity Plan 2020-2023 aims to minimise biosecurity risk within the local government area by providing a framework to mitigate the impacts of pest animal and weeds on local biosecurity considerations. The Biosecurity Plan identifies five desired outcomes including:

1. strategic Planning and Management – Pest management planning is collaborative, co-ordinated, and risk-based
2. stakeholder Awareness and Commitment – All stakeholders have an improved working knowledge of regional pest species, understand their biosecurity responsibilities, and hold agency in management goals
3. effective and Integrated Management Systems – Pest management is based on best practice information and is integrated
4. proactivity for Prevention and Early Intervention – Timely and collaborative responses diminish pest spread and promotes cost-effective, long-term asset protection
5. monitoring and Assessment **–** Review processes strive to better understand and improve biosecurity management.

The Operational Guide within the Isaac Regional Council Biosecurity Plan 2020-2023 determines management goals for priority pest animal and weed species within the local government area. Controls will be established in line with the Biosecurity Plan.

3.0 Assessment Methodology

3.1 Desktop assessment

A desktop review of ecological data and literature was undertaken to characterise ecological values and identify the potential presence of conservation significant species, habitats and vegetation communities within the Project Site. This included a thorough review of the following key references:

- DAWE EPBC Act Protected Matters Search Tool (PMST) (Department of Agriculture Water and the Environment, 2020a)
- Queensland Wildlife Online search results for flora and fauna species records (Department of Environment and Science, 2020b)
- DNRME Vegetation Management Regional Ecosystem (RE) Map, including Essential Habitat (Department of Natural Resources Mines and Energy, 2020a)
- DNRME Regulated Vegetation Management Map to determine the extent of Category A, Category B, Category C and Category R vegetation (Department of Natural Resources Mines and Energy, 2020b)
- DNRME VM Act watercourse mapping (Department of Natural Resources Mines and Energy, 2019)
- Brigalow Belt Bioregion Biodiversity Planning Assessment (BPA) Version 1.3 (Department of Environment and Science, 2020a)
- Environmentally Sensitive Areas Mapping (DEHP, 2017)
- Atlas of Living Australia (ALA) (Australian Government, 2020)
- aerial photography
- current distribution texts for vascular flora and fauna taxa
- relevant publications, including scientific papers and literature
- Ecological studies undertaken within the adjacent Saraji Mine including:
    - Ecoserve (2005). A review of Habitat Values for Biodiversity and Species of Conservation Significance. Final Report Submission for BMA Saraji Mine
    - EcoServe (2007). Biodiversity and Threatened Species Action Plan for Saraji Mine. Final Report Submission 27th June 2007. An unpublished report prepared for BMA Saraji Mine
    - EcoServe (2006). 2006 Winter Vertebrate Fauna Surveys of Remnant Habitats on Saraji Mine. Draft Submission. An unpublished report prepared for BMA Saraji Mine
    - EcoServe (2008). Baseline Fauna Surveys of Rehabilitated Lands on Saraji Coal Mine. An unpublished report prepared for BMA Saraji Mine
    - EcoServe (2009). Baseline Fauna Surveys of Rehabilitated Lands on Saraji Coal Mine. An unpublished report prepared for BMA Saraji Mine
    - SKM (2007 and 2010). Results from Comprehensive Fauna and Flora Surveys of MLA 70383 for BMA
    - SKM (2008). Results from Brigalow Mapping within MLA 70383 for BMA
    - SKM (2009). Results from Targeted Survey for Ornamental Snake on MLA 70383 for BMA
    - SKM (2010). Results from Flora Survey for RE Mapping on MLA 70383 for BMA
    - SKM (2011). Results from Winter Fauna Surveys conducted on MLA 70383 for BMA.

In order to identify the range of flora and fauna species potentially present within the Project Site and the broader region, reviews of the above data sources were conducted for the area bound by the coordinates presented below in Table 2. Prior to each survey period, new database searches were conducted. The search areas used for each data source do not necessarily correlate to the Project Site boundary due to the inherent search parameters for each database.

Table 2 Data source search parameters

Data Source	Search Area	Search Buffer
EPBC Act Protected Matters Search Tool (PMST)	Bounded by: -22.2247, 148.17096 -22.2247, 148.518 -22.6227, 148.518 -22.6227, 148.17096 -22.2247, 148.17096	10 km (built into these search coordinates)
Wildlife Online	Latitude: -22.6227 to -22.2247 Longitude: 148.1710 to 148.5180	10 km (built into these search coordinates)
Environmentally Sensitive Areas	Latitude: -22.6227 to -22.2247 Longitude: 148.1710 to 148.5180	100 km
Biodiversity Planning Assessment	Latitude: -22.6227 to -22.2247 Longitude: 148.1710 to 148.5180	100 km
• Regional Ecosystems (REs) • Essential Habitat	Restricted to bounds of the Project Site (see Figure 2).	0.0 km

3.1.1 Databases

Biodiversity values

Biodiversity significance within the survey area was identified from the BPA for the Brigalow Belt (DES, 20020a). The BPA implements the use of Biodiversity Assessment and Mapping Methodology (DEHP, 2014) to consistently determine the biodiversity significance of habitats and communities. The information produced is largely based upon remnant vegetation mapping generated by the Queensland Herbarium (RE mapping) and identifies three levels of biodiversity significance: State, regional and local. Other factors that contribute to significance ranking include diversity, fragmentation, habitat condition, resilience, threats and ecosystem processes.

EPBC MNES

The DAWE PMST generates a list of protected matters (as per the EPBC Act) that may occur in or near the search area. The database incorporates information from a range of sources including government, research and community organisations.

The MNES database has inherent limitations based on the accuracy of geographic data for some matters. In particular, confirmation of the presence of threatened or migratory species at a given site is not possible from the database, as data presented are for potential occurrences of species within a general area, rather than for known occurrences at a specific site.

The relative reliability of this database must be kept in mind as species highlighted by this search do not necessarily correlate to an actual observation. Species are highlighted by the database if their known distribution overlaps with the search area by one degree of latitude or longitude (approximately 100 km). This indication of potential presence does not take into account whether suitable vegetation, geology, soil, climate or habitat types are present to support the occurrence of a significant species or community.

Regional ecosystem mapping

DES uses REs to describe the relationships between vegetation communities and the environment at the bioregional scale. REs are mostly derived from linking vegetation mapping units recognised at a scale of 1:100,000 to land zones that represent major environmental variables, in particular geology, rainfall and landform.

The Queensland Herbarium has developed a program for mapping remnant REs across Queensland; however, it should be noted that there are inaccuracies inherent in RE mapping at a scale of 1:100,000. As a result these maps provide an indication of what is potentially present and cannot be relied upon as an inherently correct source of vegetation mapping. On-site ground-truthing is required to confirm the presence of RE types and extents, verify floristics and structure and confirm conservation status.

Under the VM Act, REs (and HVR) are assigned a conservation status (referred to as a vegetation management status (VM status)) based on an assessment of the pre-clearing and remnant extent of a RE. A second status rating (biodiversity status) is defined by DES and is based on an assessment of the condition of remnant vegetation in addition to the pre-clearing and remnant extent of a RE.

Vegetation is mapped as remnant by DES where the dominant canopy has greater than 70% of the height and greater than 50% of the cover relative to the undisturbed height and cover of that stratum (Accad *et al.,* 2017). The vegetation community must also be dominated by species characteristic of the REs undisturbed canopy.

Wildlife online

DES's Wildlife Online database contains recorded wildlife sightings and listings of plants, fungi, protists, mammals, birds, reptiles, amphibians, freshwater fish, marine cartilaginous fish and butterflies in Queensland. The database is based on collated species lists and wildlife records acquired by DSITI through a range of sources including specimen collections, research and monitoring programs, and community wildlife recording programs.

Atlas of Living Australia

The Atlas of Living Australia is a national biodiversity database which contains spatial data for fauna and flora occurrence records, expert modelled distribution maps of potential species' ranges, photographs, maps, sound recordings and literature. This database is funded by the Australian Government, through the National Collaborative Research Infrastructure Strategy (NCRIS).

Essential habitat mapping

Essential Habitat mapping (under the VM Act) is provided by DNRME and is currently maintained in the Essential Habitat database. Essential Habitat is compiled from a combination of species habitat models and buffered species records.

Essential Habitat for threatened species is defined as an extent of vegetation depicted on RE mapping as remnant:

- that has at least three Essential Habitat factors for the species, that are stated as mandatory for the protected wildlife in the Essential Habitat database, or
- in which the threatened species, at any stage of its life cycle, has been located.

Environmentally sensitive areas

ESAs include (but are not limited to) national parks, state forests, world heritage areas, Ramsar wetlands, and nationally important wetlands. ESA maps are generated from the DES 'maps of environmentally sensitive areas' webpage.

3.1.2 Aerial photograph analysis and survey site location

Survey sites for the field assessment were chosen from analysis of aerial photography and stratification based on RE mapping to enable the field survey to target a representative range of vegetation within the Project Site.

3.2 Field assessment

Several field surveys have been conducted on, or in the vicinity of, the Project Site over the past 15 years. EcoServe studies between 2005 and 2009 and SKM studies for ML70383 between 2007 and 2011 provide background information on the flora and fauna present in the locality of the Project Site and results of those surveys have been incorporated into literature review analysis.

To supplement previous field surveys, four additional biodiversity surveys have been conducted across the Project Site by AECOM between 2016 and 2020 including:

- winter season survey between 27 and 29 August 2016
- spring season survey between 6 and 10 October 2016
- summer season survey between 30 January and 3 February 2017
- autumn season survey between 23 and 20 March 2020.

Field assessments, including those conducted previously by SKM have involved flora and fauna surveys, which are described below.

3.2.1 Flora survey

Flora surveys assessed floral taxa and vegetation communities in keeping with the methodology employed by the Queensland Herbarium for the survey of REs and vegetation communities (Neldner, 2012). Flora surveys involved a botanical assessment at representative sites within each remnant, non-remnant and regrowth vegetation community as identified from desktop searches outlined in Section 3.1.1. The surveys employed standard methods including secondary survey sites, tertiary survey sites, quaternary survey sites and random meander search areas. RE classification (Sattler, P., & William, R., 1999) was determined based on estimated structural and floristic analysis and in accordance with the REDD (Queensland Herbarium, 2016).

Secondary survey sites followed the Queensland Herbarium standards as identified in Neldner *et al.* (2005) using formalised secondary-level sampling procedures. Data recorded included location, environmental and overall structural information as well as a comprehensive list of woody species and percentage cover. Tertiary transects recorded descriptive site information such as location, aspect, slope, soil type, landform, disturbance, fire history and general notes on ecological integrity. Quaternary-level sites were utilised to verify vegetation units and confirm dominant characteristic species. Structural analysis included recording the height class and life form of the dominant species within the mid and canopy strata as per Neldner *et al.* (2005). A number of vehicle traverses of the survey area were included during the survey periods to identify changes in landform and identify vegetation community boundaries.

To assess threats, evidence of previous disturbance, fire history, incidence of exotic species and general notes on soil type and ecological integrity were compiled for each quaternary survey site. Several time encoded digital photographs were taken at each plot as a reference.

Following the assessment at the tertiary and quaternary sites, a further area of approximately one hectare surrounding each plot was also searched for 20 minutes utilising meander searches (Cropper, 1993). Where a vegetation community presented potential critical habitat for listed flora species, the search area was broadened to capture flora species from an extended search area. Searches for *Dichanthium setosum* (Bluegrass), *Dichanthium queenslandicum* (King Bluegrass) and *Aristida annua* were also undertaken during the targeted surveys of natural grasslands in suitable habitat for these species.

The combined flora survey effort undertaken since 2007 comprises a total of 185 sites, including 14 secondary, 41 tertiary transects and 130 quaternary sites as shown in Figure 3 and outlined in Table 3. To consider the accumulated effort and suitability of technique used, a summary of each flora survey undertaken across the Project Site is provided below.

Table 3 Summary of flora survey methods and effort across survey period

Assessment methodology	SKM (2007 – 2010)	AECOM (2016 – 2017)	AECOM 2020 (20 March to 23 March)	Total
Secondary sites	14	-	-	**14**
Tertiary Sites	-	29	12	**41**
Quaternary Sites	50	33	47	**130**
TOTAL	64	62	59	**185**

2007 Flora survey (SKM)

A flora survey of MLA 70383 was completed by SKM between 17 and 21 November 2007. The survey method followed Queensland Herbarium standards as identified in Neldner *et al.* (2012) using a combination of secondary and quaternary level sampling, as well as informal site observations. The flora survey involved the following:

- Mapping the extent of TECs across the mining lease, including the *Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin* TEC and the *Brigalow (dominant and co-dominant*) TEC.
- Targeted survey for the vulnerable *Dichanthium queenslandicum* (King Bluegrass) (protected under the NC Act and EPBC Act).
- Field checking of RE mapping of the mining lease (Version 5.0, 2003).
- Compilation of a flora inventory for the mining lease, based on secondary and quaternary level sampling.

2008 Brigalow vegetation survey (SKM)

In November 2008, SKM surveyed the extent of remnant brigalow vegetation communities across MLA 70383. All patches of Brigalow within MLA70383 were ground-truthed, and the boundaries mapped.

2010 Flora survey (SKM)

The 2010 flora survey was conducted by SKM between 7 April 2010 and 11 April 2010. This survey focused on collation of secondary-level vegetation data for each vegetation type in the Project Site. Fourteen sites were surveyed that represent all REs mapped across the Project Site (Figure 3). The field survey methodology followed the Queensland Herbarium standards as identified in Neldner *et al.* (2012) using formalised secondary-level sampling procedures, as well as informal site observations. Proformas were used for the collection of field data. Data included location, environmental and overall structural information as well as a comprehensive list of woody species and percentage cover.

Res were classified according to the bioregion, land zone and vegetation type, in accordance with the system of Neldner *et al.* (2012) for remnant and non-remnant vegetation.

Opportunistic traverses of natural grasslands across the Project Site were also completed to search for conservation significant grassland species. An inventory of flora species was recorded from the vegetation survey plots and informal site observations across the Project Site.

2016 and 2017 Regional ecosystem survey (AECOM)

Flora surveys were conducted by AECOM between 27 August 2016 and 29 August, 2016, 6 October 2016 and 10 October 2016, and 30 January 2017 and 3 February 2017. The combined survey effort was focused on ground-truthing REs within the Project Site. A total of 62 sites were surveyed including 29 tertiary transects and 33 quaternary sites (Figure 3).

Tertiary transects were 10 by 50 metres (m) (a total area of 500 square metres (m^2)) as per the Queensland Herbarium methodology (Neldner *et al.* 2012). Structural analysis included recording the height class and distribution of the dominant species within each strata present. The Foliage Projection Cover (FPC) of each strata was calculated along each transect, where foliage projection intersected a 50 m centre tape. FPC of the ground layer was determined using visual estimation of cover within five, 1 m^2 subplots spaced at 12.5 m intervals along each transect.

Quaternary-level sites were utilised to verify vegetation units and confirm dominant characteristic species (Figure 3). Structural analysis included recording the height class and life form of the dominant species within the mid and canopy strata as per Neldner *et al.* (2012). RE classification (Sattler and Williams, 1999) was determined based on estimated structural and floristic analysis.

Following the assessment at the tertiary and quaternary sites, an area of approximately one ha surrounding each plot was searched for 20 minutes utilising the random meander technique (Cropper, 1993). Care was taken to avoid sampling in different vegetation types to those of the plots. Meander searches were employed to:

- identify additional less abundant species not recorded within survey plots
- identify any potential significant threatened or species not identified within the survey plot
- confirm the representativeness of plot locations
- confirm boundaries and ecotone areas between vegetation communities.

2020 Flora surveys (AECOM)

During the 2020 field survey, 19 *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC assessments were completed (Figure 3). *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC assessments were undertaken to identify vegetation communities meeting the key diagnostic and condition threshold criteria as described in the Commonwealth Approved Conservation Advice (Threatened Species Scientific Committee, 2013). The assessment consisted of collecting the following data at various sites within Brigalow vegetation:

- Dominance or co-dominance of *Acacia harpophylla* (*Brigalow*)
- Age of community – at least 15 years since last comprehensively cleared
- Exotic perennial cover – less than 50% total vegetation cover of the patch
- Patch size – greater than 0.5 ha.

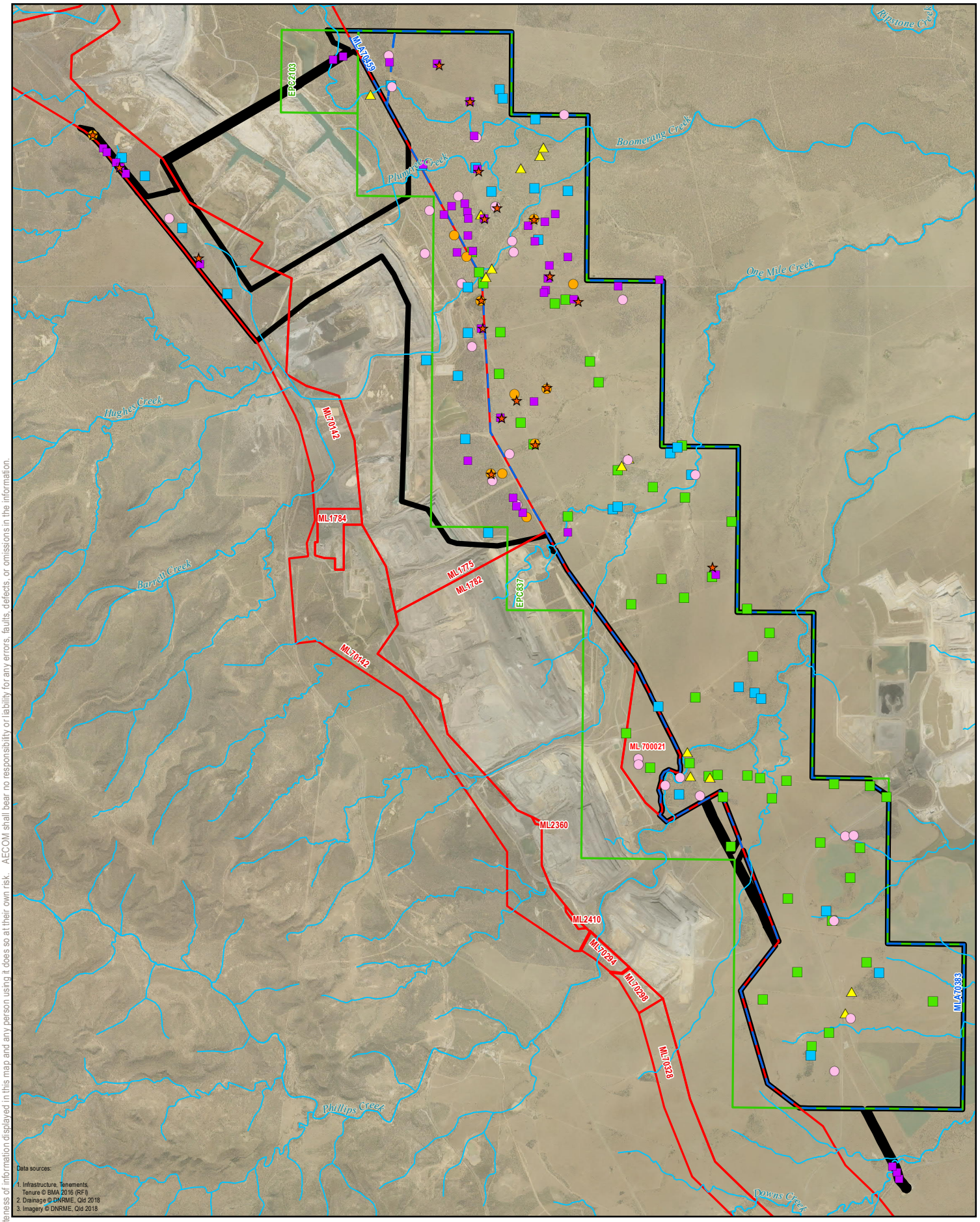
An additional 12 tertiary sites and 47 quaternary sites were also undertaken to confirm previous vegetation mapping (Figure 3).

3.2.2 Specimen identification

Where plant species could not be identified in the field, fruiting and/or flowering specimens were taken to assist with identification. For those species not field identified during the surveys, samples were pressed and dried, and positive identifications of plant specimens were subsequently made under laboratory conditions or submitted to the Queensland Herbarium for identification. A sample of conservation significant species recorded was also submitted to the Herbarium for confirmation by SKM.

3.2.3 Nomenclature

Taxonomic nomenclature used for the description of floral species is according to Bostock and Holland (2017). Exotic flora species are signified in text by an asterisk (*). Field references used for the identification and description of floral species include: Anderson (2016); Booker and Kleinig (2006); Lester (2008); and Moore (2005).



LEGEND

- Project Site
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Watercourse

Flora survey sites

- TEC assessment - Brigalow (AECOM 2020)
- Quaternary site (AECOM 2020)
- Tertiary site (AECOM 2020)
- Quaternary site (AECOM 2017)
- Tertiary site (AECOM 2017)
- Quaternary site (SKM)
- Secondary site (SKM)

N

Figure 3
Flora survey sites

Saraji East Mining Lease Project

0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 22/07/2020 VERSION: 3

Filename: \\aubne1fp003\Projects\605X\60507031\4. Tech Work Area\4.99 GIS\02_MXDs\06 Environmental Impact Statement\C-1 Ecology\60507031_G092_v3_A4P.mxd

3.2.4 Fauna survey

The sampling of vertebrate fauna species including threatened species was undertaken using standard methodologies for the systematic survey of terrestrial fauna in eastern Australia (Eyre *et al.*, 2018) and relevant EIS, Commonwealth and species-specific survey guidelines including:

- EIS information guideline: Flora and fauna (Department of Environment and Heritage Protection, 2019)
- Survey guidelines for Australia's threatened reptiles (Department of Sustainability, Environment, Water, 2011)
- Survey guidelines for Australia's threatened birds (Department of the Environment Water Heritage and the Arts, 2010b)
- Survey guidelines for Australia's threatened mammals (Department of Sustainability, Environment, Water, Population and Communities, 2011)
- Survey guidelines for Australia's threatened bats (Department of the Environment Water Heritage and the Arts, 2010a)
- Draft referral guidelines for the nationally listed Brigalow Belt reptiles (Department of Sustainability Environment Water Population and Communities, 2011)
- Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre *et al.*, 2018)
- Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (Department of the Environment and Energy, 2017e)
- species-specific survey guidelines, such as the survey guidelines for the Koala (*Phascolarctos cinereus*) (Department of the Environment, 2014), Painted Honeyeater (*Grantiella picta*) (Rowland, 2012b), Ghost Bat (*Macroderma gigas*) (Hourigan, 2011), and Yakka Skink (*Egernia rugosa*) (Ferguson & Mathieson, 2014).

During each survey period a range of methods were employed including live capture and release trapping, bird census, herpetofauna searches, spotlighting searches, active searches, call playback, microchiropteran bat call detection (Anabat) and habitat assessments. These fauna survey methods and associated survey period are described in Table 4.

Table 4 Description of fauna survey techniques and associated survey period

Survey Technique	Description or methodology and effort	Survey period
Elliot trapping	Large and small Elliott traps were used to capture ground-dwelling mammals. At four sites, twenty small traps were placed in a single transect line at intervals of approximately 5-10 m. Two large traps were placed along the transect line, at the first and tenth trap. At an additional three sites, twenty small traps were placed in a single transect line at intervals of approximately 5–10 m, with no large traps. Traps were left open for four consecutive nights and checked early each morning within two hours of sunrise. Traps were baited with a mixture of rolled oats, peanut butter, honey and vanilla essence.	November 2007 April 2010
Cage trapping	Cage traps were used to target arboreal and terrestrial mammals. At the four Elliot trap sites were large traps were also used, a single cage trap was placed at the beginning of the Elliot transect line. Traps were left open for four consecutive nights and checked early each morning within two hours of sunrise. Traps were baited with fruit scraps.	November 2007 April 2010
Harp trapping	Due to the difficulties associated with identifying fast flying, small microbats, the use of harp traps is recommended. Trapping was conducted within the vicinity of potential roosts and forest flyways, rocky outcrops, scarps and riparian zones. Traps were checked periodically throughout the night and were packed down after	November 2007 April 2010

Survey Technique	Description or methodology and effort	Survey period
	midnight, to reduce stress on heavily pregnant females and to allow lactating females to return to their young. Trapped microbats were identified to species level in the field. Appropriate measurements were recorded (such as forearm length, weight, outer canine width (OCW)), where necessary for determination to species level.	
Pitfall traps / funnel traps	Pitfall traps and funnel traps were installed to capture reptiles, amphibians and small mammals. At six of the Elliot trap-sites, a single pitfall line was installed comprising five pitfalls linked by a drift fence. Six funnel traps were installed along each drift fence. Pitfalls and funnel traps were left open for four consecutive nights and were checked each morning and afternoon..	November 2007 April 2010
Bird surveys	Bird surveys were conducted during and after morning trap clearing at all trap sites with additional observations made at an additional five sites. These surveys included observations of birds and identification of bird calls.	November 2007 April 2010 July 2011 August 2016 October 2016 January 2017 March 2020
Spotlighting searches	Roaming/meandering nocturnal searches in suitable habitat using headtorches and hand-held spotlights. Spotlighting from the passenger window of a slow-moving vehicle was also undertaken along farm tracks, targeting larger ground and arboreal mammals and nocturnal birds.	November 2007 April 2010 August 2016 October 2016 January 2017 March 2020
Anabat	Unattended bat recorders (Anabat Swift and Songmeter SM2) were placed in the vicinity of foraging sites such as vegetation corridors, flyways, over watercourses and adjacent to artificial waterbodies (dams) in representative potential, likely and known habitat. Data recorded on the bat recorders were analysed by a qualified specialist, Greg Ford of Balance! Environmental. The format and content of the analysis summary reports comply with nationally accepted standards for the interpretation and reporting of Anabat data (Reardon, 2003).	November 2007 April 2010 July 2011 August 2016 October 2016
Call Playback	Playback sessions targeting nocturnal mammals, birds and owls were conducted at selected sites. The activity involved broadcasting pre-recorded calls, and then listening and spotlighting the area immediately afterwards.	November 2007 April 2010
Herpetofauna searches	Active diurnal and nocturnal searches were undertaken for reptiles, amphibians and small mammals included scanning of trees and ground, searching beneath microhabitat such as rocks, fallen timber and peeling bark, and digging through leaf litter and soil at tree bases. Searches also focussed on locating and identifying tracks and traces such as nests, scats, diggings and tree scratchings. In suitable habitat, searches for signs of activity specific to threatened fauna were also conducted (i.e. searches for communal latrine sites for Yakka Skink (*Egernia rugosa*) and searches for Koala (*Phascolarctos cinereus*) scratches and scats).	November 2007 April 2010 July 2011 August 2016 October 2016 January 2017 March 2020

Survey Technique	Description or methodology and effort	Survey period
	Active searches were undertaken within suitable microhabitat at each habitat assessment site (i.e. across the broad range of habitat types throughout the Project Site). All fauna observed incidentally within or in near to the Project Site were recorded, including those seen while travelling along roads and tracks.	
Habitat assessments	Habitat assessments were undertaken to characterise the fauna habitat values within the Project Site. These assessments provide an indication of likely fauna utilisation, and suitability for fauna species, including conservation significant fauna. Habitat attributes recorded during the assessment include: • vegetation structure and dominant species, including a description of canopy, shrub and ground layer structure and composition • presence and abundance of tree hollows and stags • presence and abundance of woody debris such as habitat logs and ground timber • presence and abundance of Koala (*Phascolarctos cinereus*) food trees • presence and abundance of soil cracks and Gilgai • rocky habitat such as surface rocks, boulders, crevices, overhangs and caves • proximity to water (both permanent and ephemeral) • disturbance from invasive weeds/pests • other disturbances such as grazing pressure, clearing, thinning or fire • any other significant habitat features or values present e.g. large nesting trees. Habitat assessments included searches for signs of animal activity, including tracks, scats, scratches, bones, fur, feathers, nests, foraging holes and diggings. At fauna habitat assessment locations, active searches, incidental observations and visual and auditory survey of birds (including for migratory birds where suitable conditions existed) were conducted.	November 2007 January 2010 April 2010 July 2011 August 2016 October 2016 January 2017 March 2020

Prior to each AECOM survey, potential fauna survey transect sites were identified during desktop studies and aerial photograph analysis, with the objective to target and characterise the key habitats across the site. Fauna survey sites are illustrated in Figure 4. A summary of each fauna survey undertaken across the Project Site is provided below.

2007 and 2010 Fauna survey (SKM)

SKM has undertaken two fauna surveys of MLA 70383 which encompasses the majority of the Project Site (with the exception of the proposed rail loading balloon loop, proposed CHPP, run-of-mine (ROM) pad, MIA, process water dam, raw water dam, product stockpiles and conveyor in the north-west of the Project Site). The first was completed between 12 November 2007 and 18 November 2007, and the second between 7 April 2010 and 12 April 2010. The fauna survey programs comprised a combination of systematic survey at primary sites and less intensive opportunistic survey at secondary sites. The survey program was designed to census the terrestrial fauna assemblages and to identify conservation significant species that may occur within the Project Site.

The 2007 fauna survey was undertaken at four primary sites and six secondary sites (Figure 4), which were representative of the different habitat types across the Project Site. The 2010 fauna survey was undertaken at three primary sites and eight secondary sites (Figure 4), and focused on habitat within Lot 10 on CNS93 within the Project Site. The primary sites hosted the main effort and secondary sites were used to collect additional data, usually focusing on one or more fauna groups. The locations of the 2007 and 2010 survey sites are illustrated in Figure 4 and described in Table 5.

The 2010 fauna survey was conducted after the wet season due to prolonged wet weather preventing access until early April. Carfax weather station (22.46° S; 148.68° E; elevation 128 m), located approximately 30 km south-east of the Project Site, recorded 66.4 millimetres (mm) of rainfall in April 2010. Combined with overnight temperatures of around 20°C, these conditions were conducive to detection of fauna.

Table 5 2007 and 2010 Fauna Survey Sites

Site	Description
Primary Survey Sites	
2007	
1	*Eucalyptus populnea* woodland (RE 11.5.3)
2	Alluvium forest (RE 11.3.2/11.3.25/ 11.3.1) located along lower Boomerang Creek
3	*Eucalyptus tereticornis* woodland (RE 11.3.25) and *Eucalyptus populnea* woodland (11.5.3) located along Phillips Creek
4	*Acacia harpophylla* shrubby open forest (RE 11.4.9)
2010	
5	Boomerang Creek riparian woodland (RE 11.3.2/11.3.25/11.3.1) with *Eucalyptus camaldulensis*, *Melaleuca fluviatilis*, *Casuarina cunninghamiana* on alluvium
6	Oxbow wetland east (RE 11.3.27) with *Eucalyptus camaldulensis*, *Lophostemon grandiflorus* on alluvium
7	*Eucalyptus populnea* and *Casuarina cristata* woodland (RE 11.4.9) on brown clay
Secondary Survey Sites	
2007	
A	Alluvium forest (RE 11.3.2/11.3.25/ 11.3.1) located along upper Boomerang Creek
B	Alluvium forest (RE 11.3.2/11.3.25/ 11.3.1) located along upper Boomerang Creek
C	Dam and freshwater wetland surrounded by cleared land and scattered *Melaleuca* and *Eucalyptus tereticornis* located west of powerline easement in north-west of the Project Site
D	Dam surrounded by cleared grassland
E	*Acacia harpophylla* shrubby open forest (RE 11.4.9)
F	Alluvial forest. Located along Philips Creek
2010	
G	Wetland surrounded by RE 11.5.3 located south of the oxbow wetland
H	Dam surrounded by RE 11.4.9 with *Eucalyptus tereticornis*, *Acacia harpophylla*, *Lysiphyllum hookeri*, *Ventilago viminalis* and *Casuarina cristata*
I	Oxbow wetland west (RE 11.3.27) with *Eucalyptus camaldulensis*, *Lophostemon grandiflorus* on alluvium
J	Plumtree Creek riparian woodland (RE 11.3.2/11.3.25/11.3.1)
K	Phillips Creek riparian woodland (RE 11.3.25) with *Eucalyptus camaldulensis*, *Casuarina cunninghamiana*, *Corymbia tessellaris* and *Ficus opposita* on alluvium
L	Brigalow woodland (RE 11.4.9/11.4.8) with *Acacia harpophylla*, *Eucalyptus cambageana*, *Lysiphyllum carronii*
M	Belah woodland (RE 11.4.9/11.4.8) with *Casuarina cristata*, *Eucalyptus cambageana* and *Corymbia dallachiana*
N	Belah woodland (RE 11.4.9/11.4.8)

The survey techniques comprised live trapping (Elliot, cage, pitfall and harp traps), bat call detection (Anabat), bird and herpetofauna searches, spotlight searches and call broadcast. Most of these techniques were employed at the primary sites, and only searches or call broadcast used at the secondary sites. The range of survey techniques employed at each site is summarised in Table 6.

Table 6 Summary of 2007 and 2010 Fauna Survey Techniques

Fauna Survey Site	Elliot traps	Cage traps	Harp traps	Pitfall traps	Bird surveys	Spot-lighting searches	Anabat	Call Playback	Herpeto-fauna searches
1	X	X		X	X	X	X		X
2	X	X	X	X	X	X	X		X
3	X	X	X	X	X	X	X	X	X
4	X	X		X	X	X	X		X
5	X		X	X	X	X	X		X
6	X		X	X	X	X	X		X
7	X				X	X			X
A						X		X	
B									X
C					X				X
D					X				
E						X			
F					X				
G					X				
H					X	X			
I			X			X	X		
J			X						
K			X		X	X	X		
L									X
M						X			X
N						X	X		

2010 targeted survey (SKM)

A targeted survey for the Ornamental Snake (*Denisonia maculata*) was completed on 27 January 2010 and 28 January 2010. Two observers used a combination of vehicle and foot traverses within the Project Site. Vehicle traverses involved driving slowly (around 40 km per hour) along established tracks, whilst foot traverses involved walking slowly through suitable habitats not accessible by vehicle. All snakes encountered were identified and recorded and opportunistic sightings of other fauna were recorded.

Conditions for the targeted survey were good with substantial rainfall occurring over the Project Site in early January 2010. Carfax weather station recorded 141.5 mm of rainfall prior to the targeted survey. Combined with overnight temperatures of 19°C to 24°C, these conditions were ideal for detection of Ornamental Snake (*Denisonia maculata*).

2011 Winter surveys (SKM)

SKM undertook a winter fauna survey of MLA 70383 between 4 July 2011 and 8 July 2011. The survey consisted of morning bird surveys at wetland habitats (i.e. dams, creeks, wetlands), diurnal herpetofauna searches in *Acacia harpophylla* (Brigalow) and *Casuarina cristata* (Belah) habitats and bat call detection (Anabat). The purpose of the survey was to detect fauna over the dry, winter season and to search for possible migratory fauna utilising the area during the winter months.

2016 and 2017 Biodiversity surveys (AECOM)

The AECOM 2016 and 2017 surveys targeted the entire Project Site and included observations of terrestrial vertebrate fauna assemblages (birds, mammals, reptiles and amphibians), habitat assessments and Anabat deployment.

Survey tasks undertaken included:

- targeted early morning bird surveys within suitable habitat
- fauna observations and active searches at all flora transect locations
- habitat assessments targeted at conservation significant species potentially occurring within the Project Site
- observations and analysis of fauna scats as an indication of fauna utilisation
- spotlighting searches
- scans of the canopy and shrub layer for nests, hollows and arboreal fauna
- microchiropteran bat call detection (Anabat).

Detailed fauna habitat assessments were conducted at eight sites (Figure 4), while an assessment of habitat suitability for conservation significant fauna species was conducted at all 62 flora sites (Figure 3).

In addition all fauna observed incidentally during site traverses were recorded with habitat type in which they were observed. The location of fauna survey sites are depicted in Figure 4.

2020 targeted fauna surveys (AECOM)

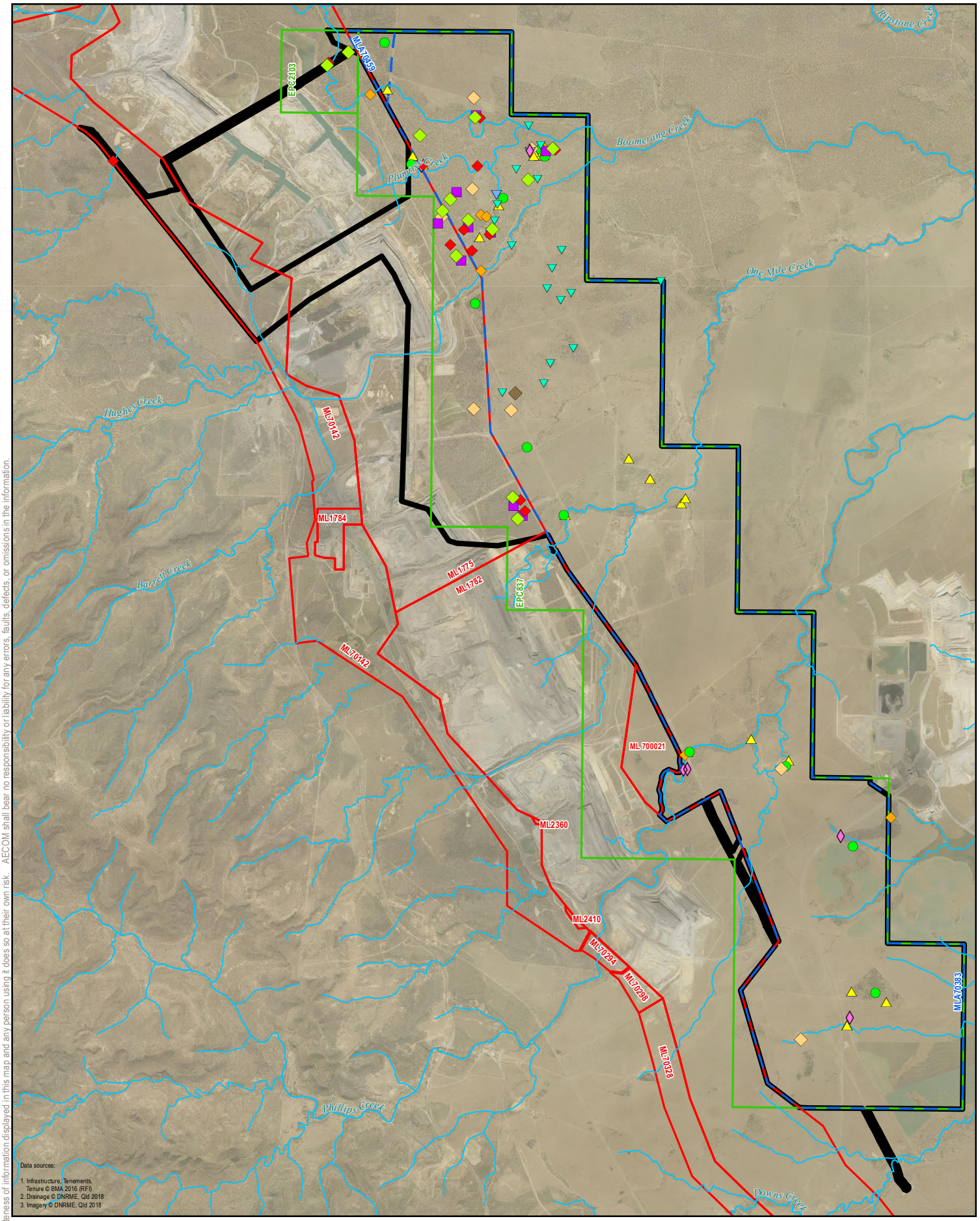
Commonwealth survey guidelines provide a recommended standardised method of collecting ecological data, generally across smaller sized project sites (i.e. < 50 ha). To meet Commonwealth survey guidelines, a supplementary assessment of the entire Project Site was completed in March 2020 for the following threatened species:

- Dunmall's Snake (*Furina dunmalli*)
- Yakka Skink (*Egernia rugosa*)
- Ornamental Snake (*Denisonia maculata)*
- Adorned Delma (*Delma torquata*)
- Koala (*Phascolarctos cinereus*)
- Greater Glider (*Petauroides volans*)
- Latham's Snipe (*Gallinago hardwickii*)
- Australian Painted Snipe (*Rostratula australis*)
- Painted Honeyeater (*Grantiella picta*)
- Red Goshawk (*Erythrotriorchis radiatus*)
- Squatter Pigeon (southern) (*Geophaps scripta scripta*)

Survey tasks undertaken included:

- active bird searches
- flushing surveys
- driving transects
- targeted habitat assessments (bird, mammals and reptiles)
- incidental bird surveys
- spotlighting
- active diurnal searches (mammals and reptiles)

Detailed assessment of habitat suitability for conservation significant fauna species was conducted at all 72 flora sites (Figure 3).



Legend

- Project Site
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Watercourse

Fauna survey sites

- Yakka Skink habitat site (AECOM 2020)
- Squatter Pigeon habitat site (AECOM 2020)
- Greater Glider habitat site (AECOM 2020)
- Active fauna search (AECOM 2020)
- Spotlight location (AECOM 2020)
- Fauna habitat site (AECOM 2017)
- Anabat location (AECOM 2017)
- Spotlight location (AECOM 2017)
- Winter site (SKM)
- Primary site (SKM)
- Secondary site (SKM)

N

Figure 4
Fauna survey sites

Saraji East Mining Lease Project

0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 26/08/2020 VERSION: 3

Filename: \\aubne1fp003\Projects\605X\60507031\4. Tech Work Area\4.99 GIS\02_MXDs\06 Environmental Impact Statement\C-1 Ecology\60507031_G094_v3_A4P.mxd

3.3 Likelihood of occurrence assessment

A likelihood of occurrence assessment for threatened and migratory species and TECs identified during the desktop review was undertaken. Targeted searches were undertaken in the field for species identified as either being likely to occur, or having potential to occur, within the Project Site, based on the desktop sources. The methodology was applied again after field surveys to determine the likelihood of occurrence once site-based information became available.

Each species was assessed against the categories defined below.

- **Known:** Species was positively identified and recorded in the Project Site during the field surveys; or previous, reliable records occur within the Project Site.
- **Likely:** Species was not recorded during the field surveys or previously, however there are known records within the nearby surrounding area (i.e. 15 km) and suitable habitat exists in the Project Site.
- **Potential:** Species was not recorded during the field surveys or previously, however known records occur in the surrounding area (i.e. 15 km) and habitat in the Project Site is marginal or degraded.
- **Unlikely:** Habitat in the Project Site might be suitable or marginal; however, species was not recorded during the field surveys, and no known records of the species exist within the surrounding area (i.e. 15 km).
- **No:** This is usually applied to marine species or seabirds for terrestrial sites.

3.4 Potential Habitat Mapping

Following the completion of field surveys and the likelihood of occurrence assessment, habitat mapping for the MNES values known or considered likely to occur within the Project Site was undertaken. MNES potential habitat mapping of the Project Site was undertaken to:

- Estimate the extent of potential habitat present within the Project Site
- Determine the potential impact to MNES values
- Aid the development of specific mitigation measures.

MNES potential habitat mapping was undertaken in accordance with Central Queensland Threatened Species Habitat Descriptions (Kerswell A, Kaveney T, Evans C and Appleby L, 2020). This covers some of the key threatened fauna species of the Central Queensland region and defines habitat based on three categories – preferred, suitable and marginal habitat. The definitions of each category are provided in Table 7 below. Preferred habitat definitions have been provided for all species but not all species have been allocated both a suitable and marginal habitat category. Allocation of these categories was based on the known ecological requirements of the species and the most applicable category that best describes the species habitat.

For species not covered by Central Queensland Threatened Species Habitat Descriptions (Kerswell A, Kaveney T, Evans C and Appleby L, 2020), habitat definitions were developed from information sourced from publicly available databases, including relevant species recovery plans (where available), referral guidelines, approved conservation advice, the Species Profile and Threats database (SPRAT), management plans and peer-reviewed journal articles.

Habitat assessment information collected during the field surveys, species records (previous and survey records), and Project vegetation mapping was used to map the potential habitat according to the habitat definitions.

Table 7 Habitat category definitions

Habitat Category	Definition
Preferred	Habitats that are most important to the species and contain the features that are crucial for the species' persistence in an area. It includes habitats in which key activities are undertaken e.g. breeding, roosting and/or where high quality/species limiting foraging resources are found. If the species is present in a region, individuals will usually be found in preferred habitat.
Suitable	Habitats that provide resources for the species but is not crucial for its persistence in an area. Individuals may be found in suitable habitat but are not likely to be undertaking key activities such as breeding or roosting. Foraging resources may be lower quality or used opportunistically (rather than being depended upon). If the species is present in a region, individuals may be found in suitable habitat but this habitat type may also remain unoccupied.
Marginal	Habitats that provides limited resources for the species and is not crucial for its persistence in an area. Individuals may be occasionally found in marginal habitat but will not be undertaking key activities such as breeding, roosting or extensive foraging. If the species present in a region, individuals would be found in marginal habitat only rarely and this habitat type is likely to be unoccupied most of the time.

3.5 Significant Residual Impact Assessment

A significant residual impact assessment in accordance with the criteria provided in the Significant Residual Impact Guidelines (Department of the Environment and Heritage Protection, 2014) has been undertaken for the Project on MSES identified within the Project Footprint.

4.0 Terrestrial flora results

4.1 Literature review results

4.1.1 Regional context

Bioregion

The Project Site is situated within the northern Brigalow Belt bioregion. Queensland's bioregions are based on landscape patterns that reflect changes in geology and climate, as well as major changes in floral and faunal assemblages at a broad scale and are used as the fundamental framework for the planning and conservation of biodiversity.

Nature conservation of the northern Brigalow Belt bioregion has received increasing attention due to the rapid and extensive loss of habitat that has occurred. Major impacts upon vegetation of the Brigalow Belt include tree clearing, high grazing pressure and the proliferation of exotic species such as the Prickly Pear (*Opuntia spp*.*). As a consequence of habitat modification, many flora and fauna species have undergone severe range reductions and localised extinctions have occurred for several fauna species (Sattler and Williams, 1999).

Vegetation clearing has occurred on most of the lowland landscapes and those formed on shales. The more rugged topography associated with the sandstone and metamorphic ranges remain relatively undisturbed (Sattler and Williams, 1999).

Subregion

The Brigalow Belt bioregion contains 36 subregions that delineate significant differences in geology and geomorphology (Sattler and Williams, 1999). The Project Site is situated within the Isaac – Comet Downs subregion. The landscape of this bioregion is predominantly undulating country dominated by *Acacia harpophylla* (Brigalow) and *Eucalyptus cambageana* (Dawson Gum) communities on clay soils and *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Eucalyptus populnea* (Poplar Box) open woodland communities on the shallower textured-contrast soils. *Acacia harpophylla* (Brigalow) and *Eucalyptus coolabah* (Coolabah) woodlands are common on alluvium which is commonly encountered in this subregion (Sattler and Williams, 1999).

4.1.2 Regional ecosystems and high value regrowth

DNRME RE mapping (Version 10.1) was reviewed to determine the extent of REs across the Project Site. Ten REs are mapped as occurring within the Project Site; these are listed in Table 8 and shown on Figure 5 and Figure 6 (VM Act Status). The REs are predominantly associated with the creeks that drain across the properties as remaining areas have largely been cleared. Based on the Biodiversity Status classifications, three REs are listed as endangered, four as of concern and three as no concern at present. The EPBC Act status refers to the status of the threatened ecological community which contains the RE. Three of the REs are also component REs of endangered ecological communities listed under the EPBC Act.

DNRME mapping was also consulted to determine the extent of HVR within the Project Site. HVR occurs in several small patches which have not been cleared for greater than 15 years. These are outlined in Table 9.

Table 8 DNRME mapped regional ecosystems

Regional Ecosystem	Description[1]	Biodiversity Status[2]	VM Act Status[3]	EPBC Act Status[4]
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	Endangered	Endangered	Endangered (when condition thresholds and diagnostic criteria are met)
11.3.2	*Eucalyptus populnea* woodland on alluvial plains	Of Concern	Of Concern	-
11.3.25	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	Of Concern	Least Concern	-
11.3.27	Freshwater wetlands	Of Concern	Least Concern	-
11.4.8	*Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains	Endangered	Endangered	Endangered (when condition thresholds and diagnostic criteria are met)
11.4.9	*Acacia harpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains	Endangered	Endangered	Endangered (when condition thresholds and diagnostic criteria are met)
11.4.13	*Eucalyptus orgadophila* open woodland on Cainozoic clay plains	Of Concern	Least Concern	-
11.5.3	*Eucalyptus populnea* ± *E. melanophloia* ± *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces	No Concern at Present	Least Concern	-
11.5.9	*Eucalyptus crebra* and other *Eucalyptus spp.* And *Corymbia spp.* Woodland on Cainozoic sand plains and/or remnant surfaces	No Concern at Present	Least Concern	-
11.9.2	*Eucalyptus melanophloia* +/- *E. orgadophila* woodland on fine-grained sedimentary rocks	No Concern at Present	Least Concern	-

[1] Description of REs as contained in the REDD Version 10.0 (Queensland Herbarium, 2018).

[2] Biodiversity status of the RE based on an assessment of the condition of remnant vegetation in addition to the pre-clearing and remnant extent of a regional ecosystem.

[3] Conservation status of the RE under the Queensland VM Act.

[4] Conservation status of the TEC for which the RE is analogous. RE must meet the condition thresholds and diagnostic criteria to be considered TEC.

Table 9 DNRME mapped high value regrowth Regional Ecosystems

HVR – Regional Ecosystem	Description[1]	Biodiversity Status[2]	VM Act Status[3]	EPBC Act Status[4]
11.4.4	*Dichanthium* spp., *Astrebla* spp. Grassland on Cainozoic clay plains.	Of Concern	Least Concern	Endangered (when condition thresholds and diagnostic criteria are met)
11.4.8	*Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains	Endangered	Endangered	Endangered (when condition thresholds and diagnostic criteria are met)
11.4.9	*Acacia harpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains	Endangered	Endangered	Endangered (when condition thresholds and diagnostic criteria are met)
11.5.3	*Eucalyptus populnea* ± *E. melanophloia* ± *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces	No concern at present	Least Concern	-

[1] Description of REs as contained in the REDD Version 10.0 (Queensland Herbarium, 2018).

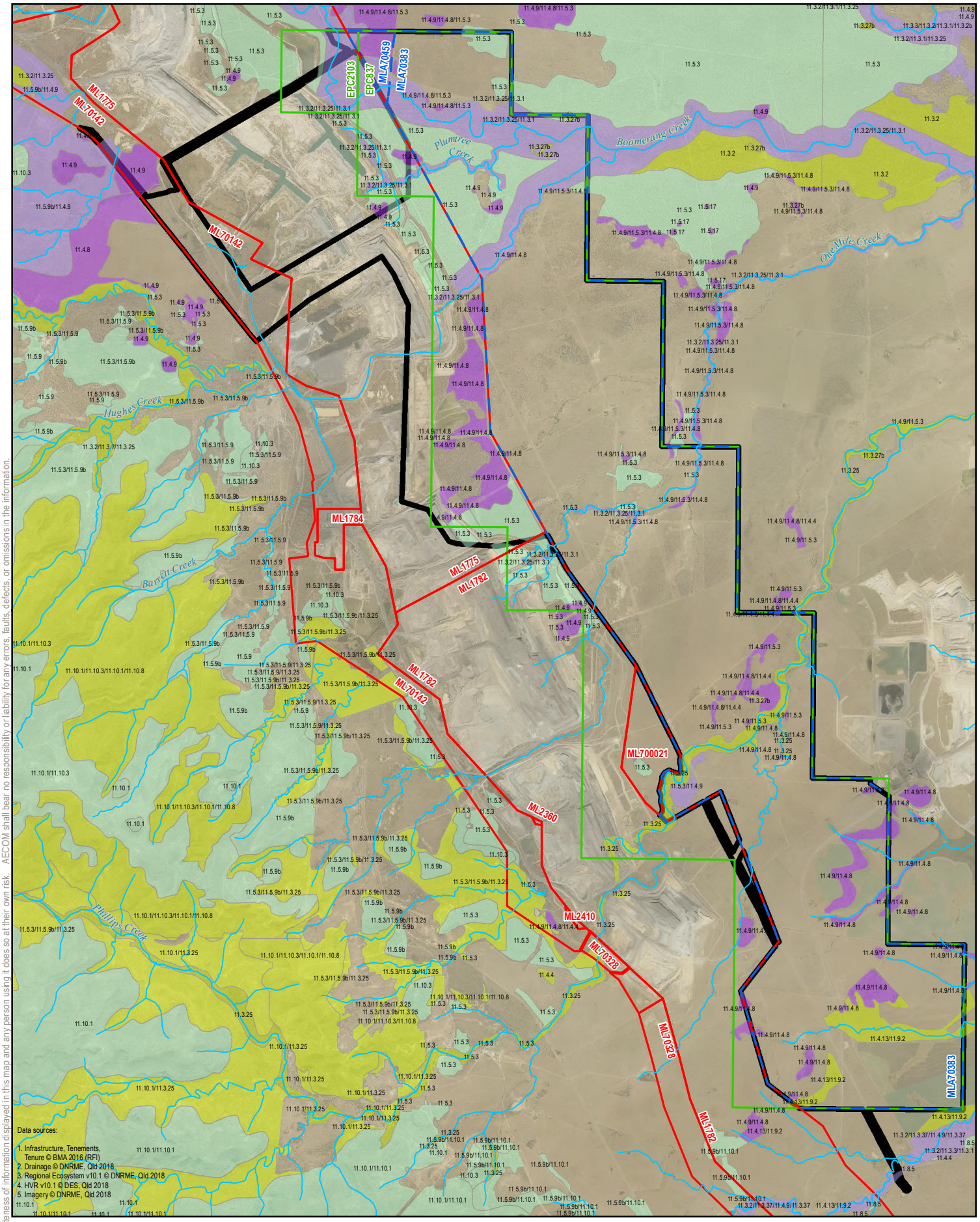
[2] Biodiversity status of the RE based on an assessment of the condition of remnant vegetation in addition to the pre-clearing and remnant extent of a regional ecosystem.

[3] Conservation status of the RE under the VM Act.

[4] Conservation status of the TEC for which the RE is analogous. RE must meet the condition thresholds and diagnostic criteria to be considered TEC..

4.1.3 Essential habitat

No Essential Habitat for conservation significant flora species has been mapped within the Project Site.



LEGEND

- Project Site
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)

Biodiversity Status Regional Ecosystems

- Endangered Dominant
- Endangered Sub Dominant
- Of Concern Dominant
- Of Concern Sub Dominant
- No Concern at Present

N

Figure 5
State Mapped Regional Ecosystems Biodiversity Status (DNRME Version 10.1)
Saraji East Mining Lease Project

0 0.5 1 2
Kilometres

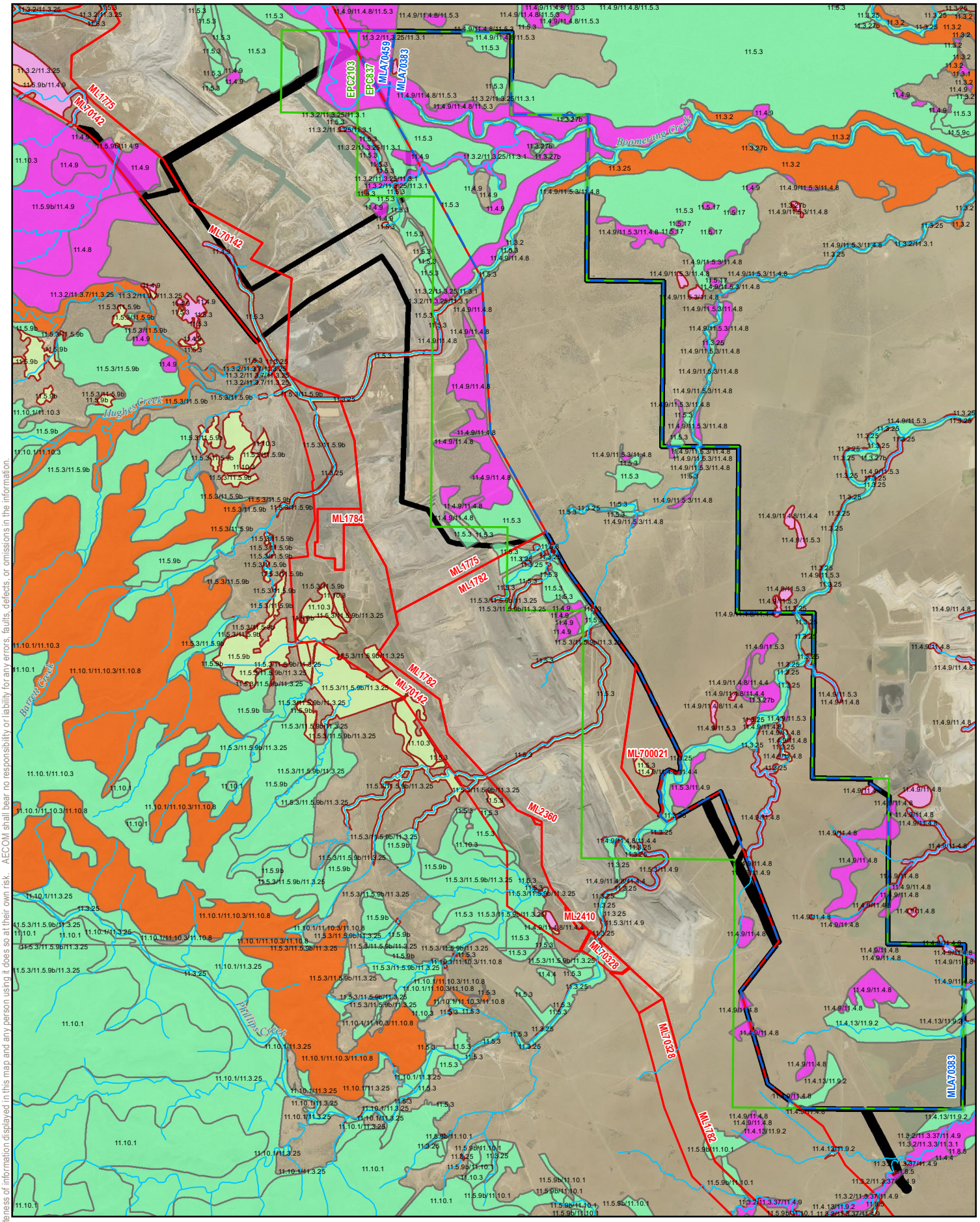
Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 10/11/2020 VERSION: 4

Filename: \\aubne1fp003\Projects\605X\60507031\4. Tech Work Area\4.99 GIS\02_MXDs\06 Environmental Impact Statement\C-1 Ecology\60507031_G097_v4_A4P.mxd



AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.

LEGEND

- Project Site
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Watercourse

Vegetation Management Regional Ecosystem

- Category A or B area containing endangered
- Category A or B area containing of concern
- Category A or B area that is least concern
- Category C or R area containing endangered
- Category C or R area containing of concern
- Category C or R area that is of least concern

Data sources:

1. Infrastructure, Tenements, Tenure © BMA 2016 (RFI)
2. Drainage © DNRME, Qld 2018
3. Regional Ecosystem v10.1 © DNRME, Qld 2018
4. HVR v10.1 © DES, Qld 2018
5. Imagery © DNRME, Qld 2018

N

Figure 6
State Mapped Regional Ecosystems VM Act Status (DNRME 10.1).

Saraji East Mining Lease Project

0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 10/11/2020 VERSION: 2

Filename: \\aubne1fp003\Projects\605X\60507031\4. Tech Work Area\4.99 GIS\02_MXDs\06 Environmental Impact Statement\C-1 Ecology\60507031_G390_v2_A4P.mxd

4.1.4 Threatened ecological communities

A review of the EPBC Act PMST determined that four EPBC listed Threatened Ecological Communities (TECs) are potentially occurring within the Project Site. The list of ecological communities and likelihood of occurrence is presented in Table 10.

Table 10 EPBC Listed threatened ecological communities potentially occurring within the Project Site

Ecological Community	EPBC Act Status	Description	Likelihood of Occurrence
Brigalow (Acacia harpophylla dominant and codominant)	Endangered	*Acacia harpophylla* (Brigalow) is a distinctive silver-foliaged shrub or tree dominant or co-dominant in open forests or woodlands within Queensland and NSW.	**Known.** This TEC corresponds to REs that have been identified within the Project Site by Queensland Government mapping and confirmed during field surveys.
Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin	Endangered	Native tussock grasslands typically composed of a mixture of forbs (i.e. herbs that are broad-leaved and not grass-like) and native grasses that usually occur where fine grained sedimentary rocks occur on alluvial plains, flat ground or gently undulating rises in subtropical climate.	**Known.** This TEC has been identified by SKM within the Project Site and confirmed by AECOM during biodiversity surveys in 2016.
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Dry seasonal subtropical rainforest on medium-high fertility soils, generally characterised by the prominence of vines, twining or scrambling plants on mixed evergreen, semi-evergreen and deciduous tree species with microphyll sized leaves (2.5–7.5cm long) and the frequent presence of Swollen-stemmed “Bottle Trees” (*Brachychiton australis, B. rupestris*) as emergents from the vegetation.	**Unlikely. REs** analogous to this TEC have not been mapped by DES within the Project Site and the TEC was not identified during ecological surveys.
Weeping Myall Woodlands	Endangered	Open, shrubby or grassy woodland in which Weeping Myall (*Acacia pendula*) trees are the sole or dominant overstorey species with understorey comprising an open layer of shrubs above an open ground layer of grasses and herbs.	**Unlikely.** Analogous RE (RE 11.3.2) was mapped by DES within the Project Site, however it was not identified through extensive ecological surveys.

4.1.5 Flora of conservation significance

Seven conservation significant flora species listed under the EPBC Act and/or NC Act were identified from desktop searches as potentially occurring within the Project Site. A likelihood assessment was conducted for each of these species to determine which species are known, likely, potential, unlikely or no possibility to occur within the Project Site. This evaluation is based on an understanding of the preferred habitats of the species, knowledge of the type and condition of habitats present at the Project Site, and the results of the SKM flora surveys. The results of this likelihood assessment are presented in Table 11.

Of those seven species, previous field surveys undertaken by SKM confirmed the presence of one: *Dichanthium setosum* (Bluegrass), which is listed as vulnerable under the EPBC Act. *Dichanthium setosum* (Bluegrass) was recorded south of Phillips Creek (Figure 7) where it was observed as one of the dominant species within RE 11.4.4 (*Dichanthium spp., Astrebla spp.* Grassland on Cainozoic clay plains*)* which forms part of the *Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin* TEC. This vegetation also represents high potential habitat (Figure 8) for another species, *Dichanthium queenslandicum* (King Bluegrass), which is considered a likely occurrence. No other EPBC Act or NC Act listed flora species were recorded during the field surveys.

The full list of database search results is provided in Appendix A.

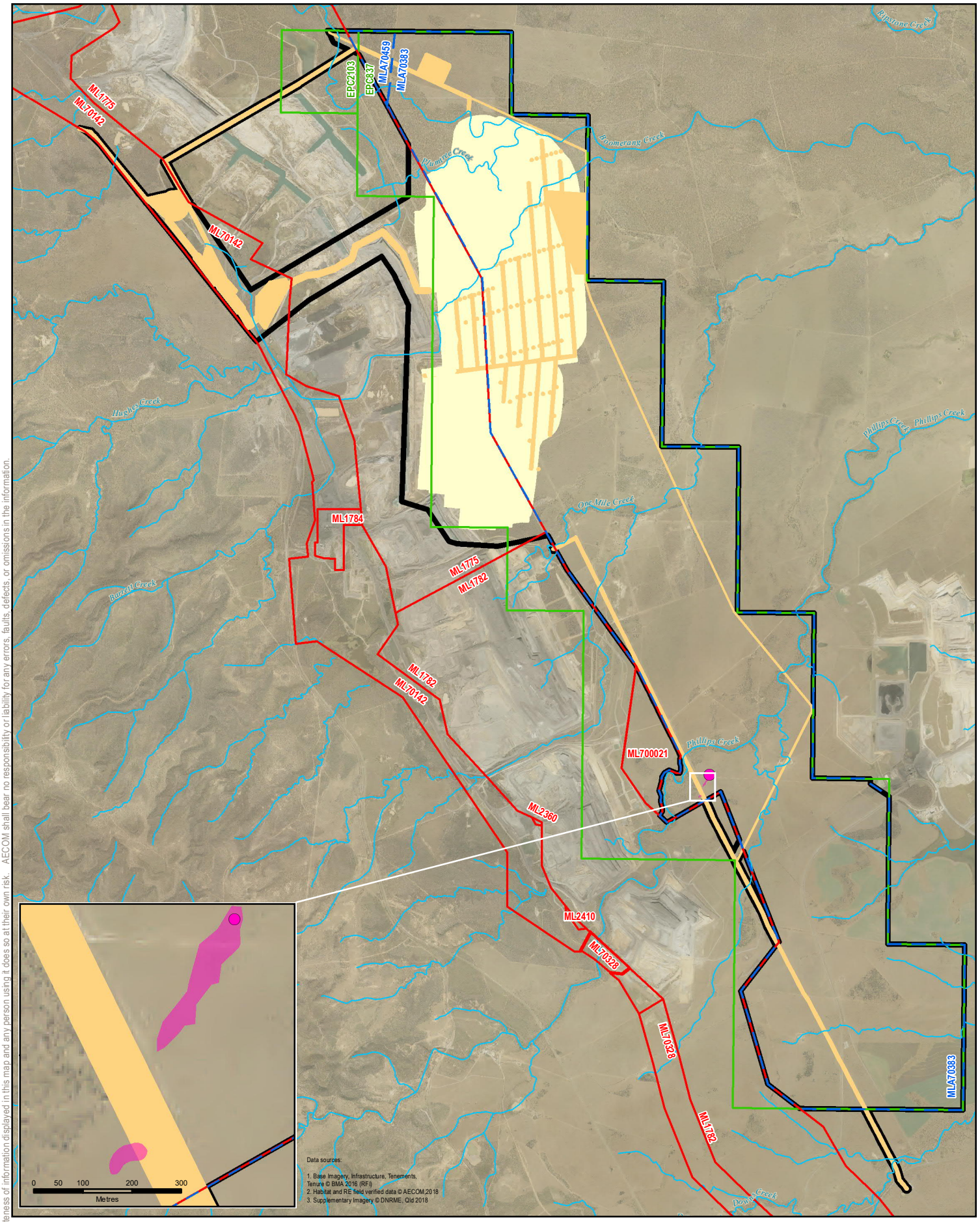
Table 11 Likelihood of occurrence for Conservation Significant flora species within the Project Site

Scientific Name	Common Name	EPBC Act Status[1]	NC Act Status[2]	Habitat/Distribution	Likelihood of occurrence
Aristida annua	-	V	V	Annual grass growing up to approximately 50 centimetres (cm) in height Occurs in eucalypt woodland and is restricted to black clay soils and basalt soils. Occurs in the Natural Grasslands of the *Queensland Central Highlands and the northern Fitzroy Basin* TEC.	**Potential** Suitable habitat within natural grassland habitat within the Project Site.
Cadellia pentastylis	Ooline	V	V	Ooline is a medium-sized spreading tree typically growing to 10m high, but occasionally up to 25m. It's distribution is from the NSW north-west slopes to Carnarvon Range and the Callide Valley in Queensland. Ooline occurs within dry rainforest, semi-evergreen vine thickets and sclerophyll communities.	**Unlikely** Ooline is a large, conspicuous species which is unlikely not to have been identified during previous field surveys. No records are available within the area.
Cerbera dumicola	-	-	NT	*Cerbera dumicola* occurs across a range of habitats in central and southern Queensland. Associated vegetation and species include: sandstone hills in open *E. umbra* subsp. *Carnea*; on plateaus, in woodland of *Acacia shirleyi* with *Corymbia dolichocarpa*; acidic soils in mine rehabilitation area; woodland of *A. catenulata* and *A. shirleyi* with *E. thozetiana* on a slope of sand/clay soil; semi-deciduous notophyll-microphyll vine forest of *Brachychiton australis*, *Gyrocarpus americanus*, *Flindersia australis*, *Pleiogynium timorense*, *Drypetes deplanchei* and *Sterculia quadrifida* on rhyolite hillslopes; open-woodland of *E. melanophloia* with occasional *Acacia shirleyi*, *E. populnea* and *E. brownii*; semi-evergreen vine thicket with *Corymbia citriodora* and *Corymbia aureola* emergents; woodland of *A. rhodoxylon* on brown, sandy loam; and in *Corymbia tessellaris – Acacia 33ossyp* open woodland.	**Potential** Some marginal habitat is available in *Eucalyptus populnea* (Poplar Box) woodlands, however no known vegetation associations are present. A record is available from approximately 7 km west of the Saraji Mine complex.

Scientific Name	Common Name	EPBC Act Status[1]	NC Act Status[2]	Habitat/Distribution	Likelihood of occurrence
Cycas ophiolitica	-	E	E	*C. ophiolitica* Occurs from Marlborough to the Fitzroy River near Rockhampton, in woodland or open woodland dominated by eucalypts, often on serpentinite substrates (Queensland Herbarium, 2007).	**Unlikely** No suitable habitat within the Project site.
Dichanthium setosum	Bluegrass	V	-	An upright Bluegrass less than 1 m tall. Associated with heavy basaltic black soils and found in moderately disturbed areas such as cleared woodland, grassy roadside remnants, grazed land and highly disturbed pasture. In Queensland ,its distribution includes the Leichhardt, Moreton, North Kennedy and Port Curtis regions (TSSC, 2008b).	**Known** *Dichanthium setosum* (Bluegrass) was recorded within RE 11.4.4 in the south of the Project Site (Figure 7). This was found to be a dominant species within this vegetation community.
Dichanthium queenslandicum	King Bluegrass	E	V	A perennial grass growing to 80 cm in height. Occurs on black cracking clay in tussock grasslands. Mostly occurs in natural bluegrass grasslands including the TEC Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC which occurs within the Project Site.	**Likely** Suitable habitat within natural grassland habitat within the Project Site (Figure 8).
Samadera bidwillii	Quassia	V	V	*Samadera bidwillii* (Quassia) is a small tree or shrub that is endemic to Queensland. It is distinguished by its red floral clusters (November to March), slender flower stalks and smooth red fruits (February to April). Branchlets are ribbed with fine, pale brown hairs. Leaves are stiff, narrowly elliptical and leathery with a glabrous upper surface and sparsely hairy lower surface. It commonly occurs in rainforest margins, low land rainforest with a canopy dominated by *Araucaria cunninghamii* (Hoop Pine) or open eucalypt forests in moist areas such as creek lines and riverbanks and in locations up to 510 m. The species can also occur on ridges and disturbed habitats such as roadside vegetation.	**Unlikely** The Project Site does not fall within the known distribution of this species and the species was not recorded during previous ecological surveys.

[1] Conservation status under the EPBC Act: E (endangered), V (vulnerable)

[2] Conservation status under the NC Act: E (endangered), V (vulnerable), NT (near threatened)



AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.

LEGEND

- Project Site
- Project Footprint - Direct impact
- Project Footprint - Indirect impact
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Watercourse

Threatened flora location and high potential habitat

- Remnant grassland habitat
- Bluegrass

N

Figure 7

Bluegrass potential habitat within the Project Site

Saraji East Mining Lease Project

0 0.5 1 2
Kilometres

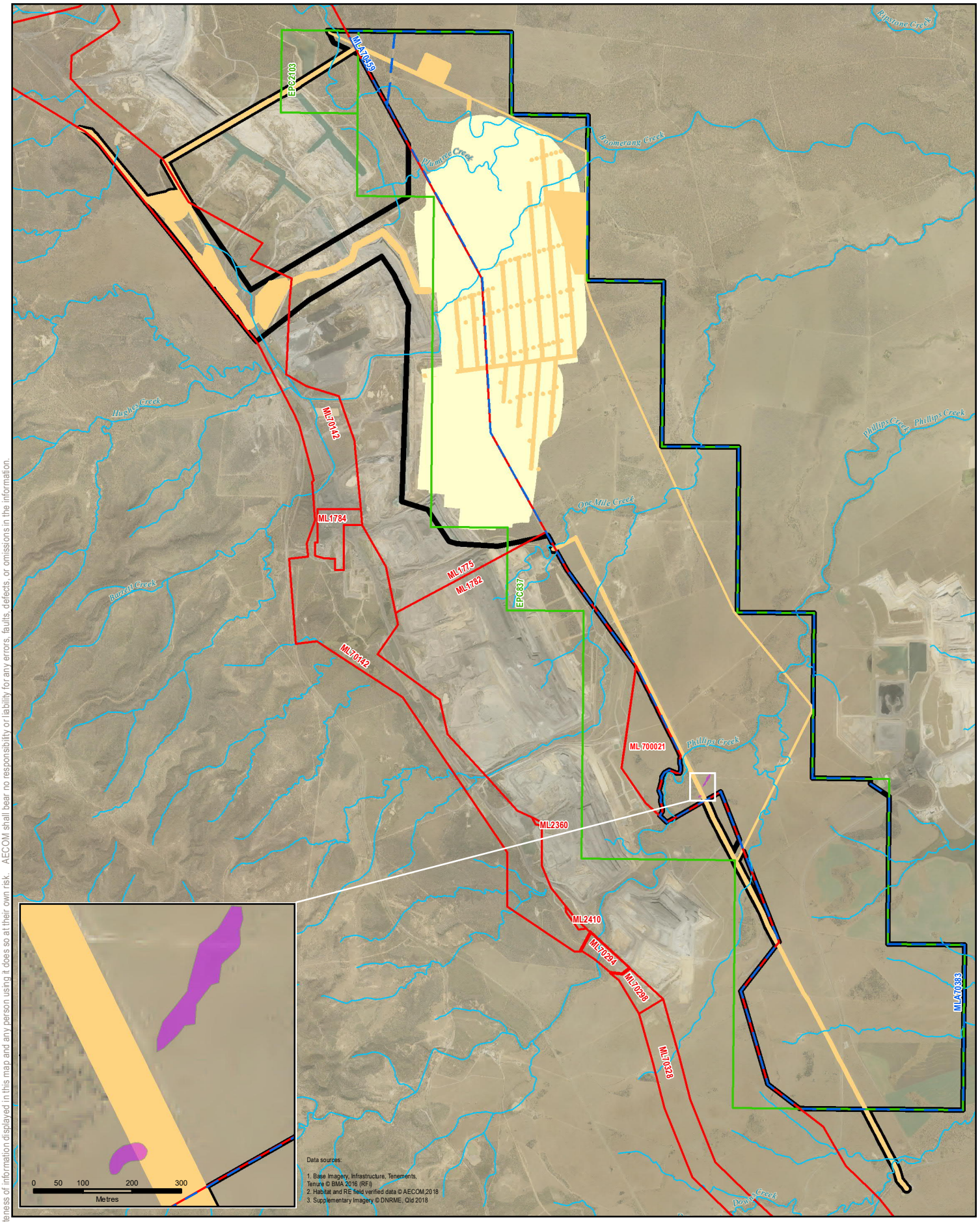
Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 10/11/2020 VERSION: 1

Filename: \\aubne1fp003\Projects\605X\60507031\4. Tech Work Area\4.99 GIS\02_MXDs\06 Environmental Impact Statement\C-1 Ecology\60507031_G369_v1_A4P.mxd



LEGEND

- Project Site
- Project Footprint - Direct Impact
- Project Footprint - Indirect Impact
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)

High potential habitat

- Remnant grassland habitat

N

Figure 8

King bluegrass potential habitat within the Project Site

Saraji East Mining Lease Project

0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 22/09/2020 VERSION: 0

4.2 Field survey results

This section documents the results of the detailed field surveys of the flora and vegetation communities of the Project Site, undertaken by AECOM in 2016, 2017 and 2020 and includes a summary of species diversity, remnant and regrowth REs, conservation significant flora, condition of grasslands and weeds of concern. A complete list of all taxa identified is provided in Appendix B.

The field assessment of the survey area was carried out using the methodology outlined in Section 3.2. The sites surveyed are depicted in Figure 3.

The seasonal weather conditions for the four AECOM survey periods are detailed below in Table 12.

Table 12 Weather observed during survey periods

Survey Timing	Temperature		Rainfall	
	Minimum (°C)	Maximum (°C)	During Survey (mm)	Month prior to survey (mm)
27 August 2016 to 29 August 2016	4.4	25.6	0.0	10.0 (all fell on 25 August 2016)
6 October 2016 to10 October 2016	9.8	32.9	0.0	14.2 (3.2 fell on 4 October 2016)
30 January 2017 to 3 February 2017	20.6	37.7	0.0	60.2 (3.6 fell on 14 January 2017)
20 to 23 March 2020	15.6	33.4	0.4	76.4 (20.0 fell on 24 February 2020)

4.2.1 Regional ecosystems

Ten REs were described and mapped in the Project Site on the basis of stereo pair aerial photo, geology mapping and analysis and field survey results (Figure 9). Of the REs described, three are listed as endangered, six as of concern and one as least concern as per the Biodiversity Status.

Table 13 provides a summary of the classification of vegetation communities and REs identified during the flora surveys. Vegetation communities for the survey areas have been delineated on the basis of Res. The flora surveys confirmed the DNRME RE mapping fairly represents the RE types and distribution in the Project Site. One additional RE was observed, RE 11.4.4 *Dichanthium* spp*., Astrebla spp*. Grassland on Cainozoic clay plains, which occurs south of Phillips Creek. Two REs, 11.5.9 and 11.9.2 were mapped by DNRME as heterogeneous polygons in the north-west of the Project Site however these have been excluded based on field verification. The extent, condition, dominant species and conservation significance of each RE is described below, with representative site photographs. Exotic species are denoted with an asterisk (*).

4.2.2 High value regrowth

HVR was not mapped by AECOM due to not being regulated under the VM Act at the time of survey.

Legislative amendments in 2018 have reverted back to regulating HVR as Category C under the *Vegetation Management and Other Legislation Amendment Act 2018* (VMOLA). As such HVR within the Project Site has been quantified, despite the Project not requiring assessment against the VMOLA or VMA.

The DNRME RE mapping version 10.1 has been used to calculate extent of HVR within the Project Site and Project Footprint, with no field verification undertaken. Areas are provided in Table 14 below.

Table 13 Observed Regional Ecosystems within the Project Site

RE	Community Description[1]	Biodiversity Status[2]	VM Act Class[3]	EPBC Act[4]	Project Site Extent (ha)	Project Footprint (ha)
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains.	Endangered	Endangered	Endangered (when condition thresholds and diagnostic criteria are met)	15.76	6.58
11.3.2	*Eucalyptus populnea* woodland on alluvial plains.	Of Concern	Of Concern	Listed as endangered after submission	151.15	73.33
11.3.4	*Eucalyptus tereticornis* and/or *Eucalyptus spp.* Woodland on alluvial plains.	Of Concern	Of Concern	Not Listed	23.05	0.01
11.3.25	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	Of Concern	Least Concern	Not listed	192.08	79.60
11.3.27b	Lacustrine wetland (e.g. lake). Vegetation ranges from open water +/- aquatics and emergents such as *Potamogeton crispus, Myriophyllum verrucosum, Chara* spp., *Nitella* spp, *Nymphaea violacea, Ottelia ovalifolia, Nymphoides indica, N. crenata, P. tricarinatus, Cyperus difformis, Vallisneria caulescens and Hydrilla verticillata*. Often with fringing woodland, commonly *Eucalyptus camaldulensis* or *E. coolabah* but also a wide range of other species including *E. platyphylla, E. tereticornis, Melaleuca* spp., *Acacia holosericea* or other *Acacia* spp. Occurs on billabongs no longer connected to the channel flow.	Of Concern	Least Concern	Not listed	16.64	11.17
11.4.4	*Dichanthium* spp., *Astrebla* spp. Grassland on Cainozoic clay plains.	Of Concern	Least Concern	Endangered (when condition thresholds and diagnostic criteria are met)	1.73	0.075
11.4.8	*Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or	Endangered	Endangered	Endangered (when condition thresholds	322.16	236.02

RE	Community Description[1]	Biodiversity Status[2]	VM Act Class[3]	EPBC Act[4]	Project Site Extent (ha)	Project Footprint (ha)
	A. argyrodendron on Cainozoic clay plains.			and diagnostic criteria are met)		
11.4.9	*Acacia harpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains.	Endangered	Endangered	Endangered (when condition thresholds and diagnostic criteria are met)	188.57	32.57
11.4.13	*Eucalyptus orgadophila* open woodland on Cainozoic clay plains.	Of Concern	Least Concern	Not listed	222.06	37.94
11.5.3	*Eucalyptus populnea* ± *E. melanophloia* ± *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	No concern at present	Least Concern	Not listed	1,480.04	813.63

[1]- Description of REs as contained in the Regional Ecosystem Digital Database (REDD).

[2]- Biodiversity status of the RE. The Biodiversity Status is based on an assessment of the condition of remnant vegetation in addition to the pre-clearing and remnant extent of a regional ecosystem which is used to determine its class under the VM Act.

[3]- Conservation status of the RE under the Queensland VM Act.

[4]- Conservation status of the TEC for which the RE is analogous. RE must meet the condition thresholds and diagnostic criteria to be considered TEC..

Table 14 HVR Regional Ecosystems mapped by DNRME within the Project Site

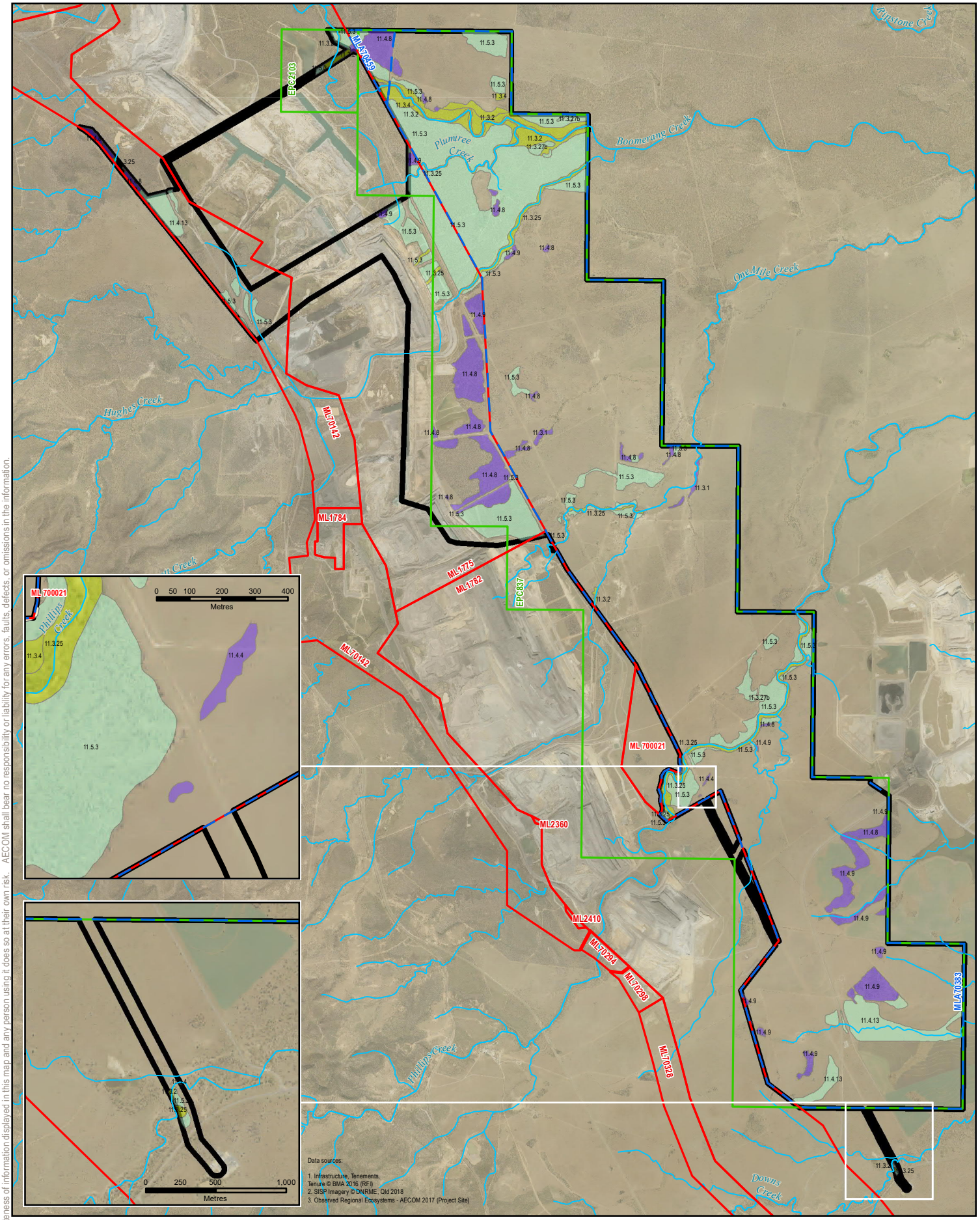
HVR – Regional Ecosystem	Description[1]	Biodiversity Status[2]	VM Act Status[3]	EPBC Act Status[4]	Project Site (ha)	Project Footprint (ha)
11.4.4	*Dichanthium* spp., *Astrebla* spp. Grassland on Cainozoic clay plains.	Of Concern	Least Concern	Endangered	2.1	0.0
11.4.8	*Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains.	Endangered	Endangered	Endangered	38.4	2.0
11.4.9	*Acacia harpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains.	Endangered	Endangered	Endangered	47.8	4.3
11.5.3	*Eucalyptus populnea* ± *E. melanophloia* ± *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces.	No concern at present	Least Concern	-	23.8	1.9

[1]- Description of REs as contained in the Regional Ecosystem Digital Database (REDD).

[2]- Biodiversity status of the RE. The Biodiversity Status is based on an assessment of the condition of remnant vegetation in addition to the pre-clearing and remnant extent of a regional ecosystem which is used to determine its class under the VM Act.

[3]- Conservation status of the RE under the Queensland VM Act.

[4]- Conservation status of the RE as an analogous TEC under the EPBC Act.



LEGEND

- Project Site
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Watercourse

Regional Ecosystems biodiversity status

- Endangered
- Of Concern
- No Concern at Present

N

Figure 9

Ground-truthed regional ecosystems

Saraji East Mining Lease Project

0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 16/10/2020 VERSION: 4

Filename: \\aubne1fp003\Projects\605X\60507031\4. Tech Work Area\4.99 GIS\02_MXDs\06 Environmental Impact Statement\C-1 Ecology\60507031_G098_v4_A4P.mxd

RE 11.3.1 *Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains

A small area of this RE fringes One Mile Creek east of the Project Site. This riparian woodland is dominated by *Acacia harpophylla* (Brigalow) with occasional *Casuarina cunninghamiana* (River She-oak) also present in the canopy layer. The shrub layer consisted of *Alectryon diversifolius* (Scrub Bonaree), juvenile *Acacia harpophylla* (Brigalow) and *Atalaya hemiglauca.*

The ground layer was predominantly bare (55% - 90% bare), with sparse ground cover including *Carissa ovata* (Currant Bush) the exotic grass *Cenchrus ciliaris** (Buffel Grass) and the weed of national significance *Parthenium hysterophorus** (Parthenium Weed).

Plate 1 RE 11.3.1 Fringing One Mile Creek

RE 11.3.2 *Eucalyptus populnea* woodland on alluvial plains

This RE was recorded within a small area on the alluvial plain surrounding Boomerang Creek in the north of the Project Site. Within RE 11.3.2, *Eucalyptus populnea* (Poplar Box) forms an open canopy with *Lysiphyllum carronii* (Queensland Ebony), *Cassia brewsteri* (Leichhardt Bean), *Acacia salicina* (Sally Wattle), and *Eremophila mitchellii* (False Sandalwood) scattered in the lower tree layers. The moderately dense ground layer is dominated by *Bothriochloa bladhii* (Forest Bluegrass) and *Cenchrus ciliaris**), with occasional *Themeda triandra* (Kangaroo Grass) and *Heteropogon contortus* (Black Speargrass).

RE 11.3.25 *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines

RE 11.3.25 occurs fringing the drainage lines of Boomerang Creek, Plumtree Creek, Hughes Creek, One Mile Creek and Phillips Creek.

Eucalyptus camaldulensis (River Red Gum) forms a tall canopy (between 16 m and 24 m in height), with *Casuarina cunninghamiana* (River She-oak), *Corymbia tessellaris* (Moreton Bay Ash) and *Melaleuca fluviatilis* present in the lower tree layers. The shrub layers include *Cassia brewsteri* (Leichhardt Bean) and *Acacia salicina* (Sally Wattle). *Ficus opposita* (Sandpaper Fig) was present along Phillips Creek.

*Megathyrsus maximus** (Guinea Grass)*, Cynodon dactylon** (Couch)*, Chloris virgata* (Feathertop Rhodes Grass) and *Lomandra longifolia* (Mat Rush) are common in the ground layer. The community is disturbed by grazing, flooding, feral animals and weeds.

Plate 2 RE 11.3.25 *Eucalyptus tereticornis* or *Eucalyptus camaldulensis* woodland fringing drainage lines

11.3.27b Lacustrine wetland

Two freshwater oxbow wetlands (RE 11.3.27b) occur in the north-east of the Project Site which comprises open water with aquatic species, fringing sedgeland and eucalypt woodland. The canopy comprises *Eucalyptus camaldulensis* (River Red Gum) and *Lophostemon grandifloras* (Northern Swamp Box) (between 16 m and 20 m in height), both species also present in the lower tree layer (between 8 m and 12 m in height), with a shrub layer of *Acacia salicina* (Sally Wattle) and *Xanthium pungens** (Noogoora Burr) and ground layer including *Cyperus spp.* And the aquatic grass species *Pseudoraphis spinescens*.

Plate 3 RE 11.3.27b in the north of the Project Site

11.3.4 *Eucalyptus tereticornis* and/or *Eucalyptus spp.* Woodland on alluvial plains

This RE was located in two locations within the Project Site, in the north associated with Plumtree Creek and also in the south associated with Phillips Creek (Plate 4). This community comprises open woodland dominated by *Corymbia tessellaris* (Moreton Bay Ash). The shrub layer was sparse with species including *Corymbia tessellaris* (Moreton Bay Ash), *Clerodendrum floribundum, Acacia salicina* (Sally Wattle) and the weed of national significance *Lantana camara** (Lantana). The ground cover was close to 100% and was dominated by the exotic species *Megathyrsus maximus** (Guinea Grass). Other ground cover species included *Lomandra longifolia* (Spiny-headed Mat Rush), *Sida cordifolia**. The weed of national significance *Parthenium hysterophorus** (Parthenium Weed) was also recorded in this RE.

Plate 4 RE 11.3.4 *Eucalyptus tereticornis* and/or *Eucalyptus spp*. Woodland on alluvial plains associated with Phillips Creek

11.4.4 *Dichanthium spp., Astrebla spp*. Grassland on Cainozoic clay plains

Two small patches of natural grassland (RE 11.4.4) occur south of Phillips Creek. The grassland is dominated by *Dichanthium setosum* (Bluegrass), *D. sericeum* (Queensland Bluegrass), *Iseilema membranaceum* (Small Flinders Grass) and *Astrebla pectinata* (Barley Mitchell Grass). Other grasses present include *Bothriochloa bladhii* (Forest Blue Grass), *Cenchrus ciliaris** (Buffel Grass), *Cyperus bifax, Cyperus difformis* (Dirty Dora), *Eriochloa crebra* (Spring Grass) and *Sporobolus caroli* (Fairy Grass). Herbs present include *Ammannia multiflora* (Jerry-jerry), *Alternanthera nana* (Hairy Joyweed), *Crotalaria sp., Eryngium paludosum* (Long Eryngium), *Haloragis stricta, Hibiscus 45ossypii var. vesicarius, Ipomoea plebeia, I. lonchophylla, Marsilea hirsuta* (Nardoo), *Mimulus gracilis* (Slender Monkey-flower), *Neptunia gracilis* (Native Sensitive Plant), *Rostellularia obtusa, Sesbania cannabina* (Sesbania Pea), *Sida fibulifera* (Pin Sida) and *Vigna vexillata* (Wild Cow Pea). The shrub, *Terminalia oblongata* (Yellowwood) is occasionally present.

Plate 5 RE 11.4.4 *Dichanthium spp., Astrebla spp.* Grassland on Cainozoic clay plains

RE 11.4.8 *Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains

The canopy is dominated by *Eucalyptus cambageana* (Dawson Gum) (between 13 m and 15 m in height), with *Acacia harpophylla* (Brigalow) and *Lysiphyllum carronii* (Queensland Ebony) in the lower tree layers (between 8m and12 m in height). The shrub layer comprises *Atalaya hemiglauca* (Whitewood), *Psydrax odorata* (Shiny-leaved Canthium), *Alectryon diversifolius* (Scrub Boonaree), *Lysiphyllum carronii* (Queensland Ebony), *Carissa ovata* (Currant Bush), *Diospyros humilis* (Small-leaved Ebony), *Eremophila mitchellii* (False Sandalwood), *Citrus glauca* (Desert Lime) and *Erythroxylum australe*. The ground layer is disturbed by grazing and is dominated by *Cenchrus ciliaris** *(B*uffel Grass), *Eriochloa crebra* (Spring Grass), *Paspalidium caespitosum* (Brigalow Grass), *Parthenium hysterophorus** (Parthenium Weed) and *Bothriochloa bladhii* (Forest Blue Grass).

RE 11.4.9 *Acacia harpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains

Scattered patches of RE 11.4.9 occur across the Project Site. This RE comprises *Acacia harpophylla* (Brigalow) and *Casuarina cristata* (Belah) in the canopy with a range of species in the T2 including *Alectryon oleifolius* (Boonaree), *Flindersia dissosperma, Geijera parviflora* (Wilga) and *Owenia acidula* (Emu Apple). The shrub layer is dominated by *Denhamia oleaster, Carissa ovata* (Currant Bush) and *Grewia latifolia* (Dysentery Bush). The ground layer is disturbed by grazing and feral animals and comprises *Cenchrus ciliaris** (Buffel Grass), *Paspalidium caespitosum* (Brigalow Grass), *Dichanthium sericeum* (Queensland Bluegrass) and *Bothriochloa bladhii* (Forest Blue Grass).

In some patches *Casuarina cristata* (Belah) dominates and *Acacia harpophylla* (Brigalow) is absent. On Meadowbrook, it occurs as a small patch dominated by *Casuarina cristata* (Belah) with scattered *Eucalyptus populnea* (Poplar Box) (between 10 m and 14 m in height). The community is highly disturbed by grazing with no shrub layer and limited ground cover comprising *Megathyrsus maximus** (Guinea Grass) and *Paspalidium* spp

In the south of the Project Site *Casuarina cristata* (Belah) forms a low canopy with scattered *Corymbia dallachiana* (Ghost Gum) and *Terminalia oblongata* (Yellowwood) (between 6 m and 10 m in height).

Plate 6 RE 11.4.9 (at Q10) *Acacia harpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains

RE 11.4.13 *Eucalyptus orgadophila* open woodland on Cainozoic clay plains.

RE 11.4.13 occurs scattered across the Project Site, south of Lake Vermont Mine Road and railway. *Eucalyptus orgadophila* (Mountain Coolibah) forms a sparse canopy (between 10 m and 14 m in height) with *Terminalia oblongata* (Yellowwood) and *Ventilago viminalis* (Supplejack) scattered in the lower tree layers (between 6 m and 8 m in height). There is a moderately dense ground layer of grasses, dominated by *Heteropogon contortus* (Black Speargrass) and *Dichanthium sericeum* (Queensland Bluegrass) with some *Paspalum dilatatum** (Paspalum).

RE 11.5.3 *Eucalyptus populnea* ± *E. melanophloia* ± *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces

RE 11.5.3 occurs commonly across the Project Site on sandy plains. Some variation in structure and species composition exists within this RE. At AECOM flora survey site south of the oxbow wetland, *Eucalyptus populnea* (Poplar Box) and *E. melanophloia* (Silver-leaved Ironbark) forms an open canopy (between 10 m and 14 m in height). The community is heavily disturbed by grazing and past clearing, rendering the shrub layer almost completely absent with the exception of the occasional immature *Acacia salicina* (Sally Wattle) and *Eucalyptus populnea* (Poplar Box).

A moderately dense ground layer of *Cenchrus ciliaris** (Buffel Grass) with occasional *Themeda triandra* (Kangaroo Grass) was also observed.

At AECOM flora survey site near Hughes Creek, *Eucalyptus populnea* (Poplar Box*)* forms an open canopy (between 10 m and 14 m in height) with a very sparse shrub layer of *Cassia brewsteri* (Yellowwood) and dense ground layer of *Cenchrus ciliaris** (Buffel Grass). The community is disturbed by grazing, previous thinning and feral animals.

At AECOM flora survey site south of Phillips Creek, *Eucalyptus populnea* (Poplar Box) forms an open canopy (between 13 m and 15 m in height) with occasional *Corymbia dallachiana* (Ghost Gum) and *Corymbia erythrophloia* (Variable-barked Bloodwood). *Acacia salicina* (Sally Wattle) is scattered in the lower tree layer (between 5 m and 7 m in height) with rare or incidental records of *Acacia excelsa* (Ironwood), *Hakea lorea* (Bootlace Oak), and *Grevillea striata* (Beefwood) also present. The community is disturbed by grazing and previous clearing, with a very sparse shrub layer of *Grewia latifolia* (Dysentery Bush) and *Carissa ovata* (Currant Bush) dense ground layer dominated by *Cenchrus ciliaris** (Buffel Grass) with occasional *Heteropogon contortus* (Black Speargrass) and *Aristida calycina*.

Plate 7 **RE 11.5.3 (at T16) *Eucalyptus populnea* +/- *E. melanophloia* +/- *Corymbia clarksoniana* on Cainozoic sand plain**

4.2.3 Conservation significant vegetation communities

4.2.3.1 EPBC threatened ecological communities

Field surveys confirmed the presence of two EPBC Act TECs likely to be present; *Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin* and *Brigalow (Acacia harpophylla dominant and co-dominant)*. A total of 1.73 ha of *Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin* and 417.85 ha of *Brigalow (*Acacia harpophylla *dominant and co-dominant)* TECs have been ground-truthed and delineated within the Project Site. Table 15 outlines the EPBC Act TECs and analogous Res.

Table 15 EPBC Listed Threatened Ecological Communities and Related Regional Ecosystems

EPBC TEC	Analogous Res	EPBC Act Status	Project Site (ha)	Project Footprint (ha)
Brigalow (Acacia harpophylla dominant and co-dominant)	RE 11.3.1 RE 11.4.8 RE 11.4.9 (only polygons which met the criteria for this TEC)	Endangered	417.85	246.07
Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin	RE 11.4.4	Endangered	1.73	0.075

Natural grasslands

The *Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin* TEC is listed as Endangered under the EPBC Act.

This TEC is characterised by the presence of native tussock perennial grasses with the shrub layer a minor component and the absence of a tree canopy. The species composition of tussock grasslands varies throughout their range and is influenced by factors such as rainfall, soil, geology and land use history (Threatened Species Scientific Committee, 2009). This TEC is mostly dominated by *Dichanthium* spp. (Bluegrasses), with tropical *Aristida* spp. (three-awned grasses) and *Panicum* spp. (panic grasses). This ecological community usually occurs on flat ground or gently undulating rises, with soils being cracking or self-mulching and this development of deep cracks may tear tap roots leading to a possible reason for the absence of trees and woody shrubs (Threatened Species Scientific Committee, 2009). Water penetration deep into the soil profile is inhibited by the high water holding capacity of the clay soils which may provide another reason as to the dominance of ground layer species.

In Queensland, the *Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin* TEC can be defined using the RE framework, where a number of REs are considered analogous with the TEC, provided that other key diagnostic criteria and condition thresholds are met. In addition, the definition of the ecological community extends to all natural grasslands within specified subregions that meet the key diagnostic characteristics and condition thresholds (Threatened Species Scientific Committee, 2009). The *Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin* TEC is analogous to areas mapped as REs 11.3.21, 11.4.4, 11.4.11, 11.8.11, 11.9.9, 11.9.12 and 11.11.17.

Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin have been identified as occurring on the Project Site as two small patches of the analogous RE, RE 11.4.4 on clay depressions which occurs south of Phillips Creek (Figure 10). The community is dominated by *Dichanthium sericeum* (Queensland Bluegrass), *D. setosum* (Bluegrass), *Iseilema membranaceum* (Small Flinders Grass), *Astrebla pectinata* (Barley Mitchell Grass), *Cyperus bifax, and Eriochloa crebra* (Spring Grass) with little invasion by *Cenchrus ciliaris** (Buffel Grass) and *Bothriochloa pertusa** (Indian Bluegrass) and meets the criteria for the *Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin* TEC.

Brigalow

The *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC is listed as Endangered under the EPBC Act.

This TEC is characterised by *Acacia harpophylla* (Brigalow) as one of the dominant species in the tree layer. The species may also be co-dominant (in some circumstances with other Myrtaceous species, most commonly *Casuarina cristata (*Belah)). The community ranges in composition and structure however is typically represented by a combination of a number of species which are associated with acidic and salty clay soils (Threatened Species Scientific Committee 2013). In Queensland, the *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC is defined using the RE framework, where a number of REs are considered analogous with the TEC, provided that other key diagnostic criteria and condition thresholds are met.

Brigalow (Acacia harpophylla dominant and co-dominant) TECs have been identified as occurring across the Project Site in RE 11.3.1, RE 11.4.8 and RE 11.4.9 (Figure 10). To meet the key diagnostic characteristics of the TEC a patch must include the presence of *Acacia harpophylla* (Brigalow) as one of the most abundant tree species and it must be either dominant or co-dominant in the canopy layer (DoE, 2013). Several patches of RE 11.4.9 within the Project Site did not meet this threshold and were dominated by *Casuarina cristata* (Belah) with *Acacia harpophylla* (Brigalow) absent. As such these patches were excluded from mapping and area calculations for this TEC.

4.2.3.2 Endangered regional ecosystems

Three REs are identified as endangered as per the Biodiversity Status. A total of 526.67 ha of Endangered REs have been described and mapped within the Project Site (Figure 9). All RE descriptions and status can be seen in Section 4.1.2.

HVR (VM Status only) of two of these Endangered REs also exists within the Project Site.

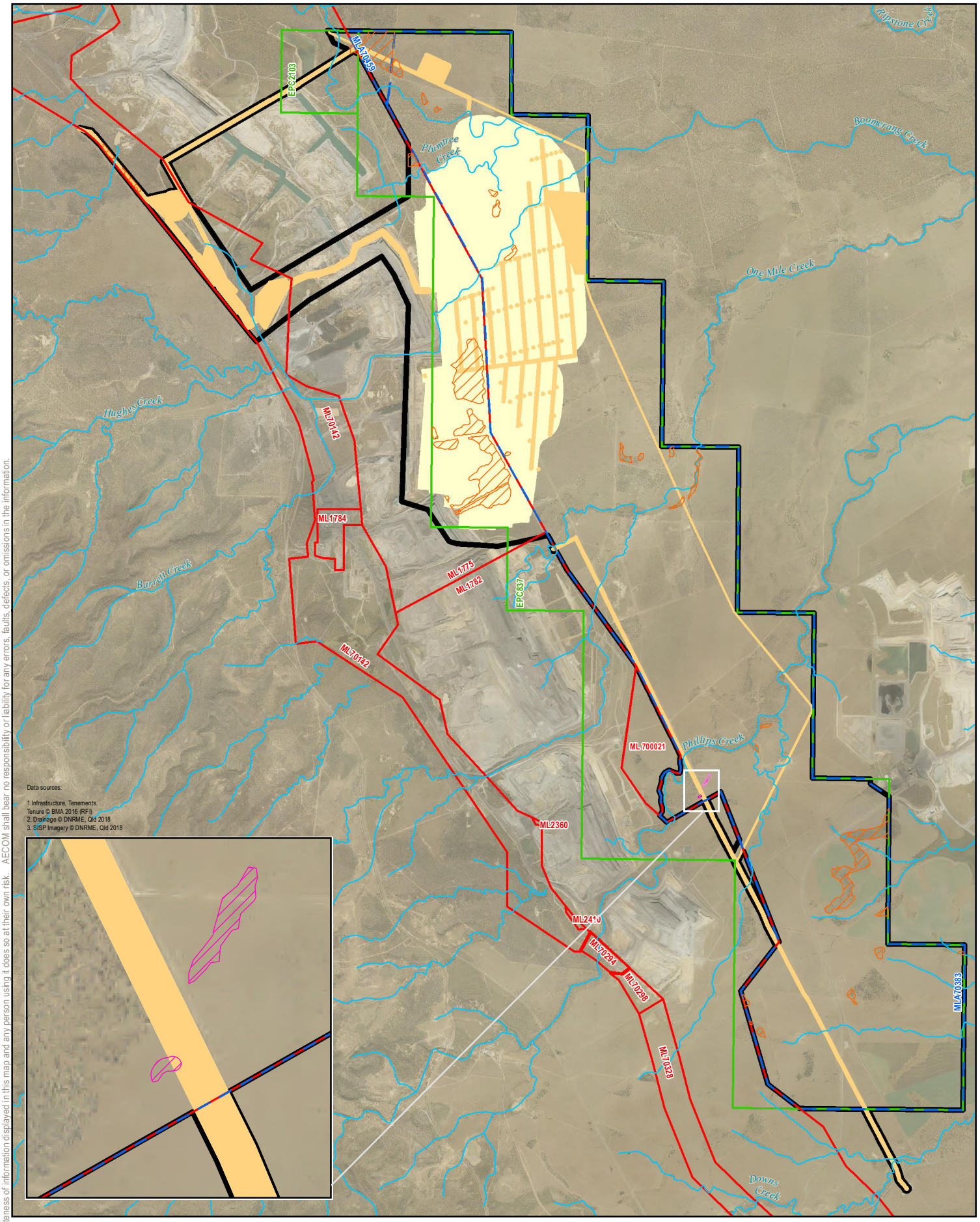
The extent of Endangered REs and HVR Endangered REs within the Project Site is quantified in Table 16 and Table 17 respectively.

Table 16 Endangered Regional Ecosystems

Regional Ecosystem	Biodiversity Status	VM Act Status	Project Site (ha)	Project Footprint (ha)
RE 11.3.1	Endangered	Endangered	15.76	6.58
RE 11.4.8	Endangered	Endangered	322.16	236.02
RE 11.4.9	Endangered	Endangered	188.57	32.56
Total			**526.49**	**275.17**

Table 17 High Value Regrowth Endangered Regional Ecosystems

High Value Regrowth Regional Ecosystem	Biodiversity Status	VM Act Status	Project Site Extent (ha)	Project Footprint Extent (ha)
HVR RE 11.4.8	NA	Endangered	38	2
HVR RE 11.4.9	NA	Endangered	48	4
Total			**86**	**6**



AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.

LEGEND

- Project Site
- Project Footprint - Direct Impact
- Project Footprint - Indirect Impact
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Watercourse

Threatened Ecological Community

- Brigalow (Acacia harpophylla dominant and co-dominant)
- Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin

N

Figure 10
Threatened ecological communities observed within the Project Site

Saraji East Mining Lease Project

0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 23/10/2020 VERSION: 5

Filename: \\aubne1fp003\Projects\605X\60507031\4. Tech Work Area\4.99 GIS\02_MXDs\06 Environmental Impact Statement\C-1 Ecology\60507031_G099_v5_A4P.mxd

4.2.4 Conservation significance flora species

The literature review and desktop searches identified seven flora species of conservation significance as potentially occurring in the survey area (Section 4.1.5). Of those seven species, field surveys undertaken by SKM confirmed the presence of one: *Dichanthium setosum* (Bluegrass), which is listed as vulnerable under the EPBC Act.

No threatened flora species within the Project Site were identified during the AECOM field surveys. However, suitable habitat within the Project Site was confirmed for the known occurrence of *Dichanthium setosum* (Bluegrass). The likely occurrence of *Dichanthium queenslandicum* (King Bluegrass) was also confirmed as this species is known to inhabit similar areas to *Dichanthium setosum* (Bluegrass). These two species are discussed further below.

Dichanthium setosum

Dichanthium setosum (Bluegrass) is an upright perennial grass to a metre in height. *Dichanthium setosum* occurs from Toowoomba in the south to the Lynd Junction in the north, with isolated collections from the Palmer River on the Cape and Lawn Hill NP near the Northern Territory border (WetlandInfo, 2019b). It has been recorded in Brigalow Belt, Cape York Peninsula, Desert Uplands, Einasleigh Uplands, North West Highlands and South East Queensland Bioregions. *Dichanthium setosum* occurs in heavy soils (predominantly cracking clays or alluvium, often in gilgai) in woodland or open woodland usually dominated by Acacia (brigalow) and/or Eucalyptus species. The climate is tropical to subtropical and markedly seasonal with the habitat drying out for part of the year (WetlandInfo, 2019b).

Dichanthium setosum was recorded in the south of the Project Site where it was observed within RE 11.4.4 (*Dichanthium* spp., *Astrebla* spp. Grassland on Cainozoic clay plains) which forms part of the Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC.

The extent of potential habitat is presented in Table 18 and Figure 7. A total of 0.075 ha of potential habitat occurs within the Project Footprint however this area occurs within and adjacent to the path of a proposed overhead power transmission line and is unlikely to be directly impacted by the project construction activities.

Table 18 Potential habitat for *Dichanthium setosum*

Habitat definition	Total area within Project Site (ha)	Area (ha) within Project Footprint
Naturally derived grasslands or open woodlands on heavy basaltic black soils or stony red-brown hard-setting loam with clay subsoil (Department of Agriculture Water and the Environment, 2020b).	1.73	0.075

Dichanthium queenslandicum (King Bluegrass)

Dichanthium queenslandicum (King Bluegrass) is an upright perennial grass to 80 cm in height. This species is endemic to Queensland with the main population centred around Emerald (Central Queensland). This species occurs in three disjunct populations: Hughenden district, Nebo to Monto and west to Clermont and Rolleston, and Dalby district, Darling Downs (Threatened Species Scientific Committee, 2013). *Dichanthium queenslandicum* occurs on black cracking clay soils in tussock grasslands commonly in association with *Dichanthium* spp. And *Bothriochloa* spp. Or other native grass species found on this soil type (Wetland Info, 2019a). This species is predominantly found in natural bluegrass grassland of central and southern Queensland including the EPBC Act listed the Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC.

This species was not recorded within the Project Site, however The Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC is likely to provide suitable habitat for *Dichanthium queenslandicum*.

The extent of potential habitat is presented in Table 19and Figure 8. A total of 0.075 ha of potential habitat occurs within the Project Footprint however this area occurs within and adjacent to the path of a proposed overhead power transmission line and is unlikely to be directly impacted by the project construction activities.

Table 19 Potential habitat for *Dichanthium queenslandicum*

Habitat definition	Total area (ha) within Project Site (ha)	Area (ha) within Project Footprint (ha)
Naturally derived grasslands or open woodlands on heavy basaltic black soils (Department of Agriculture Water and the Environment, 2020b).	1.73	0.075

4.2.5 Flora diversity

The field surveys identified the presence of 315 taxa representing 70 families and 190 genera. Families represented by three or more genera included Acanthaceae (4), Amaranthaceae (3), Apocynaceae (6), Asteraceae (13), Boraginaceae (3), Cactaceae (3), Caesalpiniaceae (3), Chenopodiaceae (5), Convolvulaceae (4), Cyperaceae (3), Fabaceae (16), Mimosaceae (5), Myrtaceae (4) Phyllanthaceae (3), Poaceae (35), Rubiaceae (3), Rutaceae (3) and Sapindaceae (3).

Genera represented by three or more species included *Acacia* (14 species), *Alectryon* (3), *Aristida* (5), *Astrebla* (3), *Bothriochloa* (5), *Capparis* (5), *Casuarina* (3), *Chloris* (6), *Corymbia* (4), *Crotalaria* (3), *Cyperus* (10), *Digitaria* (4), *Eragrostis* (3), *Eremophila* (5), *Eucalyptus* (11), *Indigofera* (3), *Melaleuca* (3), *Panicum* (5), *Paspalidium* (4), *Psydrax* (3), *Sida* (6) and *Sporobolus* (4).

The surveys identified 40 exotic taxa representing 70 families. Families with three or more exotic weed taxa include Asteraceae (4), Cactaceae (4) and Poaceae (12). Weed species present are discussed further below.

A full flora species list including exotic species identified from each survey period is provided in Appendix B.

4.2.6 Weeds

A total of 40 exotic species were recorded from the Project Site during the field surveys, including 11 species which are considered to be a ‘Restricted Matter’ under the *Biosecurity Act 2014.* Eight of these species are Weeds of National Significance (WoNS). A list of these significant weed species is provided in Table 20.

Under the Isaac Regional Biosecurity Plan 2020 -2023, a weed is known as a plant identified in Schedule 1 Part 2 of the *Biosecurity Act 2014* that are having, or with potential to have, adverse environmental, economic, or social impact in the Isaac region, Nine of the species recorded during survey were identified within the Isaac Regional Biosecurity Plan. These species are outlined in Table 20**.**

Table 20 Declared weed species recorded in the Project Site

Species	Common Name	Biosecurity Matter[1]	Weeds of National Significance	Isaac Regional Council Biosecurity Plan – Priority Weeds	Source[2]
*Bryophyllum daigremontianum x delagoense**	Mother of Millions Hybrid	Restricted Matter	-	Yes	ES
*Cryptostegia grandiflora**	Rubber Vine	Restricted Matter	Yes	Yes	ES
*Harrisia martinii**	Harrisia Cactus	Restricted Matter	-	Yes	AECOM, ES
*Hymenachne amplexicaulis**	Hymenachne	Restricted Matter	Yes	Yes	ES
*Jatropha 54ossypiifolia**	Bellyache Bush	Restricted Matter	Yes	Yes	ES
*Lantana camara**	Lantana	Restricted Matter	Yes	Yes	AECOM, SKM, ES, WL
*Lantana montevidensis**	Creeping Lantana	Restricted Matter	-	-	ES
*Opuntia tomentosa**	Velvety Prickly Pear	Restricted Matter	Yes	-	SKM, ES, WL
*Opuntia stricta**	Prickly Pear	Restricted Matter	Yes	Yes	SKM, ES, WL
*Parthenium hysterophorus**	Parthenium Weed	Restricted Matter	Yes	Yes	AECOM, SKM, ES, WL
*Vachellia nilotica**	Prickly Acacia	Restricted Matter	Yes	Yes	AECOM

[1] A biosecurity matter refer to matters which are listed under the *Biosecurity Act 2014*. A 'Prohibited' matters is a biosecurity matter that is not currently present in Queensland, but would have a significant adverse impact on social, economic, health or environment if it entered the state. A 'Restricted matter' refers to a biosecurity matter found in Queensland which has a significant impact on social, economic, health or environment.

[2] Source: AECOM (Field Surveys), SKM (Field Surveys), ES (EcoServe 2005), WL (Wildlife Online).

5.0 Terrestrial fauna results

5.1 Literature review results

5.1.1 Essential Habitat mapping

The Essential Habitat mapping shows vegetation which is known to support Essential Habitat values for particular conservation significant species, or habitat which surrounds point records of conservation significant species.

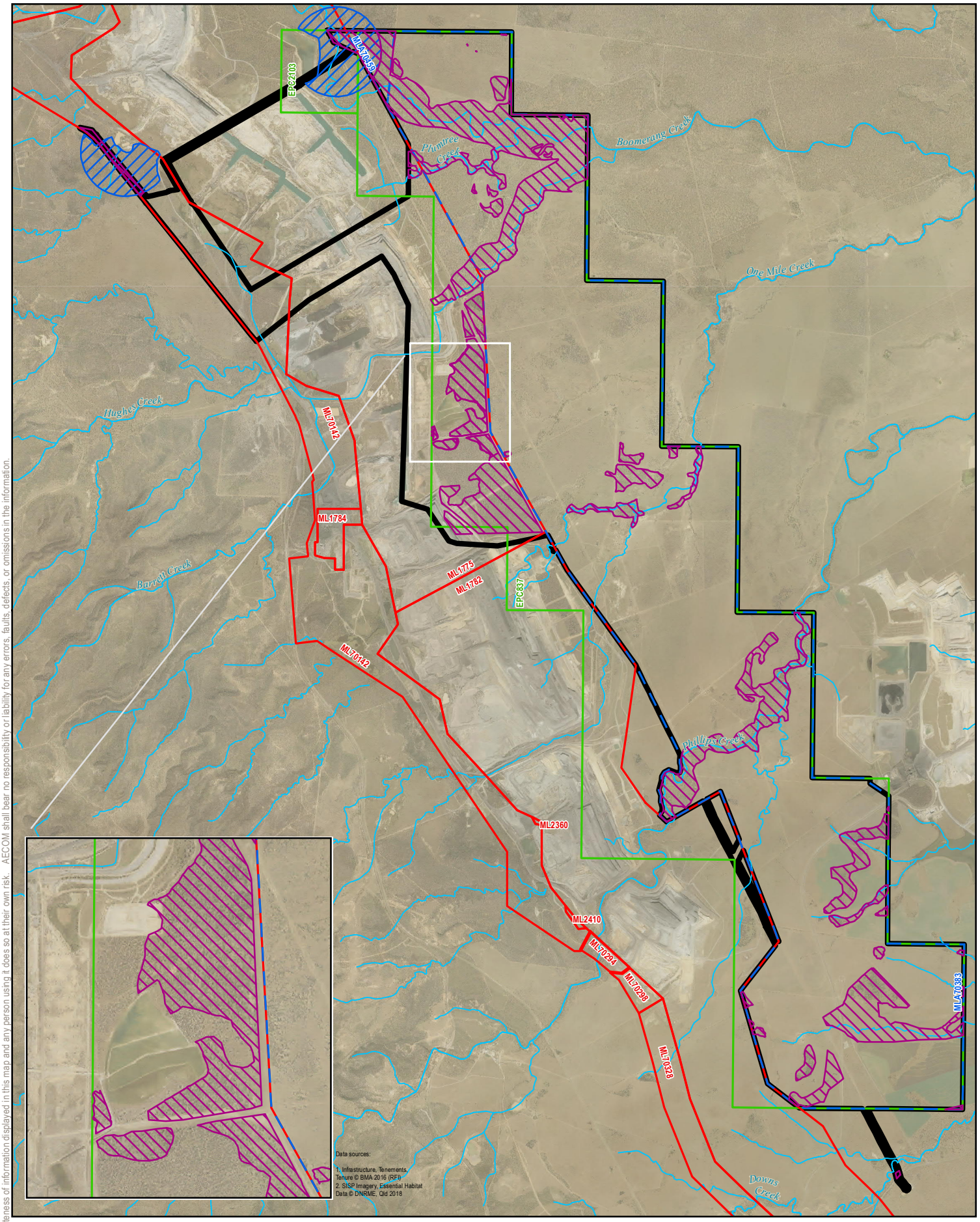
Essential Habitat has been mapped for two fauna species within the Project Site. In the north-east corner of the Project Site, Essential Habitat for Squatter Pigeon (*Geophaps scripta scripta*) has been mapped based on suitable habitat surrounding a previous record for this species (77.62 ha in Project Site and 24.79 ha in Project Footprint). Essential Habitat has also been mapped for Ornamental Snake (*Denisonia maculata*) in *Acacia harpophylla* (Brigalow) with *Casuarina cristata* or *Eucalyptus cambageana* (Dawson Gum) open woodlands, regrowth *Acacia harpophylla* (Brigalow) woodland and woodland communities on alluvium (1,985.44 ha in Project Site and 811.01 ha in Project Footprint) (Figure 11).

5.1.2 Biodiversity values

An analysis of the BPA for the Brigalow Belt shows that 692 ha of state significant habitat and 863 ha of regionally significant habitat is present within the Project Footprint. No locally significant habitat has been mapped within the Project Footprint.

Areas of conservation significance identified within a 100 km radius of the survey area are depicted in Figure 12. Regional connectivity and biodiversity corridors identified from the BPA within the Project Site are displayed in Figure 12.

The Brigalow Belt BPA mapping indicates that the major creek systems within the Project Site (Phillips Creek, Plumtree Creek, Boomerang Creek, Hughes Creek and One Mile Creek) and their associated riparian vegetation contribute to habitat connectivity from west to east on a State level. The north-east of the Project Site is largely mapped as significant for biodiversity at a State level and several disjunct patches of Regional significance for biodiversity are mapped throughout the southern half of the Project Site.



LEGEND

- Project Site
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Watercourse

Essential Habitat

- Squatter Pigeon
- Ornamental Snake

Figure 11
Essential Habitat and Observed Conservation Significant Fauna Observed within the Project Site

Saraji East Mining Lease Project

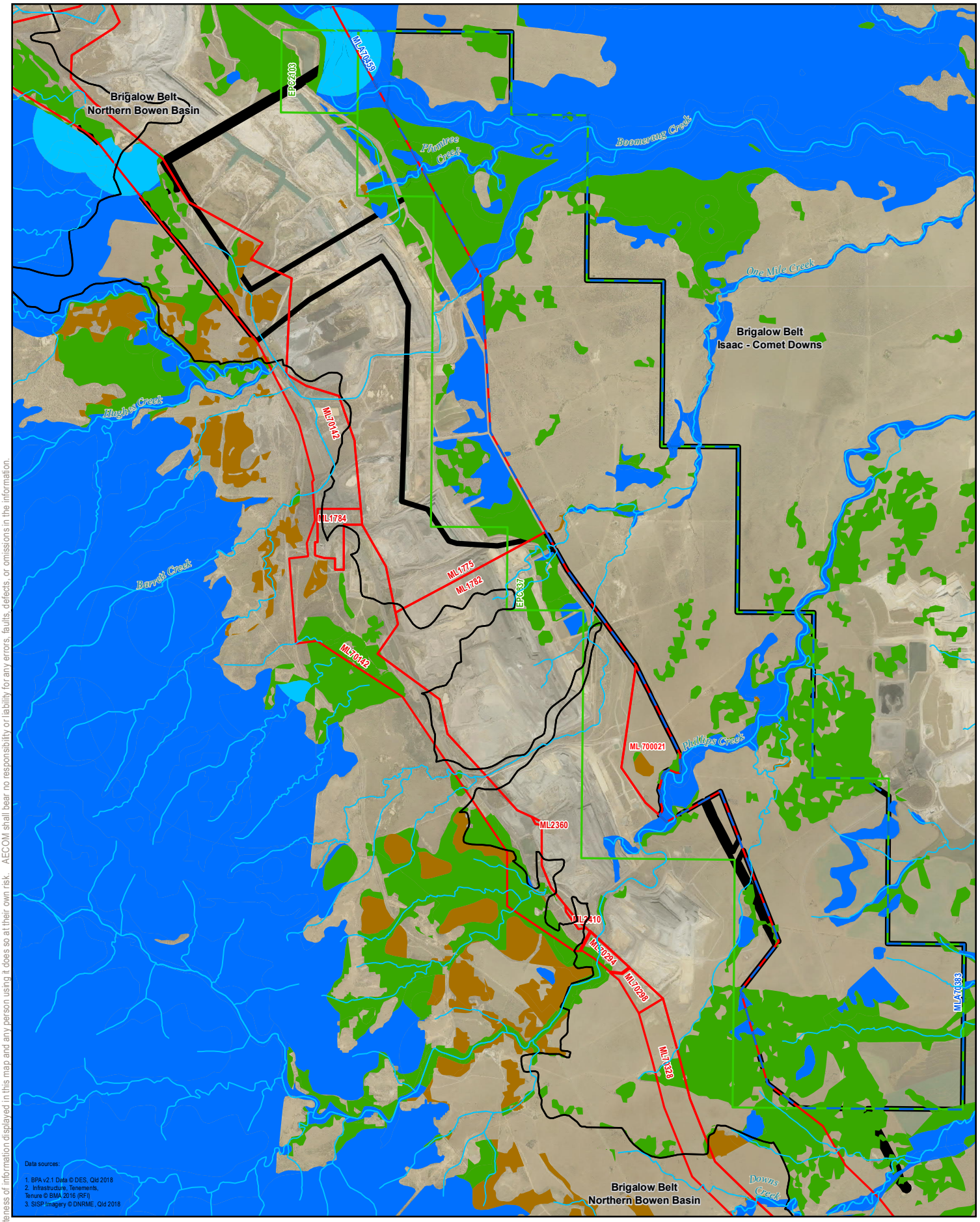
0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 22/09/2020 VERSION: 4



LEGEND

- Project Site
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Watercourse
- Biodiversity Planning Assesment (BPA) Subregion

Biodiversity planning assessment Brigalow belt

Biodiversity significance

- State Habitat for Endangered, Vulnerable and Near Threatened taxa
- State
- Regional
- Local or Other Values

N

Figure 12
Biodiversity planning assessment mapping within the project site

Saraji East Mining Lease Project

0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 22/09/2020 VERSION: 3

Filename: \\aubne1fp003\Projects\605X\60507031\4. Tech Work Area\4.99 GIS\02_MXDs\06 Environmental Impact Statement\C-1 Ecology\60507031_G106_v3_A4P.mxd

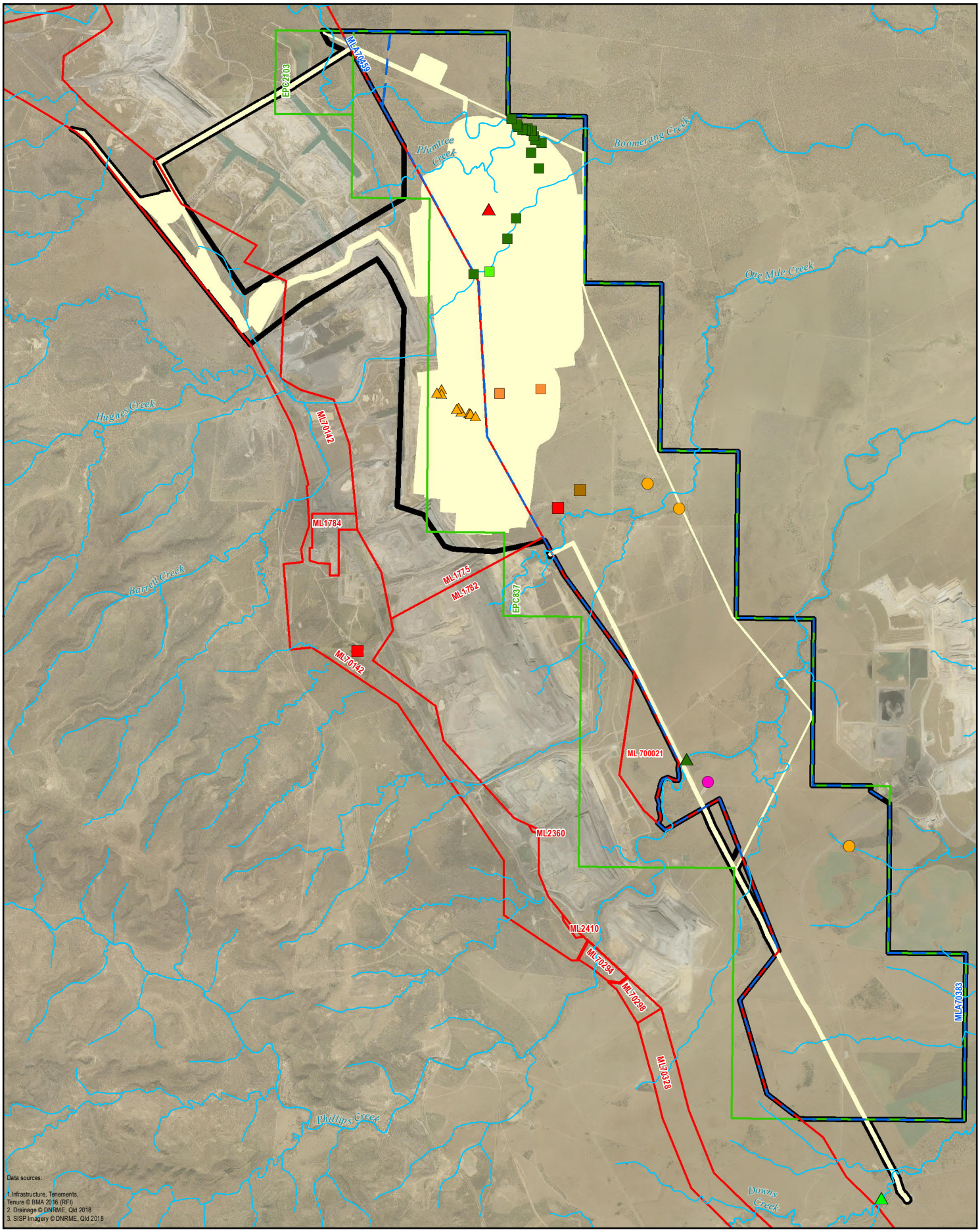
5.1.3 Fauna of Conservation Significance

5.1.3.1 Listed Threatened Species

Twenty-one conservation significant fauna species listed under the EPBC Act and/or NC Act were identified in the database search results for the Project Site. An initial likelihood of occurrence assessment was conducted to determine which of these species are known, likely, potential, unlikely or no potential to occur within the Project Site. This assessment was based on an understanding of the preferred habitats of the species, knowledge of the type and condition of habitats present, and the results of the previous Saraji Mine fauna surveys (e.g. SKM). These evaluations are presented in Table 21.

Of those 21 species, 7 threatened species have been confirmed in previous field surveys. Australian pained snipe was observed by SKM in the Project Site in 2007. During the 2010 SKM surveys, Ornamental Snake (*Denisonia maculata*), Greater Glider (*Petauroides volans*) and Squatter Pigeon (*Geophaps scripta scripta*) were also recorded within the Project Site (Figure 13). Grey Falcon (*Falco hypoleucos*) has also been previously recorded at the Saraji Mine by EcoServe in 2005. An additional Special Least Concern species, Short-beaked Echidna (*Tachyglossus aculeatus*) was recorded within the Project Site by SKM in 2007.

The full list of database search results is provided in Appendix A.



LEGEND

- Project Site
- Project Footprint
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Watercourse

Threatened fauna and flora

- Ornamental Snake (SKM 2012)
- Ornamental Snake (Australian Living atlas 2016)
- Ornamental snake (AECOM 2020)
- Koala (URS 2014)
- Koala (AECOM 2020)
- Greater glider (AECOM 2020)
- Greater Glider (SKM 2012)
- Squatter pigeon (AECOM 2017)
- Squatter Pigeon (SKM 2012)
- Painted Snipe (SKM 2012)
- Bluegrass

N

Figure 13

Observed threatened flora and fauna within the Project Site

Saraji East Mining Lease Project

0 0.5 1 2

Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 22/09/2020 VERSION: 0

Table 21 Conservation Significant Fauna Species Potentially Occurring in the Project Site

Scientific Name	Common Name	EPBC Act Status[1]	NC Act Status[2]	Habitat/distribution	Likelihood of Occurrence
Reptiles					
Denisonia maculata	Ornamental Snake	V	V	This species is known to prefer woodlands and open forests associated with moist areas, particularly gilgai mounds and depressions in Queensland RE Land Zone 4, but also lake margins and wetlands. This species' habitat is likely to be found in *Acacia harpophylla*, *A. cambagei*, *A. argyrodendron* or *Eucalyptus coolabah*-dominated vegetation communities, or pure grassland associated with gilgais. These are commonly mapped as Queensland REs 11.3.3, 11.4.3, 11.4.6, 11.4.8, 11.4.9, 11.5.16 or mapped as cleared but where the above REs formerly occurred (Department of Sustainability Environment Water Population and Communities, 2011). This species is known only from the Brigalow Belt North and parts of the Brigalow Belt South biogeographical regions. The core of the species' distribution occurs within the drainage system of the Fitzroy and Dawson Rivers (Department of Agriculture Water and the Environment, 2020b).	**Known.** The Ornamental Snake (*Denisonia maculata*) has been recorded in the Project Site on multiple occasions: • Two locations during surveys by AECOM (2020) • Three locations during surveys by SKM (2012) Essential Habitat for the species is also mapped in the west of the Project Site that relates to 11 previous records associated with studies conducted for the existing Saraji Mine.
Egernia rugosa	Yakka Skink	V	V	Habitat requirements are poorly known; however, this species is known from rocky outcrops, sand plain areas and dense ground vegetation, in association with open dry sclerophyll forest (ironbark) or woodland, brigalow forest and open shrubland. In the Brigalow Belt bioregion, core habitat includes: *Eucalyptus populnea* (Poplar Box) woodland, *Acacia 60ossyp* (*M*ulga) woodland, *Callitris glaucophylla* (*W*hite Cypress Pine); usually in association with eucalypt species such as *E. populnea*, *E. melanophloia* or *Corymbia tessellaris*, ironbark (typically *E. melanophloia*) woodland, and disturbed, treated and cleared areas of suitable habitat, grazed or ungrazed, where suitable microhabitat features still remain (Ferguson & Mathieson, 2014). Colonies have been found in large hollow logs, cavities or burrows under large fallen trees, tree stumps, logs, stick-raked piles, large rocks and rock piles, dense ground-covering vegetation, and deeply eroded gullies, tunnels and sinkholes (Department of	**Potential.** Suitable habitat (*Eucalyptus populnea* (Poplar Box) Woodland (RE 11.5.3 and RE11.3.2) for the Yakka Skink (*Egernia rugosa*) is found within the Project Site. No nearby records occur. Most records are found south of the Project Site with the nearest recent recorded occurrence at the Jellinbah Mine (ALA), 100 km south of the Project Site in 2000.

Scientific Name	Common Name	EPBC Act Status[1]	NC Act Status[2]	Habitat/distribution	Likelihood of Occurrence
				Sustainability Environment Water Population and Communities, 2011). The known distribution of the Yakka Skink (*Egernia rugosa*) extends from the coast to the hinterland of sub-humid to semi-arid eastern Queensland. This vast area covers portions of the Brigalow Belt, Mulga Lands, South-east Queensland, Einasleigh Uplands, Wet Tropics and Cape York Peninsula Biogeographical Regions (Department of Agriculture Water and the Environment, 2020b).	
Elseya albagula	Southern Snapping Turtle	CE	E	The Southern Snapping Turtle (*Elseya albagula*) prefers clear, flowing, well-oxygenated water associated with their ability to extract oxygen from the water via cloacal respiration. Populations occur at much lower densities where flow is reduced (upstream of dams, weirs etc.). This species occurs only in three catchments (Burnett, Mary and Fitzroy) and is considered a habitat specialist (Department of Agriculture Water and the Environment, 2020b).	**Unlikely.** Streams in the Project Site are ephemeral and are subject to variable flow regimes, with the availability of permanent water largely accounted for by on-stream farm dams. The condition of the streams within the Project Site are considered to be poor to moderate with low habitat and channel diversity. No nearby records occur.
Furina dunmalli	Dunmall's Snake	V	V	This species has been found in a broad range of habitats, including: forests and woodlands on black alluvial cracking clay and clay loams dominated by *Acacia harpophylla*, *A. burrowii, A. deanei, A. leiocalyx*, *Callitris* spp. Or *Allocasuarina luehmannii*; and various *Corymbia citriodora*, *Eucalyptus crebra* and *E. melanophloia*, *Callitris glaucophylla* and *Allocasuarina luehmannii* open forest and woodland associations on sandstone derived soils. The Dunmall's Snake (*Furina dunmalli*) occurs primarily in the Brigalow Belt region in the south-eastern interior of Queensland. Records indicate sites at elevations between 200–500 m above sea level (Department of Agriculture Water and the Environment, 2020b).	**Potential.** Suitable habitat in the form of brigalow woodland on clay (RE 11.3.1 /11.4.8/ 11.4.9) is present across the Project Site. The nearest recent recorded occurrence was in 1999 located near Clermont, 80 km to the west.
Lerista allanae	Allan's Lerista, Retro Slider	E	E	Suitable habitat for this species is described as vegetation occurring on mid to dark-brown-coloured, non-cracking clay soils in Queensland REs 11.8.5 and 11.8.11/11.8.5 and grassy open-woodland mapped	**Unlikely.** This species is known only from black soil downs in the central Brigalow Belt Region

Scientific Name	Common Name	EPBC Act Status[1]	NC Act Status[2]	Habitat/distribution	Likelihood of Occurrence
				as cleared but where the above REs formerly occurred (Department of Sustainability Environment Water Population and Communities, 2011). The Retro Slider's (*Lerista* allanae) range is believed to occur within the area bound by coordinates: 21°00'–24°00' S and 147°00'–149°00' E. This area is within the Brigalow Belt North Bioregion (Department of Agriculture Water and the Environment, 2020b).	from three localities: Clermont, 55 km north-east of Clermont and 30 km northwest of Capella.
Rheodytes leukops	Fitzroy River Turtle	V	V	Fitzroy River Turtles (*Rheodytes leukops*) are generally attributed to fast-flowing clear freshwater rivers and rivers with large deep pools with rocky, gravelly or sandy substrates, connected by shallow riffles, commonly in association with *Eucalyptus tereticornis, Casuarina cunninghamiana, Callistemon viminalis, Melaleuca linariifolia* and *Vallisneria* sp. The bulk of the records for this species are associated with the large primary streams of the Fitzroy River system: the Nogoa, Comet, MacKenzie, Connors, Isaac, Dawson and Fitzroy Rivers (Department of Agriculture Water and the Environment, 2020b).	**Unlikely.** No suitable habitat for this species has been previously found within the Project Site and no nearby database records are available.
Birds					
Calidris ferruginea	Curlew Sandpiper	CE, M	SLC	Curlew Sandpipers (*Calidris ferruginea*) mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They occur in both fresh and brackish waters. In Australia, Curlew Sandpipers (*Calidris ferruginea*) occur around the coasts and are also quite widespread inland, though in smaller numbers (Department of Agriculture Water and the Environment, 2020b).	**Potential.** Wetlands in the north of the Project Site may provide limited suitable habitat. No records are available from previous surveys and no records from Wildlife Online or Atlas of Living Australia databases are available within 10 km. The nearest recorded inland occurrences are at Lake Maraboon, 125 km south of the Project Site.
Erythrotriorchis radiatus	Red Goshawk	V	E	The Red Goshawk (*Erythrotriorchis* radiatus) occurs mostly in extensive areas of coastal and subcoastal open forest and woodland that support a mosaic of vegetation types. The vegetation types	**Unlikely.**

Scientific Name	Common Name	EPBC Act Status[1]	NC Act Status[2]	Habitat/distribution	Likelihood of Occurrence
				include eucalypt woodland, open forest, tall open forest, gallery rainforest, swamp sclerophyll forest, and rainforest margins. Permanent water (watercourses and wetlands) is usually present in close proximity, with tall emergent trees used for nesting. The Red Goshawk (*Erythrotriorchis radiatus*) is thought to have a very large home range covering between 50 and 220 square kilometres. Sparsely distributed across coastal and sub-coastal Australia, from the western Kimberly to northern New South Wales. Appears to have been a contraction in range in recent years. Occasionally recorded from gorge country in central Australia and western Queensland (Department of Agriculture Water and the Environment, 2020b).	Suitable habitat is not present in the Project Site. No nearby records occur.
Geophaps scripta scripta	Squatter Pigeon (Southern Subspecies)	V	V	The Squatter Pigeon (*Geophaps scripta scripta*) occurs in dry grassy woodland and open forest, mostly in sandy areas close to water. Breeding and foraging habitat is centralised around water resources such as dams and creeks. This sub-species is ground-dwelling that inhabits the grassy understorey of open eucalypt woodland, as well as sown grasslands with scattered remnant trees, disturbed areas (such as roads, railways, settlements and stockyards), scrubland, and *Acacia* regrowth. This sub-species is now largely (if not wholly) restricted to Queensland, from the New South Wales border, north to the Burdekin River, west to Charleville and Longreach, and east to the coast to Townsville and Proserpine (Department of Agriculture Water and the Environment, 2020b).	**Known.** The Squatter Pigeon (Southern) (*Geophaps scripta scripta*) was recorded in the Project Site by SKM (2012) and AECOM (2017). Essential Habitat for the species has been mapped in the north of Project Site surrounding an existing record.
Grantiella picta	Painted Honeyeater	V	V	The Painted Honeyeater (*Grantiella picta*) occurs in dry forests and woodlands, where its primary food is mistletoes in the genus *Amyema*, though it will also take some nectar and insects. It is also known to occur in riparian woodland communities dominated by eucalypt species such as *Eucalyptus camaldulensis*, although its breeding distribution is dictated by the presence of mistletoes which are largely restricted to older trees.	**Potential.** Broad habitat types for this species exist within riparian zones however mistletoes on which they depend for a feeding resource were rare. A recent record of the Painted Honeyeater (*Grantiella picta*) occurs in a property adjacent to Saraji.

Scientific Name	Common Name	EPBC Act Status[1]	NC Act Status[2]	Habitat/distribution	Likelihood of Occurrence
				The species is sparsely distributed from south-eastern Australia to north-western Queensland and eastern Northern Territory. The greatest concentrations and almost all records of breeding come from south of 26º S, on inland slopes of the Great Dividing Range between the Grampians, Victoria and Roma, Queensland (Department of Agriculture Water and the Environment, 2020b).	
Neochmia ruficauda ruficauda	Star Finch (Eastern)	E	E	The Star Finch (Eastern) (*Neochmia ruficauda* ruficauda) occurs mainly in grasslands and grassy woodlands that are located close to bodies of fresh water. It also occurs in cleared or suburban areas such as along roadsides and in towns. Studies at nine former sites of the Star Finch (Eastern) (*Neochmia ruficauda* ruficauda) found that the habitat consisted mainly of woodland. These habitats are dominated by trees that are typically associated with permanent water or areas that are regularly inundated; the most common species are *Eucalyptus coolabah*, *Eucalyptus tereticornis*, *Eucalyptus tessellaris*, *Melaleuca leucadendra*, *Eucalyptus camaldulensis* and *Casuarina cunninghamii.* Based on the small number of accepted records, the distribution of this species formerly extended from Bowen in central Queensland, south to the Namoi River in northern New South Wales, and west to the Blackall Range. Recent records have been obtained only from scattered sites in central Queensland (i.e. between 21°S and 25°S, and 141°E and 150°E) and, consequently, the Star finch (eastern) (*Neochmia ruficauda* ruficauda) now appears to be extinct in both south-eastern Queensland and northern New South Wales (Department of Agriculture Water and the Environment, 2020b).	**Unlikely.** Suitable habitat occurs within the Project Site however no confirmed sightings of this species have been made since 1995.
Poephila cincta cincta	Southern Black-throated Finch	E	E	The Black-throated Finch's (Southern) (*Poephila cincta* cincta) preferred habitat is grassy open woodland/forest dominated by *Eucalyptus*, *Melaleuca* or *Acacia*, but they are also known from pandanus flats and scrubby plains. The Black-throated Finch (Southern) (*Poephila cincta* cincta) feeds on the seed of native grasses from the ground. Three resources are required for the species to persist: water, grass seeds and trees providing suitable	**Unlikely.** Suitable habitat occurs within the Project Site; however, this species is now restricted to three key sites within Queensland. No nearby records occur.

Scientific Name	Common Name	EPBC Act Status[1]	NC Act Status[2]	Habitat/distribution	Likelihood of Occurrence
				habitat. If any of these three resources are not available, Black-throated Finch (Southern) (*Poephila cincta* cincta) is unlikely to be present. Since 1998, birds likely to be of the southern subspecies have been recorded at the following sites: Townsville and its surrounds; Ingham, and sites nearby; and scattered sites in central-eastern Queensland (Great Basalt Wall, Yarrowmere Station, Moonoomoo Station, Doongmabulla Station, Fortuna Station and Aramac) (Department of Agriculture Water and the Environment, 2020b).	
Rostratula australis	Australian Painted Snipe	E	V	Preferred habitat includes shallow inland wetlands, brackish or freshwater, that are permanently or temporarily inundated. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum Muehlenbeckia or canegrass or sometimes *Melaleuca* (*T*ea-tree). Breeding habitat requirements may be quite specific: shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby. This species has been recorded from wetlands in all Australian states, however is most common in eastern Australia, especially the Murray-Darling Basin. Individuals are nomadic, and there is some evidence of partial migration from south-eastern wetlands to coastal central and northern Queensland in autumn and winter (Department of Agriculture Water and the Environment, 2020b).	**Known.** This species was observed from an area of flooded *Acacia harpophylla* (Brigalow) woodland within the Project Site during SKM surveys in 2007.
Falco hypoleucos	Grey Falcon	-	V	Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. The species is mainly found where annual rainfall is less than 500 mm, except when wet years are followed by drought, when the species becomes more widespread. There is some evidence of regular movements, probably mostly of immatures, during the non-breeding season toward northern and coastal areas	**Known**. Recorded on Saraji Mine by EcoServe, 2005.

Scientific Name	Common Name	EPBC Act Status[1]	NC Act Status[2]	Habitat/distribution	Likelihood of Occurrence
				The species appears to be absent from Cape York Peninsula, areas east of the Great Dividing Range in Queensland and New South Wales.	
Mammals					
Dasyurus hallucatus	Northern Quoll	E	-	The Northern Quoll (*Dasyurus hallucatus*) occupies a diversity of habitats across its range which includes rocky areas, eucalypt forest and woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert. Northern quoll are also known to occupy non rocky lowland habitats such as beachscrub communities in central Queensland. Northern Quoll (*Dasyurus hallucatus*) habitat generally encompasses some form of rocky area for denning purposes with surrounding vegetated habitats used for foraging and dispersal. In Queensland, the Northern Quoll (*Dasyurus hallucatus*) is known to occur as far south as Gracemere and Mount Morgan, south of Rockhampton, as far north as Weipa in Queensland and extends as far west into central Queensland to the vicinity of Carnarvon Range National Park (Department of Agriculture Water and the Environment, 2020b).	**Unlikely.** Limited suitable habitat for this species has been previously identified in the Project Site in the form of open woodland with ground timber; however, these areas are isolated and are unlikely to support a population of Northern Quoll (*Dasyurus hallucatus*). The closest record is from 1969, located approximately 60 km south-east of the Project Site.
Macroderma gigas	Ghost Bat	V	V	The Ghost Bat (*Macroderma gigas*) currently occupies habitats ranging from the arid Pilbara to tropical savanna woodlands and rainforests. During the daytime they roost in caves, rock crevices and old mines. Roost areas used permanently are generally deep natural caves or disused mines with a relatively stable temperature of 23°−28°C and a moderate to high relative humidity of 50−100%. Most of the colony disperses (up to 150 km) from permanent roosts during the non-breeding season in the cooler months. During this time this species use large numbers of caves, rock shelters, overhangs, vertical cracks, and mines during the year as day roosts. This species is recorded from a wide range of habitats from rainforest, monsoon and vine scrub in the tropics to open woodlands and arid areas.	**Unlikely.** Suitable roosting habitat does not exist within the Project Site; however, some potential habitat may exist within rocky outcrops to the west of ML 1775. As this species is known to forage up to several kilometres from roost sites, the Project Site may provide suitable foraging habitat. Nonetheless, no database records are available from Wildlife Online or Atlas of Living Australia within 50 km of the Project Site.

Scientific Name	Common Name	EPBC Act Status[1]	NC Act Status[2]	Habitat/distribution	Likelihood of Occurrence
				In Queensland this species is currently distributed in only 4-5 highly disjunct populations along the coast and inland from the McIlwraith Range in Cape York to Rockhampton. The major colony occurs at Mount Etna (Department of Agriculture Water and the Environment, 2020b).	
Nyctophilus corbeni	South-eastern Long-eared Bat	V	V	The South-eastern Long-eared Bat (*Nyctophilus corbeni*) is found in a wide range of inland woodland vegetation types. These include box/ironbark/cypress pine woodlands, *Allocasuarina luehmannii* woodlands, *Acacia harpophylla* woodland, *Casuarina cristata* woodland, *Angophora costata* woodland, *Eucalyptus camaldulensis* forest, *Eucalyptus largiflorens* woodland, and various types of tree mallee. This species is more abundant in extensive stands of vegetation in comparison to smaller woodland patches. The South-eastern Long-eared Bat (*Nyctophilus corbeni*) is found in southern central Queensland, central western New South Wales, north-western Victoria and eastern South Australia, where it is patchily distributed, with most of its range in the Murray Darling Basin. Most records are from inland of the Great Dividing Range (Department of Agriculture Water and the Environment, 2020b).	**Unlikely.** Although some suitable habitat does exist within the Project Site, the Project Site is outside of the known distribution. No Wildlife Online or Queensland Museum database records.
Petauroides volans	Greater Glider	V	-	During the day, this species spends most of its time denning in hollowed trees, with each animal inhabiting up to twenty different dens within its home range. It is primarily folivorous, with a diet mostly comprising the leaves and flowers of Myrtaceae (e.g. eucalypt) trees. The Greater Glider (*Petauroides volans*) is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The Greater Glider (*Petauroides volans*) is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria, with an elevational range from sea level to 1200 m above sea level. An isolated inland subpopulation occurs in the Gregory Range west of Townsville, and another in the Einasleigh (Department of Agriculture Water and the Environment, 2020b).	**Known.** Greater Glider (*Petauroides volans*) was located in mature *Eucalyptus camaldulensis* (River Red Gum) woodlands fringing Phillips Creek in the south of the Project Site by SKM (2012) and a total of 19 records were made along Boomerang Creek, Hughes Creek and in adjacent *Eucalyptus* and *Corymbia* open woodland by AECOM (2020). Several records are available from Atlas of Living Australia approximately 10 km west of the Project Site and the species was recorded

Scientific Name	Common Name	EPBC Act Status[1]	NC Act Status[2]	Habitat/distribution	Likelihood of Occurrence
					from Peak Downs Mine East to the north of the Project Site by AECOM in 2018.
Phascolarctos cinereus	Koala	V	V	Koalas (*Phascolarctos cinereus*) inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by species from the genus *Eucalyptus*. Koalas (*Phascolarctos cinereus*) eat a variety of eucalypt leaves and a few other related tree species, including *Lophostemon*, *Melaleuca* and *Corymbia* species. Koalas (*Phascolarctos cinereus*) are found in higher densities where food trees are growing on more fertile soils and along watercourses. They do, however, remain in areas where their habitat has been partially cleared and in urban areas. In Queensland, the Koala's (*Phascolarctos cinereus*) distribution extends inland from the east coast: from the Wet Tropics interim biogeographic regionalisation of Australia bioregion, into the Einasleigh Uplands bioregion; from the Central Mackay Coast bioregion, through the Brigalow Belt North bioregion to the Desert Uplands and Mitchell Grass Downs bioregions, and from the South-east Queensland bioregion, through the Brigalow Belt to the Mulga Lands and Channel Country bioregions in the southwest of the state (Department of Agriculture Water and the Environment, 2020b).	**Known.** One Koala (*Phascolarctos cinereus*) was recorded within the Project Site during the AECOM 2020 survey and two records also exists directly adjacent to the Project Site from previous surveys. One record of Koala (*Phascolarctos cinereus*) is also available from Atlas of Living Australia (2014); approximately 4 km west of the Project Site. Suitable habitat is widely available in communities dominated by *Corymbia* and *Eucalyptus* species.
Pteropus poliocephalus	Grey-headed Flying-fox	V	-	Grey-headed Flying-foxes (*Pteropus poliocephalus*) occupy the coastal lowlands and slopes of south-eastern Australia from Bundaberg to Geelong and are usually found at altitudes < 200 m. Areas of repeated occupation extend inland to the tablelands and western slopes in northern New South Wales and the tablelands in southern Queensland. Grey-headed Flying-foxes (*Pteropus poliocephalus*) require a continuous sequence of productive foraging habitats, the migration corridors or stopover habitats that link them, and suitable roosting habitat within nightly commuting distance of foraging areas. Areas supporting these characters are considered to be habitat critical to the	**Unlikely.** The Project Site is approaching the western limit of the species' range and no records are available within 100 km.

Scientific Name	Common Name	EPBC Act Status[1]	NC Act Status[2]	Habitat/distribution	Likelihood of Occurrence
				survival of the Grey-headed Flying-fox (*Pteropus poliocephalus*) (Department of Agriculture Water and the Environment, 2020b).	
Tachyglossus aculeatus	Short-beaked Echidna	-	SLC	Short-beaked Echidnas (*Tachyglossus aculeatus*) are usually found among rocks, in hollow logs and in holes among tree roots. During rainy or windy weather they often burrow into the soil or shelter under bushes and tussocks of grass. They are Australia's most widespread native mammal, being found in almost all habitats, from snow covered mountains to deserts. They are also common in urban areas, although their camouflage can make them very difficult to see.	**Known**. Short-beaked Echidna (*Tachyglossus aculeatus*) was recorded within the Project Site during the SKM field survey in 2007 and is known within the region from ALA records. The species does not have specialised habitat requirements, other than a sufficient food supply of ants and termites. They can persist in modified landscapes where felled timber provides a source of insects.
Fish					
Maccullochella peelii	Murray Cod	V	-	Murray Cod (*Maccullochella peelii*) are frequently found in the main channels of rivers and larger tributaries. This species is, therefore, considered a main-channel specialist. Preferred microhabitat consists of complex structural features in streams such as large rocks, snags (pieces of large submerged woody debris), overhanging stream banks and vegetation, tree stumps, logs, branches and other woody structures. The natural distribution of the Murray Cod (*Maccullochella peelii*) is within the Murray-Darling Basin extending from southern Queensland through the south-eastern states and territories. Within Queensland, many attempts at translocation have resulted in some introduced populations existing in the Burnett and Fitzroy River basins and the Cooper Creek system (Department of Agriculture Water and the Environment, 2020b).	**Unlikely.** The Project Site is not within the natural distribution of the species or the known areas of introduced populations. No records are available within 20 km of the Project Site.

[1] Conservation status under the EPBC Act: CE (critically endangered), E (endangered), V (vulnerable), Mi (migratory)

[2] Conservation status under the NC Act: E (endangered), V (vulnerable), NT (near threatened), SLC (special least concern)

5.1.3.2 Listed migratory species

Fourteen migratory fauna species listed under the EPBC Act were identified in the database search results and literature review for the Project Site. These species were evaluated to determine which species are known, likely, potential, unlikely or no potential to occur within the Project Site. This evaluation was based on an understanding of the preferred habitats of the species, knowledge of the type and condition of habitats present at the Project Site, and the results of previous Saraji Mine fauna surveys (e.g. SKM). These evaluations are presented in Table 22.

Out of the fourteen species, four have been recorded by EcoServe in 2005 during surveys of the Saraji Mine. These species are considered to be ‘known’ occurrences.

The full list of database search results is provided in Appendix A.

Table 22 Listed Migratory Species Potentially Occurring within the Project Site

Scientific Name	Common Name	EPBC Status [1]	NCA Status [2]	Habitat/distribution	Likelihood of Occurrence
Apus pacificus	Fork-tailed Swift	Mi	SLC	Fork-tailed Swift (*Apus pacificus*) primarily occurs over inland plains but is known to utilise diverse habitat from coastal foothills, cliffs, beaches, urban areas, riparian woodland, heathland, treeless grassland, spinifex covered sandplains, open farmland, dunes, low scrub, heathland, saltmarsh and tea-tree swamps (DEE, 2016b). The species is found across northern Australia and may use wooded areas and open plains within the Project Site. Aerial only. Non-breeding habitat only.	**Known.** Previously recorded over Saraji Mine. The species may forage and disperse over the Project Site, however the species does not breed in Australia.
Actitis hypoleucos	Common Sandpiper	Mi	SLC	The Common Sandpiper (*Actitis hypoleucos*) is known to occur in a range of wetland environments, both coastal and inland. Their primary habitat is rocky shorelines and narrow muddy margins of billabongs, estuaries and mangroves. Found along all coastlines of Australia and in many areas inland, the Common Sandpiper (*Actitis hypoleucos*) is widespread in small numbers. The population when in Australia is concentrated in northern and western Australia.	**Unlikely.** Small areas of marginal foraging habitat occur within farm dams. The closest record is from 50 km south east of the Project Site.
Calidris acuminata	Sharp-tailed Sandpiper	Mi	SLC	The Sharp-tailed Sandpiper (*Calidris acuminata*) inhabits the shallow, muddy edges of a range of wetlands in fresh and brackish waters. These include billabongs, soaks, bore swamps, lakes and sewage farms inland and coastal lakes, swamps and lagoons (DoEE, 2017f; Morcombe, 2004).	**Potential**. Records indicate the species is predominately recorded in coastal areas or recorded at large wetlands, however marginal foraging habitat is present within wetlands in the Project Site and a record from a dam at Peak Downs Mine is available.

Scientific Name	Common Name	EPBC Status [1]	NCA Status [2]	Habitat/distribution	Likelihood of Occurrence
Calidris ferruginea	Curlew Sandpiper	Mi, CE	SLC	Inhabits intertidal mudflats of estuaries, lagoons, mangrove channels in sheltered coastal areas. Recorded inland around ephemeral and permanent lakes, dams, waterholes.	**Potential.** Wetlands in the north of the Project Site may provide limited suitable habitat. No records are available from previous surveys and no records from Wildlife Online or Atlas of Living Australia databases are available within 10 km. The nearest recorded inland occurrences are at Lake Maraboon, 125 km south of the Project Site.
Calidris melanotos	Pectoral Sandpiper	Mi	SLC	This species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. In Queensland, most records for the Pectoral Sandpiper (*Calidris melanotos*) occur around Cairns. There are scattered records elsewhere, mainly from east of the Great Divide between Townsville and Yeppoon. Records also exist in the south-east of the state as well as a few inland records at Mount Isa, Longreach and Oakley.	**Unlikely.** Small areas of marginal habitat are available within farm dams and wetlands, closest record is approximately 50 km south east of the Project Site
Cuculus optatus	Oriental Cuckoo	Mi	SLC	The Oriental Cuckoo (*Cuculus optatus*) is known from monsoon forest, rainforest edges, vine scrub, riverine thickets, wetter, densely canopied eucalypt forest, paperbark swamp and mangroves (Morcombe, 2004). This species does not breed in Australia.	**Unlikely.** Habitat within the Project Site is generally not suitable for the species. No records are available from previous surveys and no nearby records from Wildlife Online or Atlas of Living Australia..
Gallinago hardwickii	Latham's Snipe	Mi	SLC	In Australia, Latham's Snipe (*Gallinago hardwickii*) occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit a variety of freshwater or brackish wetlands, preferring to be close to protective vegetation cover. Latham's Snipe (*Gallinago hardwickii*) is a non-breeding visitor to south-eastern Australia, and is a passage migrant through northern Australia. The range extends inland over the eastern tablelands in south-eastern Queensland (and occasionally from Rockhampton in the north), and to west of the Great Dividing Range in New South Wales.	**Known** Previously recorded from Saraji Mine by EcoServe in 2005. Small patches of suitable habitat may be available within the Project Site. No nearby records are available from Wildlife Online or Atlas of Living Australia databases within 10 km.

Scientific Name	Common Name	EPBC Status [1]	NCA Status [2]	Habitat/distribution	Likelihood of Occurrence
Hirundapus caudacutus	White-throated Needletail	Mi	SLC	Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. In eastern Australia, it is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains.	**Known** Previously recorded in the airspace over Saraji Mine. The species is almost exclusively aerial and does not breed in Australia. It may use the airspace above the Project Site for foraging and dispersal.
Hydroprogne caspia	Caspian Tern	Mi	SLC	The Caspian Tern (*Hydroprogne caspia*) is mostly found in sheltered coastal embayments (harbours, lagoons, inlets, bays, estuaries and river deltas) and those with sandy or muddy margins are preferred. They also occur on near-coastal or inland terrestrial wetlands that are either fresh or saline, especially lakes (including ephemeral lakes), waterholes, reservoirs, rivers and creeks. Widespread in coastal regions from the southern Gulf of Carpentaria to the Torres Strait, and along the eastern coast. Recorded in the western districts, especially the Lake Eyre Drainage Basin, north-west to the Gulf Country north of Mt Isa and Cloncurry, there are also scattered records for central Queensland.	**Known.** Previously observed at Saraji Mine foraging over the evaporation dam on the eastern side of the mining lease. This species is likely to occur over suitable wetland habitat and dams
Monarcha melanopsis	Black-faced Monarch	Mi	SLC	The species can be found in wet forest specialist, found mainly in rainforest and wet sclerophyll forest, especially in sheltered gullies and slopes with a dense understorey of ferns and shrubs' (DoE, 2015b). In Queensland, it is widespread from the islands of the Torres Strait and on Cape York Peninsula, south along the coasts (occasionally including offshore islands) and the eastern slopes of the Great Divide, to the New South Wales border	**No**. No suitable habitat occurs within the Project Site and no nearby Wildlife Online or Atlas of Living Australia database records exist.
Motacilla flava	Yellow Wagtail	Mi	SLC	Yellow Wagtail (*Motacilla flava*) are known from open country near swamp margins, sewage ponds, salt marshes, grassed surroundings of airfields and rarely on drier inland plains (Morcombe, 2004). Do not breed in Australia.	**Unlikely**. No nearby Wildlife Online or Atlas of Living Australia database records and no records from previous surveys. Suitable habitat is not available within the Project Site.

Scientific Name	Common Name	EPBC Status [1]	NCA Status [2]	Habitat/distribution	Likelihood of Occurrence
Myiagra cyanoleuca	Satin Flycatcher	Mi	SLC	In Queensland, it is widespread but scattered in the east, being recorded on passage on a few islands in the western Torres Strait. It is patchily recorded on Cape York Peninsula, from the Cape south to a line between Aurukun and Coen. The species is more widespread farther south, though still scattered, from Musgrave Station, mostly in coastal areas, but also on the Great Divide, and occasionally further west (Blakers *et al.* 1984). Satin Flycatchers (*Myiagra cyanoleuca*) are widespread in south-eastern Queensland, in the area from Fraser Island, west to Goombi and south to the NSW border.	**Unlikely**. No nearby Wildlife Online or Atlas of Living Australia database records. The Satin Flycatcher (*Myiagra cyanoleuca*) may occur in eucalypt and riparian woodlands across the Project Site.
Pandion haliaetus	Osprey	Mi	SLC	This species is found along coastlines, estuaries, lagoons, reefs, rock cliffs, bays, inlets, islands and other areas surrounding water. The species range extends from Esperance in Western Australia to NSW, where records become scarcer towards the south, and into Victoria and Tasmania, where the species is a rare vagrant.	**Unlikely**. No nearby Wildlife Online or Atlas of Living Australia database records. No suitable habitat appears available within the Project Site.
Tringa nebularia	Common Greenshank	Mi	SLC	Species is found inland in floodplains, swamps, lakes, permanent and temporary wetlands. The species is widespread in the Gulf country and eastern Gulf of Carpentaria. It has been recorded in most coastal regions, possibly with a gap between north Cape York Peninsula and Cooktown. Inland, there have been a few records south of a line from near Dalby to Mt Guide, and sparsely scattered records elsewhere	**Potential**. Several small wetlands are present within the Project Site which may be utilised by this species. It has not been identified in previous surveys however a record does exist from Atlas of Living Australia at the Peak Downs tailings dam north of the Project Site.

[1] Conservation status under the EPBC Act: CE (critically endangered), Mi (migratory)

[2] Conservation status under the NC Act: SLC (Special Least Concern).

5.1.4 Historical ecological reports

BMA has previously undertaken a series of ecological assessments for development and management of the existing Saraji Mine. A total of 282 terrestrial vertebrate fauna species have been recorded from the habitats of Saraji Mine from previous studies (WBM 1999; WBM 2002; WBM 2003; EcoServe 2005; EcoServe, 2006), including 47 mammal, 48 reptile, 21 frog and 166 bird species.

Fauna surveys undertaken in 2006, 2008 and 2009 identified three conservation significant, migratory or otherwise significant fauna species. A Koala (*Phascolarctos cinereus*) was observed within riparian vegetation along Lake Lester and Plumtree Creek. A Squatter Pigeon (*Geophaps scripta scripta*) was recorded on the entrance track to the Lisgard area of Saraji Mine and a pair of Caspian Terns (*Hydroprogne caspia*) were observed foraging over the evaporation dam on the eastern side of Saraji Mine. (EcoServe 2006, 2008, 2009).

5.2 Field survey results

5.2.1 Fauna habitats

The habitat landscape within the Project Site has been significantly altered from its original state; the majority of the area is cleared for grazing land and improved pasture. The current habitat landscape comprises cleared grazing land dominated by the exotic grass species *Cenchrus ciliaris** (Buffel Grass) traversed by narrow remnants of riparian woodlands. There are larger patches of remnant woodlands in the northern section of the Project Site, connected to more extensive areas of habitat to the north. Fauna habitat that does persist has been subject to disturbance from cattle grazing, selective clearing, weeds and pests. This has led to a general lack of native understorey growth in the remnant woodlands. However, thinning has resulted in an accumulation of ground habitats in the form of logs and large branches. Despite signs of habitat degradation, several fauna habitat values exist.

Nine distinct habitat types were recorded within the Project Site (Table 23; Figure 14). A description of these communities and the key fauna habitat opportunities are provided below.

Table 23 Fauna habitat types within the Project Site

Habitat Type	Habitat Summary	Analogous Res	Project Site (ha)	Project Footprint (ha)
1	River Red Gum Riparian Woodland	11.3.25	192.08	79.60
2	*Eucalyptus* and/or *Corymbia* Open Woodland	11.3.2, 11.3.4, 11.4.13; 11.5.3	1,876.30	924.91
3	Dawson Gum and Brigalow Woodland	11.4.8	322.16	236.02
4	Brigalow or Belah Woodland	11.3.1, 11.4.9	204.33	39.15
5	Oxbow Wetland	11.3.27b	16.64	11.17
6	Natural Grasslands	11.4.4	1.73	0.075
7	Modified Grasslands	Non-remnant	6,252.43	1,229.62
8	Shrubby Brigalow regrowth with Gilgai	Non-remnant	1,776.14	652.63
9	Dams	Non-remnant	107.66	70.72

5.2.1.1 River red gum riparian woodland

This habitat type comprises alluvial riparian forest, analogous with RE 11.3.25 along the major creeks and drainage lines, including Boomerang Creek, Plumtree Creek, Hughes Creek, One Mile Creek and Phillips Creek. This community is defined by a tall, open canopy of *Eucalyptus camaldulensis* (River Red Gum), over a mid-storey of *Casuarina cunninghamiana* (River She-oak), *Corymbia tessellaris* (Moreton Bay Ash) and *Melaleuca fluviatilis* with an abundance of grasses along the stream banks. Large, mature *Eucalyptus camaldulensis* (River Red Gum) present in riparian habitats frequently contain hollow limbs which provide denning sites for arboreal mammals and microchiropteran bat species and nesting sites for many bird species such as parrots and owls. Notably two threatened

species were recorded in this habitat, the Greater Glider (*Petauroides volans*) and Koala (*Phascolarctos cinereus*).

This community also acts as a food source for insectivorous and nectivorous birds and mammals. Where this habitat forms a continuous corridor, it constitutes a route for migratory and dispersing fauna of all types. Ground timber, high ground cover and decorticating bark also provide habitat opportunities for reptiles and ground-dwelling mammals.

Seasonal inundation and flow along the creeks and their tributaries also provides habitat and breeding sites for aquatic or semi-aquatic species such as frogs and their predators such as snakes. Four amphibians were recorded in this habitat type including Ornate Burrowing Frog (*Platyplectrum ornatum*), Short-footed Frog (*Cyclorana brevipes*) and the invasive Cane Toad (*Bufo marinus**) which was noted in large numbers along Phillips Creek. A Keelback Snake (*Tropidonophis mairii*) was observed hunting Cane Toads (*Bufo marinus**) in the dry creek bed of Phillips Creek and a Common Tree Snake (*Dendrelaphis punctulata*) was also recorded in this habitat.

5.2.1.2 Eucalyptus and/or Corymbia open woodland

This habitat type occupied large areas of remnant woodland in the north and centre of the Project Site with smaller isolated patches in the south. It is analogous with REs 11.3.2, 11.3.4, 11.5.3 and 11.4.13. This community is defined by a canopy comprising Myrtaceous tree species including *Eucalyptus populnea* (Poplar Box), *Eucalyptus orgadophila* (Mountain Coolibah), *Corymbia dallachiana* (Ghost Gum), *E. melanophloia* (Silver-leaved Ironbark), *Corymbia clarksoniana, Corymbia tessellaris* (Moreton Bay Ash) and *Corymbia erythrophloia* (Variable-barked Bloodwood). The lower tree layer is sparse primarily due to the cattle damage while the ground layer typically displayed high cover of native and exotic grass species and low shrubs (i.e. *Carissa ovata* (Currant Bush)).

Eucalyptus populnea (Poplar Box) readily forms hollows and hollows in stags were also common where *Eucalyptus orgadophila* (Mountain Coolibah) dominates. As a result, many trees within these communities possessed one or more such habitat features. Despite this, arboreal mammal diversity was found to be relatively low in this habitat type with the exception of microchiropteran bat species which were regularly recorded.

A Koala (*Phascolarctos cinereus*) record also occurs in this habitat type within Downs Creek, downstream of the Project Site. Thinning of this community has resulted in an accumulation of fallen timber, including large branches and logs, which provide habitat opportunities for reptiles and ground mammals.

Opportunities exist for a range of birds in this habitat include foraging habitat for foliage-gleaners, nectar feeders and raptors. Raptors including Wedge-tailed Eagle (*Aquila audax*) and Pacific Baza (*Aviceda subcristata*) were observed soaring above or perched in the canopy and Brolgas (*Grus rubicunda*) and Emu (*Dromaius novaehollandiae*) were also noted moving through the ground layer in this habitat type.

5.2.1.3 Dawson gum and brigalow woodland

This community is analogous with RE 11.4.8 and occurs as fragmented patches across the Project Site. It comprises an open canopy of *Eucalyptus cambageana* (Dawson Gum) with a lower tree layer of *Acacia harpophylla* (Brigalow) and *Lysiphyllum carronii* (Queensland Ebony), and a relatively diverse shrub layer. This community typically features a mid-dense shrub layer that is attractive to woodland bird species. Hollows form in large *Eucalyptus cambageana* (Dawson Gum) and stags which provide valuable habitat for arboreal mammals, microchiropteran bats, parrots and owls. Habitat logs, ground timber and decorticating bark were common and leaf litter cover was typically high, providing habitat resources for reptiles and amphibians. Like the majority of habitat found within the Project Site, these communities are heavily impacted by cattle. The presence of cattle and *Cenchrus ciliaris** (Buffel Grass) may deter some ground fauna from utilising these areas.

5.2.1.4 Brigalow or Belah woodland

This community occurs as small, fragmented patches across the Project Site and is analogous with RE 11.3.1 and RE 11.4.9.

Acacia harpophylla (Brigalow) or *Casuarina cristata* (Belah) forms a closed canopy often with emergent eucalypt species. Structural complexity was typically high with well-defined shrub and ground layers. Microhabitat features typically include high leaf litter cover, grass tussocks, ground timber and habitat logs. Gilgai formation was observed in some areas and cracking clay also provides

opportunities for some amphibian and reptile species including the vulnerable Ornamental Snake (*Denisonia maculata*). During years of high rainfall or after the wet season, Gilgai depressions fill with and maintain water which in turn fosters an increase in local biodiversity (i.e. frogs, snakes, aquatic vegetation and birds).

In the survey area patches of this habitat type were generally small, fragmented and heavily degraded by cattle grazing. They were also found to be generally low in fauna diversity. However, these areas traditionally offer refuge for a number of species that are typically associated with this community.

5.2.1.5 Oxbow wetland

This habitat type was found in several open and vegetated freshwater bodies in the north-east of the Project Site and is analogous with RE 11.3.27b. It is a fringing woodland and sedgeland dominated by *Eucalyptus camaldulensis* (River Red Gum) and *Lophostemon grandiflorus* (Swamp Box). This riparian community was noted to provide habitat opportunities for all fauna groups with hollows, flowering canopy trees, grassy banks, decorticating bark and ground timber observed. Large, mature *Eucalyptus camaldulensis* (*R*iver Red Gum) present in this habitat type frequently contain hollows in trunks and limbs which provide denning sites for arboreal mammals and microchiropteran bats (nine species recorded) and nesting sites for many bird species such as parrots and owls. Further, tree hollows provide refuge and access to arboreal prey species targeted by reptiles such as arboreal snakes and monitors. Hollows in live trees also provide a stable moist environment, thermal conditions which may be beneficial to some reptile species (Fitzgerald *et al.*, 2010). Flowering canopy *Eucalypts* are also likely to support foraging birds and flying foxes, including the little Red Flying-fox (*Pteropus scapulatus*) which was recorded within this habitat.

This community provides suitable habitat for amphibians and a permanent water resource for macropods, with both detected during spotlighting and observational surveys. Two amphibian species were observed within this habitat including the Bumpy Rocket Frog (*Litoria inermis*) and Desert Tree Frog (*Litoria rubella*). The complex in stream habitat, including aquatic vegetation and woody debris, provided abundant foraging and breeding habitat opportunities. Two Eastern Brown Snakes (*Pseudonaja textilis*) were also observed exhibiting courting behaviour (Plate 8) on a farm track adjacent to the wetland.

Water bodies in the area, both natural and artificial, are attractive as watering points for woodland bird species and provide habitat for a number of waterbird and frog species. Waterbirds noted using this habitat included Little Pied Cormorant (*Phalacrocorax melanoleucos*) and Australian Pelican *(Pelecanus conspicillatus*) and woodland bird species which show preference for areas in close proximity to waterbodies included Rainbow Bee-eater (*Merops ornatus*) and Dollarbird (*Eurystomus orientalis*). Nocturnal predatory birds were also noted using this habitat (Southern Boobook (*Ninox boobook*); Tawny Frogmouth (*Podargus strigoides*)) with suitable amphibian, insect and bat prey species widely available.

Although not noted during surveys, such permanent waterbodies in the area are also important in promoting the survival and proliferation of feral animals such as Feral Pig (*Sus scrofa**) and Cane Toad (*Bufo marinus**).

Plate 8 Eastern Brown Snakes (*Pseudonaja textilis*) observed adjacent to oxbow wetland

5.2.1.6 Natural grasslands

This community occurs as a small patch in the middle of the Project Site mapped as RE 11.4.4, and comprises a mixture of native grasses and herbs on black clay. Although no detailed fauna surveys were conducted in this area, common bird species such as Torresian Crow (*Corvus orru*), Magpie-lark (*Grallina cyanoleuca*) and Whistling Kite (*Haliastur sphenurus*) were noted using this community. Notably a large herd of Feral Pigs (*Sus scrofa**) was recorded moving through the grassland and some previous pig damage was evident.

5.2.1.7 Modified grasslands

The grasslands found within the Project Site mostly exist as a relic from clearing practices and form the largest community type (approximately 64% of the Project Site). The introduced pasture species *Cenchrus ciliaris** (Buffel Grass) dominates much of this community, although patches of native grasses still exist in places. *Cenchrus ciliaris** (Buffel Grass) does not provide preferred habitat for native ground fauna. However, the modified grasslands support a range of larger mammal species such as the Grey Kangaroo (*Macropus giganteus*) and specialist grassland bird species such as the Nankeen Kestrel (*Falco cenchroides*), Tawny Grassbird (*Megalurus timoriensis*) and the Australasian Pipit (*Anthus novaeseelandiae*). The presence of native grasses found in isolated patches (as described in Natural grasslands above) in the southern area of the Project Site would typically offer better habitat values for native dasyurids, murids and herpetofauna.

In some areas gilgai micro-relief and cracking clays are present. This provides suitable habitat for frog species and the vulnerable Ornamental Snake (*Denisonia maculata*).

Plate 9 Modified grasslands typical of the Project Site

5.2.1.8 Shrubby brigalow regrowth with gilgai

Patches of shrubby *Acacia harpophylla* (Brigalow) and *Eucalyptus cambageana* (Dawson Gum) regrowth exist throughout Project Site, ranging from 0.5 m to 5 m in height. Microhabitat features include ground timber accumulation where clearing has taken place with some leaf litter, grass tussocks and gilgai. Where cracking clay and gilgai are present opportunities for reptile and amphibian species such as Green Tree Frog (*Litoria caerulea*) (Plate 11) and the vulnerable Ornamental Snake (*Denisonia maculata*) exist. Ornamental Snake (*Denisonia maculata*) was recorded in this habitat type by AECOM in 2020 and by SKM after rainfall.

Weed disturbance was found to be high in this habitat type and patches were often found to be heavily disturbed by feral animals such as Feral Pig (*Sus scrofa**) and livestock (Cattle (*Bos taurus**)).

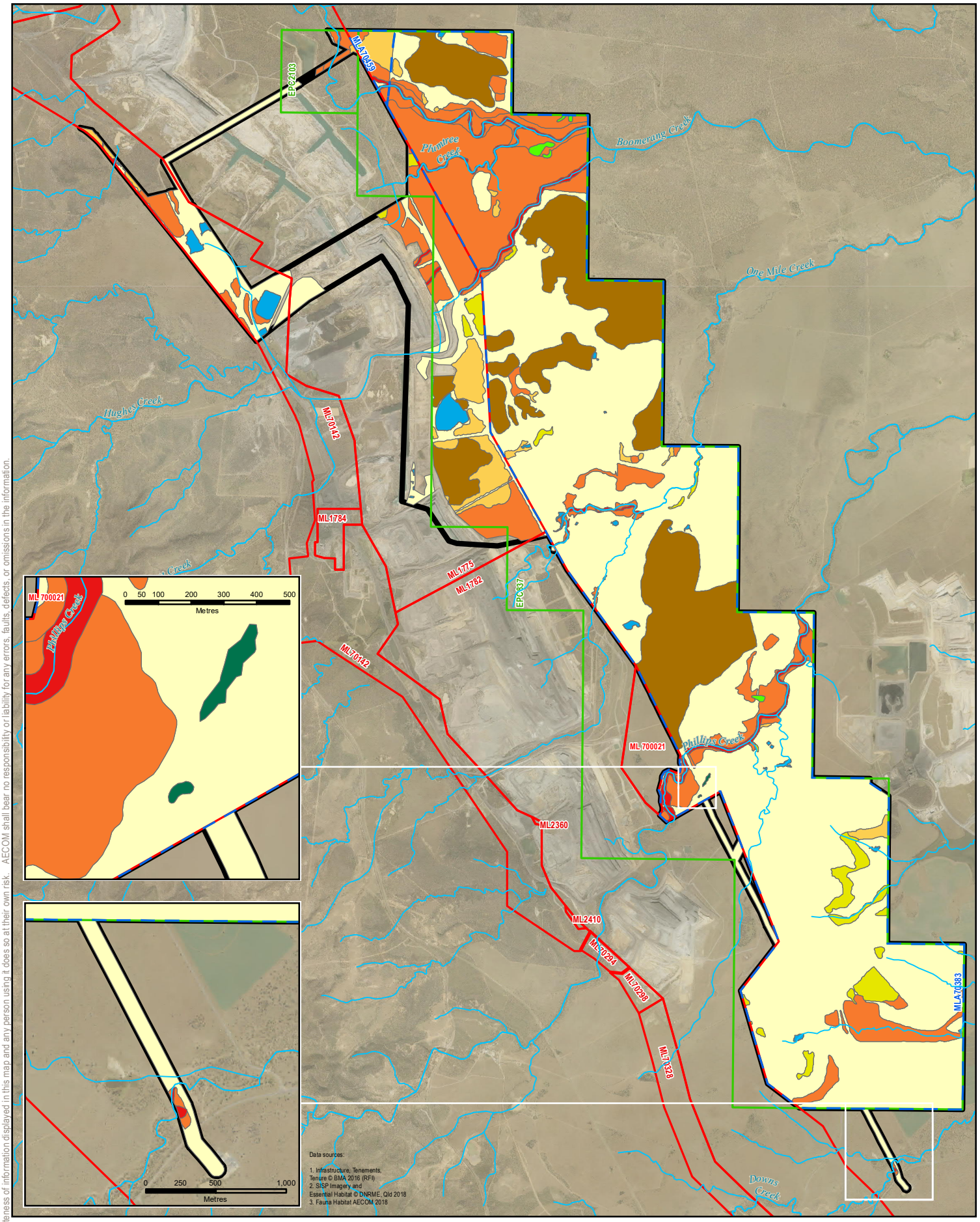
Plate 10 ***Acacia harpophylla*** **(Brigalow) regrowth with gilgai within the Project Site**

Plate 11 **Green Tree Frog (*Litoria caerulea*) taking refuge in an Eastern Grey Kangaroo (*Macropus giganteus*) track in gilgai within regrowth *Acacia harpophylla* (Brigalow)**

5.2.1.9 Dams

This habitat type is characterised by open water bodies with limited aquatic vegetation, exposed mud and cattle impacts. As all watercourses within the Project Site are ephemeral and natural waterholes are uncommon, farm dams (and mine dams) act as reliable water sources and refugia for fauna throughout the year. Bird diversity was particularly high at some dams with species such as Black-necked Stork (*Ephippiorhynchus asiaticus*) and Pied Cormorant (*Phalacrocorax varius*) only observed in this habitat type.

Plate 12 Large farm dam in the south of the Project Site



LEGEND

- Project Site
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Watercourse

Fauna habitat types

- River red gum riparian woodland
- Eucalyptus and Corymbia open woodland
- Dawson gum and brigalow woodland
- Brigalow or belah woodland'
- Oxbow wetland
- Natural grasslands
- Modified Grasslands
- Shrubby Brigalow Regrowth with Gilgai
- Dams

N

Figure 14
Fauna habitat types within the project site

Saraji East Mining Lease Project

0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 22/09/2020 VERSION: 4

5.2.2 Fauna corridors

Riparian corridors associated with Boomerang Creek, Plumtree Creek, Hughes Creek, one Mile Creek, Phillips Creek and Downs Creek provide east–west fauna movement opportunities through the landscape. The functional habitat connectivity in an east to west direction in a regional context is interrupted by the Saraji mine complex directly west of the Project Site. However, to the east and west of the Saraji mine complex, there are opportunities for fauna movement despite the historical clearing of woodland for grazing.

The northern portion of the Project Site also forms part of a large contiguous area of remnant vegetation which provides significant faunal dispersal opportunities to the north and east. The Project Site is bisected by the Lake Vermont Mine Road and railway corridor as well as Golden Mile Road in the southern extent, and movement opportunities for fauna through the landscape north–south are limited.

5.2.3 Fauna species richness

A total of 188 vertebrate fauna species were recorded during the 2007, 2010, 2011, 2016, 2017 and 2020 field surveys, comprising 14 amphibians (including one exotic species), 24 reptiles, 117 birds and 33 mammals (including seven exotic species). A composite fauna list is provided in Appendix C and a discussion of the diversity of the four main terrestrial vertebrate groups (birds, mammals, reptiles, amphibians) is provided in the following sections.

5.2.3.1 Amphibians

A total of 14 species of amphibian were found including one exotic species: the Cane toad (*Bufo marinus**). Several species, including New Holland Frog (*Cyclorana novaehollandiae*), Striped Burrowing Frog (*Cyclorana alboguttata*), Ornate Burrowing Frog (*Platyplectrum ornatum*), Green Tree Frog (*Litoria caerulea*), Bumpy Rocket Frog (*Litoria inermis*) and Desert Tree Frog (*Litoria rubella*) were routinely encountered near creeks, dams and billabongs. Of particular note was the capture of over 88 Ornate Burrowing Frogs (*Platyplectrum ornatum*), from one night of pitfall trapping on Boomerang Creek. Amphibian activity throughout the 2010 autumn survey period was very high, correlated with the prolonged summer rains.

The Project Site provides suitable habitat for a diversity of amphibians despite the intensive grazing pressures. Creeks and billabongs are fringed by remnant woodlands and sedgelands which provide habitat for stream-breeding frogs. The remnant woodlands, particularly within floodplains, provide habitat for open grassland species (such as striped burrowing frog and spotted grass frog) after good rainfall events. Farm dams also provide habitat for some frog species, however the extent of bare ground in the riparian zone and the extent of emergent vegetation cover may impact the usability of the habitat for some species. Gilgai formations with cracking clays in modified grasslands and remnant and non-remnant *Acacia harpophylla* (Brigalow) communities also provide food habitat and breeding opportunities for frogs as they hold water well into the dry season.

5.2.3.2 Reptiles

A total of 24 species of reptile were found, including seven geckos, five skinks, one dragon and eleven snakes. One species, the Ornamental Snake (*Denisonia maculata*) is listed as vulnerable under the EPBC Act and NC Act (see Section 5.2.4 for further information). During the 2020 field surveys, this species was recorded within Brigalow fringed gilgai which retained low levels of water derived from recent rainfall. This species is likely to utilise a range of habitats (remnant and non-remnant) across the Project Site where gilgai depressions are found. This species is likely to take advantage of water-dependent frogs which proliferate during times of inundation.

Patches of *Eucalyptus cambageana* (Dawson Gum)/*Acacia harpophylla* (Brigalow) woodland and *Casuarina cristata* (Belah) woodland provided good habitat for reptiles despite disturbance by cattle grazing, with moderate availability of shelter sites including leaf litter, fallen bark and branches, and rotting logs.

Within open woodlands dominated by *Eucalyptus* and *Corymbia* species ground timber, high ground cover and decorticating bark also provide habitat opportunities for reptiles.

5.2.3.3 Birds

A total of 117 species of bird were observed across the Project Site including two conservation significant species and four listed migratory species (see Appendix C). The Squatter Pigeon (*Geophaps scripta scripta*) listed as vulnerable under the EPBC Act and NC Act was observed along a powerline track on MLA 70383 (Figure 11). The Australian Painted Snipe (*Rostratula australis*) listed as vulnerable under the EPBC Act was observed from an area of flooded *Acacia harpophylla* (Brigalow) woodland also in MLA 70383 (Figure 11) and a Grey Falcon (*Falco hypoleucos*) was recorded by EcoServe over the adjacent Saraji Mine.

The Project Site supports a diversity of open grassland and woodland birds that are reasonably common throughout central Queensland. Birds that were common in the open and lightly timbered pastures include Magpie (*Gymnorhina tibicen*), Magpie-lark (*Grallina cyanoleuca*), Butcherbirds (*Cracticus torquatus* and *Cracticus nigrogularis*), Torresian Crow (*Corvus orru*), Noisy Miner (*Manorina melanocephala*), Willie Wagtail (*Rhipidura leucophrys*), Peaceful Dove (*Geopelia placida*) and Crested Pigeon (*Geophaps lophotes)*. Granivorous (seed-eating) and insectivorous (insect-eating) birds were abundant throughout the Project Site in pastures and grasslands, including Australasian Pipit (*Anthus australis*), Golden-headed Cisticola (*Cisticola exilis*), Songlarks (*Cincloramphus* spp.) and Tawny Grassbird (*Megalurus timoriensis*). Smaller birds, including Finches (*Taeniopygia* spp. And *Neochmia* spp.) and Fairy-wrens (*Malurus* spp.) also occurred in more open habitats, however they preferred a shrubby understorey to provide some shelter. Birds that converged in riparian habitats include Red-winged Parrot (*Aprosmictus erythropterus*), Rosellas (*Platycercus* spp.), Lorikeets (*Trichoglossus* spp.), Kookaburras (*Dacelo* spp.), Kingfishers (*Todiramphus* spp.) and Friarbirds (*Philemon* spp.).

Several waterbirds were common within dam and wetland habitats including Ducks (*Anas* spp*., Dendrocygna* spp*.* And *Chenonetta sp*.), Herons (*Ardea* spp.), Australasian Darter (*Anhinga novaehollandiae*), Cormorants (*Phalacrocorax* spp.), Ibis (*Threskiornis* spp.) and Spoonbills (*Platalea* spp.).

Larger birds such as the Australian Bustard (*Ardeotis australis*), Emu (*Dromaius novaehollandiae*) and Brolga (*Grus rubicunda*) were commonly observed across the plains of the Project Site. Raptors that were frequently observed included Falcons (*Falco* spp.) and Kites (*Haliastur sphenurus* and *Milvus migrans*).

5.2.3.4 Mammals

Thirty-three species of mammal were identified during the field surveys including eight exotic species. Two mammals listed as vulnerable under the EPBC Act, the Greater Glider (*Petauroides volans*) and Koala (*Phascolarctos cinereus*) were recorded within the Project Site. The Greater Glider (*Petauroides volans*) requires habitat with a high abundance of medium to large sized hollows and a diversity of eucalypt species flowering throughout the year for food resources. Koalas (*Phascolarctos cinereus*) feed almost exclusively on the foliage of species from the genus *Eucalyptus*; however, they are also known to consume foliage of *Corymbia* spp., *Angophora* spp. And *Lophostemon* spp. Suitable habitat is widespread throughout the Project Site including riparian zones and open woodlands which reflect a similar habitat type to the Greater Glider (*Petauroides volans*). Additionally, Koalas (*Phascolarctos cinereus*) were observed in two locations both contiguous within suitable eucalypt woodland habitat within the Project Site.

The diversity of native mammal species is considered low, particularly with respect to small, ground-dwelling marsupials and rodents. The absence of this fauna group may be due to extensive fragmentation of habitats, abundance of predators (native and exotic), absence of shelter sites (i.e. lack of density and/or structure in the understorey vegetation) and/or extensive grazing.

The lack of diversity of other mammal groups, including macropods, was expected considering the highly-disturbed and fragmented habitats within the Project Site. These species are highly mobile through such landscapes.

Of the 33 mammals species recorded, 16 of these were bats which are considered below in Section 5.2.3.5.

5.2.3.5 Bats

A total of 16 bats were positively detected during the field surveys, including 15 microchiropteran bats and one Flying Fox. A further four 85ossypiifolia85an bat species were potentially detected however recorded files of echolocation calls used for identification contain similar call characteristics of multiple species. None of the potentially detected species are considered to be of conservation significance.

Eight of the microchiropteran bats identified are known to roost in tree hollows and are likely to utilise roost sites within riparian *Eucalyptus camaldulensis* (River Red Gum) woodlands. The Little Bentwing Bat (*Miniopterus australis*), although a cave-dwelling species that congregates in summer into maternity colonies, is known to disperse during winter and may use tree hollows opportunistically (Churchill 2008). The White-striped Freetail Bat (*Tadarida australis*) roosts in disused mines, caves, boulder piles and rock fissures.

No suitable caves are available for roosting habitat within the Project Site; however, it is possible that these cave-dwelling bats are roosting in rocky outcrops to the southwest of the Project Site. It was also noted that bats were regularly seen flying around the entrance to the road tunnel on Lake Vermont Road at dawn and dusk where a roost site was established.

5.2.4 Fauna of conservation significance

5.2.4.1 Listed threatened species

Seven conservation significant fauna species listed as threatened under the EPBC Act and/or the NC Act were recorded in the Project Site.

These species are listed in Table 24 and the location in which they were recorded is shown in Figure 11. These species are discussed further below.

Table 24 Listed threatened species recorded within and adjacent to the Project Site

Common Name	Scientific Name	EPBC Act[1]	NC Act[2]
Ornamental Snake	*Denisonia maculata*	Vulnerable	Vulnerable
Australian Painted Snipe	*Rostratula australis*	Endangered	-
Squatter Pigeon (Southern)	*Geophaps scripta scripta*	Vulnerable	Vulnerable
Grey Falcon	*Falco hypoleucos*	-	Vulnerable
Greater Glider	*Petauroides volans*	Vulnerable	-
Koala	*Phascolarctos cinereus*	Vulnerable	Vulnerable
Short-beaked Echidna	*Tachyglossus aculeatus*	-	Special Least Concern

[1] Conservation status under the EPBC Act

[2] Conservation status under the NC Act

Ornamental Snake (*Denisonia maculata*)

The Ornamental Snake (*Denisonia maculata*) is listed as vulnerable under the EPBC Act and NC Act.

The species feeds almost exclusively on frogs (Cogger *et al.*1993) and occurs in moist areas such as *Acacia harpophylla* (Brigalow) woodland on clay and sandy soils, riverside woodland, open forest on natural levees and where gilgai formations exist (Shine 1983; Cogger *et al.*1993 and Wilson & Knowles 1988). It is known only from the Brigalow Belt region and is known to occur at Saraji Mine.

The Ornamental Snake (*Denisonia maculata*) was recorded from five locations across the Project Site (Figure 15). Eleven records are known from ML 1775 in regrowth *Acacia harpophylla* (Brigalow) which has consequently been mapped as Essential Habitat. Two individuals were detected in regrowth brigalow fringing gilgai with standing water east of eleven previously recorded ALA Ornamental Snake (*Denisonia maculata*) sightings. A third individual was spotlighted east of the previous two sightings and was detected in regrowth *Acacia harpophylla* (Brigalow) fringing gilgai with standing water. This individual was then seen to swim through the standing water to retreat from observation. Frog activity and diversity at both these locations was high. A juvenile was also detected from a small patch of *Acacia harpophylla* (Brigalow) in the east of MLA 70383. The soils were predominantly black cracking clays, and standing water was evident in pools with some frog activity. An adult was detected from a

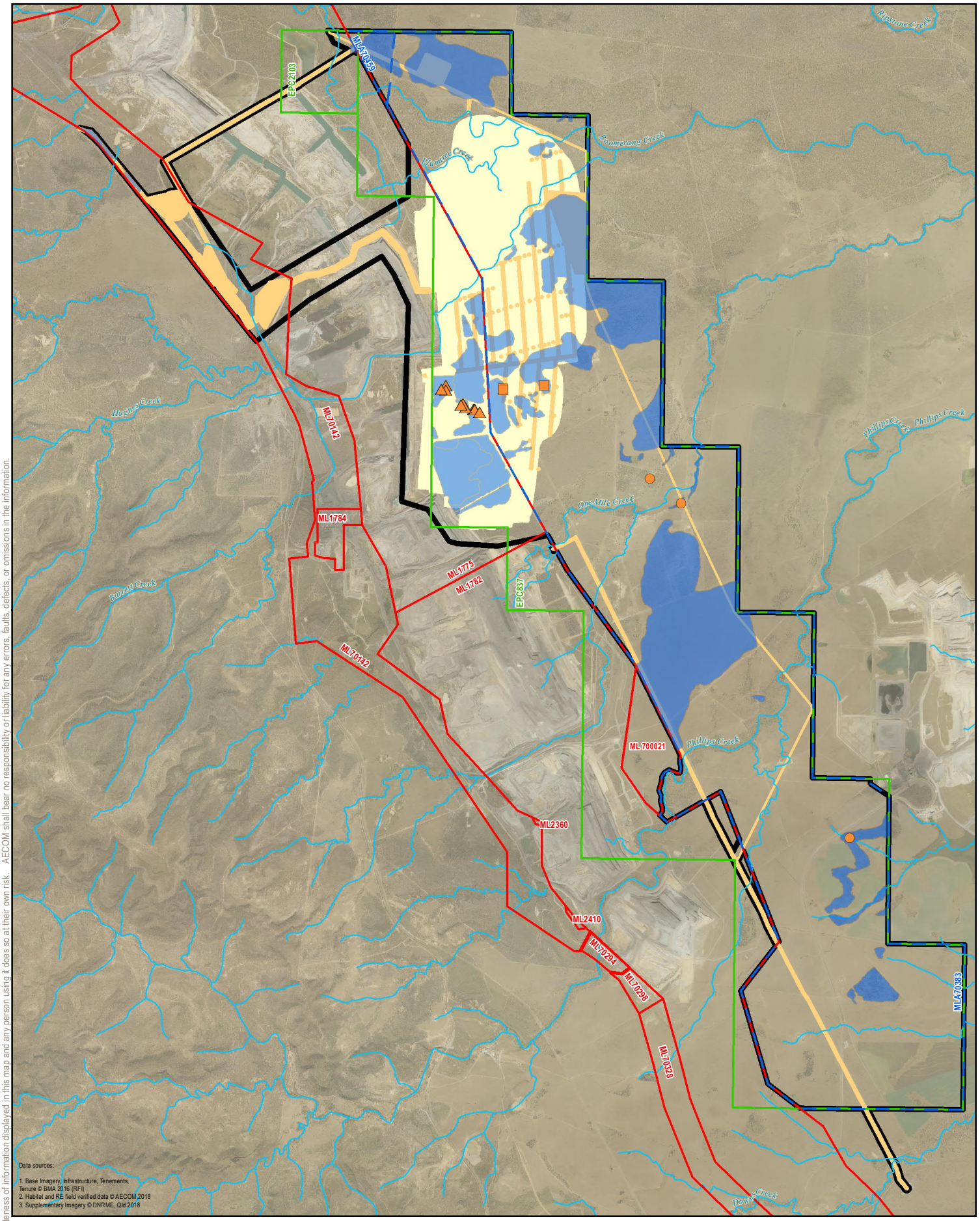
small, sandy waterway fringed by degraded riparian vegetation to the south of Phillips Creek. No standing water was present although some frog activity was recorded. A further two juveniles were detected from a sandy waterway passing through *Casuarina cristata* (Belah) woodland. Some standing water and frog activity was evident at that location.

The extent of potential habitat for the species is summarised in Table 25 and shown in Figure 15.

Table 25 Potential habitat for Ornamental Snake (*Denisonia maculata*)

Habitat definition	Potential habitat type	Total area (ha) within the Project Site	Area (ha) within Project Footprint
• Gilgai depressions (with or without the presence of brigalow or other canopy vegetation[1]), mounds and wetlands on cracking clays (predominantly land zone 4) where essential microhabitat features are present including an abundance of deep soil cracks and fallen woody debris. Seasonal flooding of habitat areas is a requirement.	Preferred	0	0
• Dispersal areas within 1 km of preferred habitat currently or previously dominated by brigalow or coolabah communities where gilgais or soil cracks are infrequent or are shallow or non-remnant areas.	Suitable	2,276.31	925.73
• Areas currently or previously dominated by brigalow or coolabah communities where gilgais or soil cracks are infrequent or are shallow or non-remnant areas where threats are high (high abundance of weed incursion and cattle compacting soils) but the species still have potential to occur, especially in times where water is present and prey abundance (frogs) is high.	Marginal	0	0
Total		**2,276.31**	**975.73**

[1] including remnant, regrowth and non-remnant areas as identified in the QLD vegetation mapping framework.



LEGEND

- Project Site
- Project Footprint - Direct Impact
- Project Footprint - Indirect Impact
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Watercourse

Threatened Fauna Location

- Ornamental Snake (AECOM 2020)
- Ornamental Snake (Australian Living Atlas 2016)
- Ornamental Snake (SKM 2012)
- Ornamental Snake suitable habitat

N

Figure 15

Ornamental Snake potential habitat within Project Site

Saraji East Mining Lease Project

0 0.5 1 2

Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 23/10/2020 VERSION: 3

Filename: \\aubne1fp003\Projects\605X\60507031\4. Tech Work Area\4.99 GIS\02_MXDs\06 Environmental Impact Statement\C-1 Ecology\60507031_G391_v3_A4P.mxd

Australian Painted Snipe (*Rostratula australis*)

The Australian Painted Snipe (*Rostratula australis*) is listed as Endangered under the EPBC Act.

The Australian Painted Snipe (*Rostratula australis*) is a wading bird found in wetland habitats. It has been recorded at wetlands in all states of Australia. It is most common in eastern Australia, where it has been recorded at scattered locations throughout much of Queensland, New South Wales, Victoria and south-eastern South Australia.

This species generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. However, they have also been known to utilise areas lined with trees, as well as modified habitats such as low-lying woodlands converted to grazing pasture, sewage farms, dams, bores and irrigation schemes (Department of Agriculture Water and the Environment, 2020b).

Australian Painted Snipe (*Rostratula australis*) breeding habitat requirements may be quite specific: shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby. Nest records are nearly all from or near small islands in freshwater wetlands, provided that these islands are a combination of very shallow water, exposed mud, dense low cover and sometimes some tall dense cover.

This species was observed from an area of flooded *Acacia harpophylla* (Brigalow) woodland within the Project Site during SKM surveys in 2007. Potential habitat within the Project Site lacks the required microhabitat features to provide breeding habitat for this species. The species is likely to be a vagrant visitor only and may use wetlands in the Project Site on passage to more suitable breeding or foraging grounds.

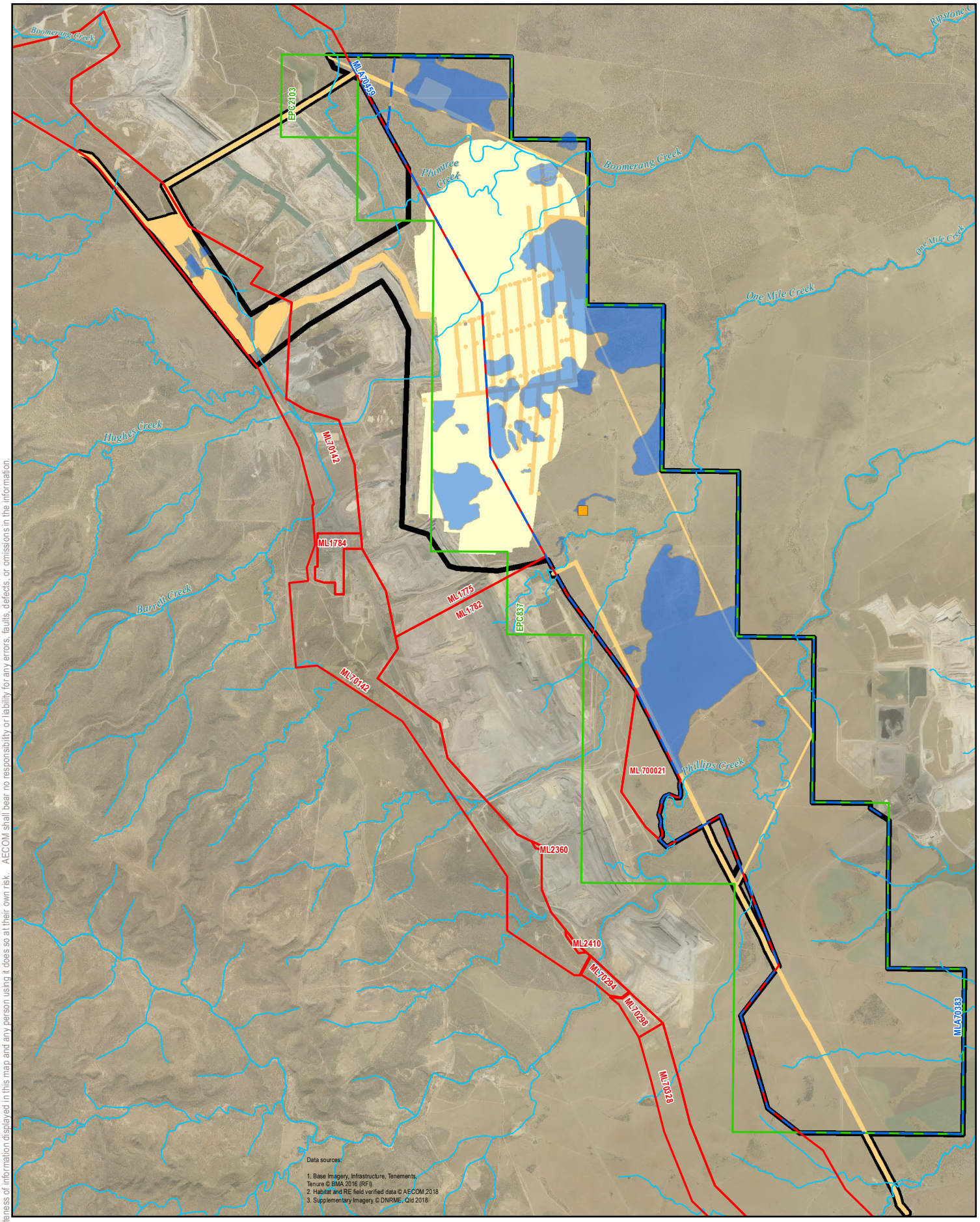
The extent of potential habitat for the species is summarised in Table 26 and displayed in Figure 16.

Table 26 Potential habitat for Australian Painted Snipe (*Rostratula australis*)

Habitat definition	Potential habitat type	Total area (ha) within the Project Site	Area (ha) within Project Footprint
• Shallow, permanent or ephemeral, freshwater wetlands which provide areas of bare, exposed wet mud and a mosaic of ground cover[1] (tufted grasses, sedges, small woody plants).	Preferred	0	0
• Shallow permanent or ephemeral freshwater or brackish wetlands and other inundated/waterlogged areas[2] with a variable ground cover (e.g. grasses, shrubs and rushes). • Habitat for this species does not include tall, dense reedbeds associated with stabilized water levels, wetlands that are cropped, and areas of low water quality due to nutrient run-off, agricultural chemicals and turbidity.	Suitable	1,861.15	750.14
Total		**1,861.15**	**750.14**

[1] May include rushes and sedges up to 1 m in height

[2] Can include gilgais lakes, springs, swamps, claypans, inundated or waterlogged grassland/saltmarsh, dams, rice fields, sewage farms and bore drains.



LEGEND

- Project Site
- Project Footprint - Direct Impact
- Project Footprint - Indirect Impact
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Watercourses

Threatened fauna location

- Australian Painted Snipe (SKM 2012)

Potential habitat

- Australian Painted Snipe suitable habitat

N

Figure 16

Australian Painted Snipe potential habitat within the Project Site

Saraji East Mining Lease Project

0 0.5 1 2

Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 22/09/2020 VERSION: 3

Squatter Pigeon (Southern) (*Geophaps scripta scripta*)

The Squatter Pigeon (Southern) (*Geophaps scripta scripta*) is listed as Vulnerable under the EPBC Act and NC Act.

The Squatter Pigeon (Southern) (*Geophaps scripta scripta*) is a ground-dwelling bird that inhabits the grassy understorey of open woodland (mostly dominated by *Eucalyptus*, *Corymbia*, *Acacia* or *Callitris* in the canopy), as well as sown grasslands with scattered remnant trees, disturbed areas (such as roads, railways, settlements and stockyards), scrubland, and *Acacia* regrowth (Department of Agriculture Water and the Environment, 2020b). In Queensland, foraging and breeding habitat is known to be associated with the soil landscapes of Land Zone 5 (well drained sandy or loamy soils on undulating plains and foothills) and Land Zone 7 (lateritic soils on low jump-ups and escarpments) (Department of Agriculture Water and the Environment, 2020b).

Breeding habitat is within 1 km of suitable waterbodies, whereas foraging can occur up to 3 km from such waterbodies. Waterbodies that are suitable for the species occur on the lower, gentle slopes and plateaus of sandstone ranges (equivalent to Land Zone 10), alluvial clay soils on river or creek flats (represented by Land Zone 3) or non-alluvial clay soils on flats or plains which are not associated with current alluvial deposits (represented by Land Zone 4). Where natural foraging or breeding habitat occurs (i.e. on Land Zones 5 and 7), the Squatter Pigeon (southern) (*Geophaps scripta scripta*) may be found in vegetation types growing on the above soil types (Squatter Pigeon Workshop, 2011).

Dispersal habitat for this species is any forest or woodland occurring between patches of foraging or breeding habitat, and suitable waterbodies.

The Squatter Pigeon (Southern) (*Geophaps scripta scripta*) was recorded in the Project Site by SKM (2012) and AECOM (2017). Essential Habitat for the species has also been mapped in the north of Project Site surrounding an existing record. This species is expected to occur throughout the Project Site, with preferred, suitable and marginal habitat identified.

The extent of potential habitat for the species is summarised in Table 27 and displayed in Figure 17.

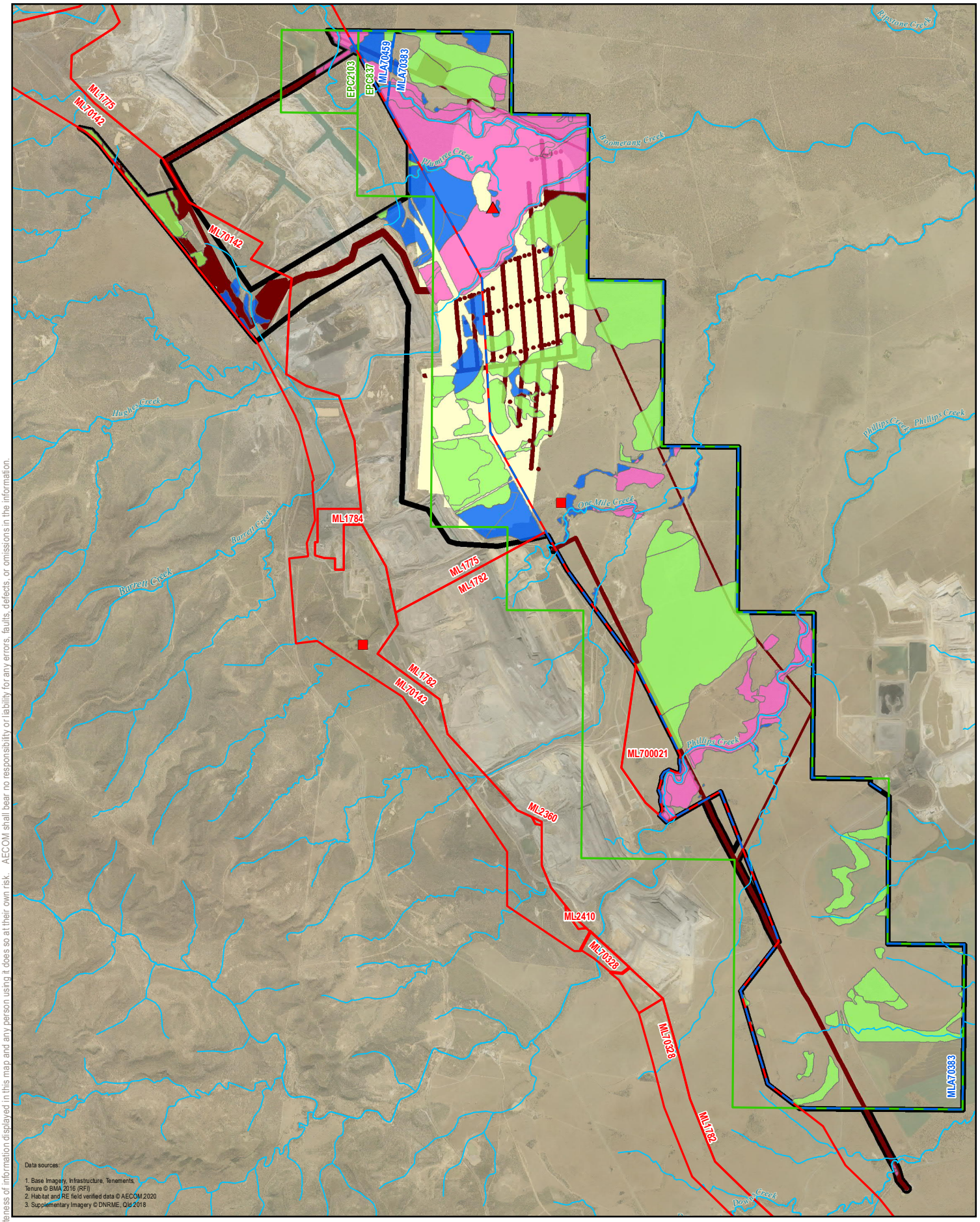
Table 27 Potential habitat for Squatter Pigeon (*Geophaps scripta scripta*)

Habitat definition	Potential habitat type	Total area (ha) within the Project Site	Area (ha) within Project Footprint
• Remnant or regrowth grassy open forest to woodland dominated by Eucalyptus, Corymbia, Callitris or Acacia with patchy, relatively sparse ground cover vegetation (33 %) and sparse shrub layer on well-draining sandy, loamy or gravelly soils within 1 km of a suitable permanent waterbody. • Preferred habitat may be located on land zones 3, 5, 7, 8, 9 and 10. • Preferred habitat does not include areas dominated by introduced pasture grasses, in particular Cenchrus ciliaris, nor heavily grazed areas but these areas may be included in suitable and marginal habitat as defined below.	Preferred	1,375.27	699.10

Habitat definition	Potential habitat type	Total area (ha) within the Project Site	Area (ha) within Project Footprint
• Remnant or regrowth grassy open forest to woodland dominated by Eucalyptus, Corymbia, Callitris or Acacia with patchy, relatively sparse ground cover vegetation (<33 %) on well-draining sandy, loamy or gravelly soils between 1 and 3 km of a suitable permanent or seasonal waterbody2; and • Non-remnant areas within 100 m of preferred habitat. • Suitable habitat may be located on land zones 3, 5, 7, 8, 9 and 10.	Suitable	482.27	285.25
• Non-remnant areas, regrowth and remnant woodland or forest areas more than 3 km from a permanent or seasonal waterbody that facilities the movement of the species between patches of preferred or suitable habitat.	Marginal	2,518.19	966.77
Total		**4,375.73**	**1,951.12**

[1] Includes mapped wetlands and ≥3rd order streams

[2] Includes 1st and 2nd order streams.



LEGEND

- Project Site
- Project Footprint - Direct Impact
- Project Footprint - Indirect Impact
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Watercourse

Threatened Fauna Location

- Squatter Pigeon (AECOM 2017)
- Squatter Pigeon (SKM 2012)

Potential habitat

- Squatter Pigeon preferred habitat
- Squatter Pigeon suitable habitat
- Squatter Pigeon marginal habitat

N

Figure 17

Squatter Pigeon potential habitat within Project Site

Saraji East Mining Lease Project

0 0.5 1 2

Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 10/11/2020 VERSION: 5

Greater Glider (*Petauroides Volans*)

The Greater Glider (*Petauroides volans*) is listed as Vulnerable under the EPBC Act and NC Act.

The Greater Glider (*Petauroides volans*) is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest). This species is largely restricted to eucalypt forests and woodlands. During the day, they spend most of their time denning in hollowed trees, with each animal inhabiting up to twenty different dens within its home range. It is primarily folivorous, with a diet mostly comprising the leaves and flowers of Myrtaceae (e.g. eucalypt) trees. Home ranges of this species are typically relatively small (1 – 4 ha) but are larger in lower productivity forests and more open woodlands (up to 16 ha) (Threatened Species Scientific Committee, 2016).

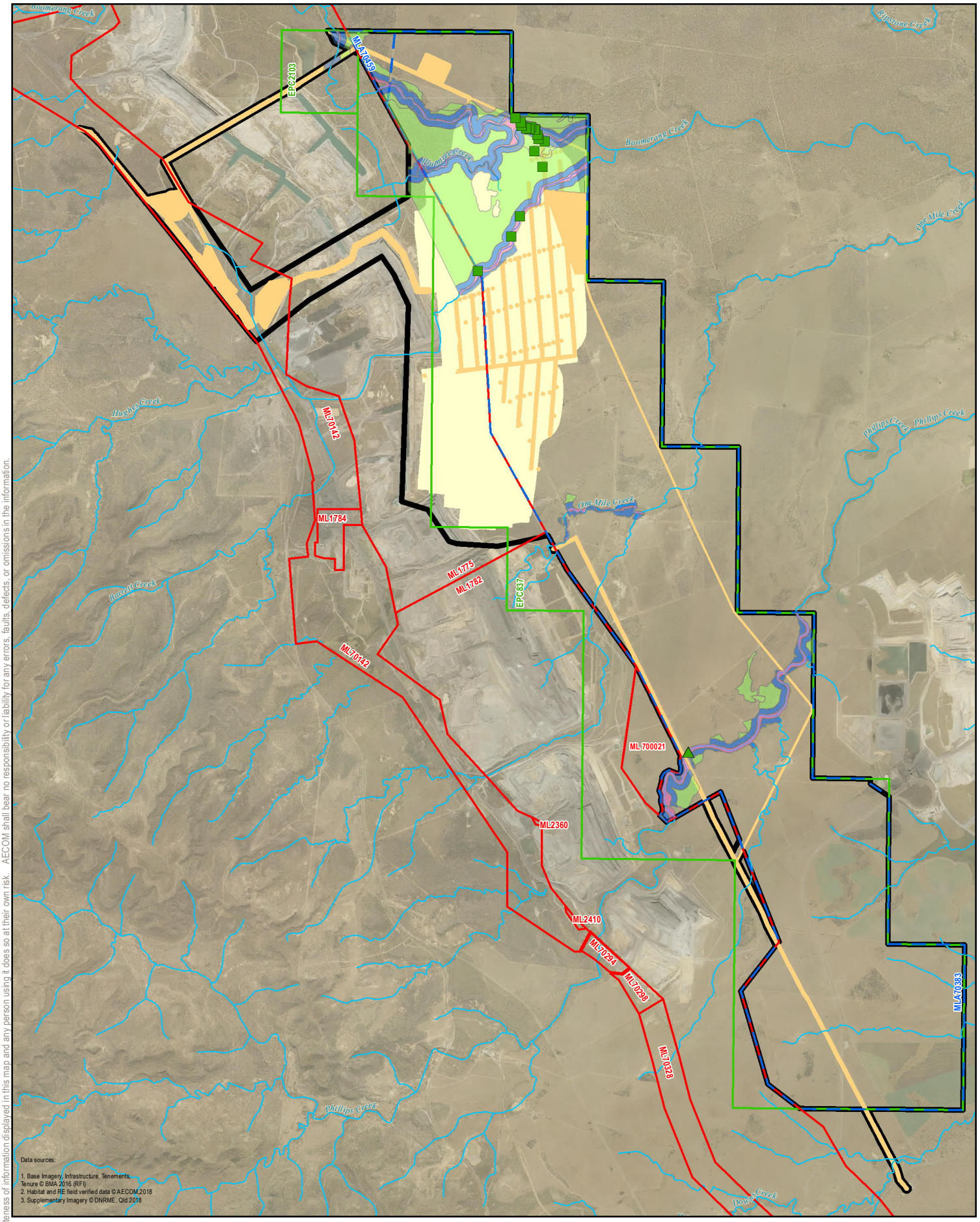
One Greater Glider (*Petauroides volans*) was located in mature *Eucalyptus camaldulensis* (River Red Gum) woodlands fringing Phillips Creek in the south of the Project Site by SKM (2012). Within similar habitat associated with Boomerang Creek and Hughes Creek in the north of the Project Site, another 18 Greater Gliders (*Petauroides volans*) were observed by AECOM in 2020 and one additional individual was also found in *Eucalyptus* and/or *Corymbia* open woodland (RE 11.5.3). Several records are available from Atlas of Living Australia approximately 10 km west of the Project Site.

The extent of potential habitat for the species is summarised in Table 28 and displayed in Figure 18.

Table 28 Potential habitat for Greater Glider (*Petauroides volans*)

Habitat definition	Potential habitat type	Total area (ha) within the Project Site	Area (ha) within Project Footprint
• Remnant, connected eucalypt woodlands containing more than 2 hollow bearing trees/ha, with hollows medium-large in size (>10 cm entrance). • In Central Queensland, preferred foraging and den trees include E. camaldulensis, E. tereticornis, E. fibrosa and Corymbia citriodora. The species has also been observed in Angophora floribunda, Eucalyptus cambageana, E. coolabah, E. crebra, E. laevopinea, E. moluccana, E. orgadophila, E. populnea, E. melanophloia and C. tessellaris in which it may use for foraging and/or denning.	Preferred	190.05	78.18
• Remnant eucalypt woodlands connected to areas of roosting habitat that does not contain more than 2 hollow bearing trees/ha, medium-large in size (>10 cm entrance). Home range of the species estimated at 120 m of breeding / denning habitat.	Suitable	442.75	203.81
• Remnant or high value regrowth vegetation1 adjacent to preferred greater glider habitat where hollows are smaller and/or less frequent. Isolated patches of marginal habitat >100 m from adjacent habitat do not provide habitat for the species due to gliding capabilities.	Marginal	848.01	524.68
Total		**1,480.81**	**806.67**

[1] For high value regrowth to be considered marginal habitat, it needs to include scattered large Eucalypt trees as Smith *et al.* (2007) did not observe any gliders foraging in non-myrtaceous species or myrtaceous trees <20 cm dbh.



LEGEND

- Project Site
- Project Footprint - Direct Impact
- Project Footprint - Indirect Impact
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Watercourse

Threatened fauna location

- Greater Glider (AECOM 2020)
- Greater Glider (SKM 2012)

Potential habitat

- Greater Glider preferred habitat
- Greater Glider suitable habitat
- Greater Glider marginal habitat

N

Figure 18

Greater Glider potential habitat within the Project Site

Saraji East Mining Lease Project

0 0.5 1 2

Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 22/09/2020 VERSION: 2

Koala (*Phascolarctos cinereus*)

Koala (*Phascolarctos cinereus*) is listed as Vulnerable under the EPBC Act and NC Act.

Koalas (*Phascolarctos cinereus*) inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by species from the genus *Eucalyptus* (Martin & Handasyde, 1999). With relation to the combined populations of Queensland, New South Wales and the Australian Capital Territory, the range of this species extends from approximately the latitude of Cairns to the New South Wales-Victoria border. The distribution of Koalas (*Phascolarctos cinereus*) is also affected by altitude (limited to less than 800 m ASL), temperature and at the western and northern ends of the range, leaf moisture (Munks, Corkrey, & Foley, 1996).

The Koala (*Phascolarctos cinereus*) is heavily reliant on eucalypt leaves, a diet that is extremely energy constraining. As a result, the Koala (*Phascolarctos cinereus*) is very inactive and spends around 19 hours per day sleeping (Curtis & Dennis, 2012). As per the *EPBC Act Referral Guidelines For The Vulnerable Koala* (Department of the Environment, 2014), food trees are those from the following genus: *Angophora, Corymbia, Eucalyptus, Lophostemon* and *Melaleuca*. 'Primary' food and 'secondary' Koala (*Phascolarctos cinereus*) food trees are also defined by the Australian Koala Foundation (Mitchell, 2015), however It should be noted that these categories are not relevant to EPBC Act assessments.

A solitary Koala (*Phascolarctos cinereus*) was observed to the north-west of the Project Site within the riparian zone associated with Plumtree Creek by AECOM (2020) and one Koala (*Phascolarctos cinereus*) was recorded from Downs Creek adjacent to the Project Site during previous ecological surveys. An additional record exists from Atlas of Living Australia approximately 4 km west of the Project Site and the species was recorded at Peak Downs Mine East, directly north of the Project Site by AECOM in 2018.

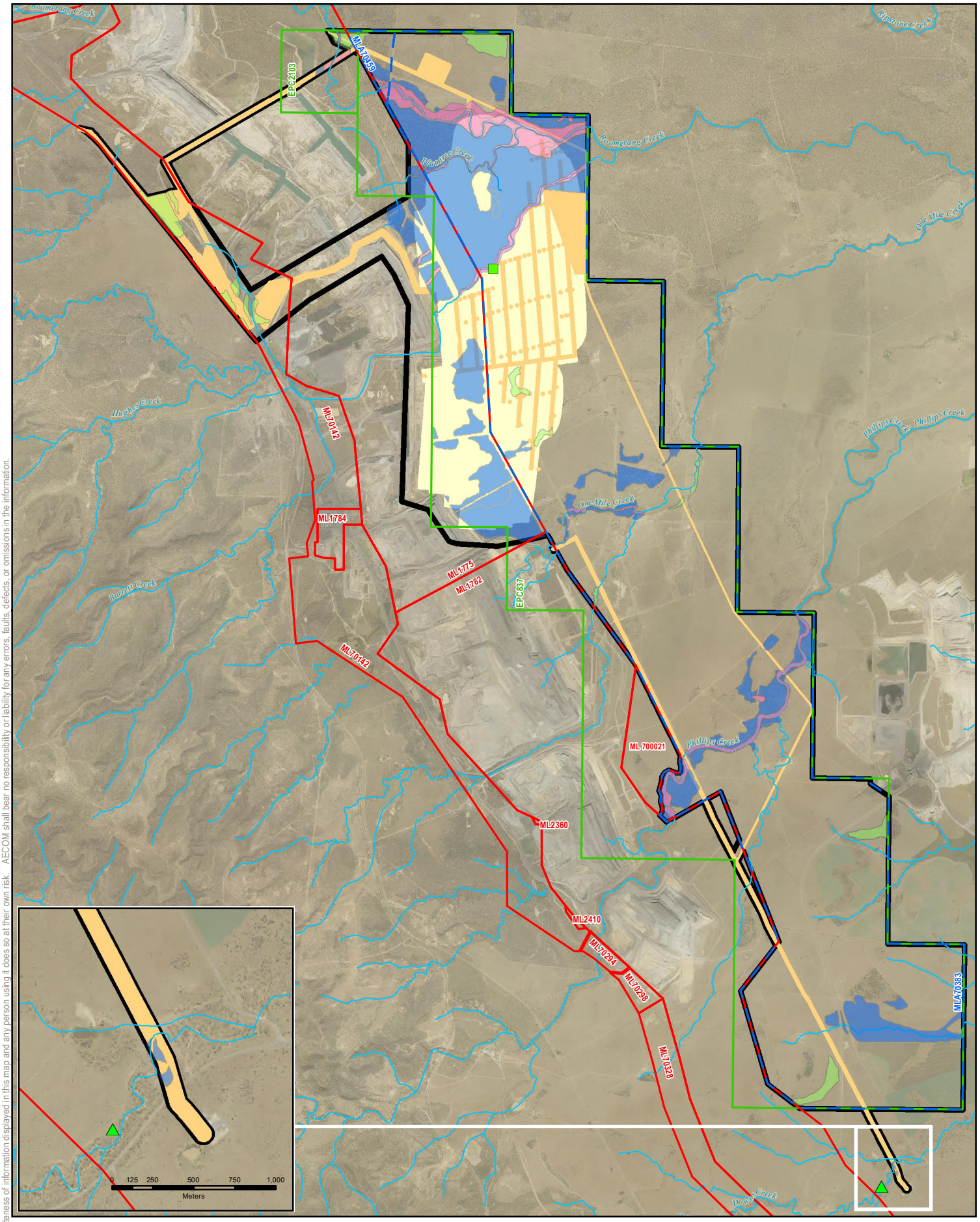
The extent of potential habitat for the species is summarised in Table 29 and displayed on Figure 19.

Table 29 Potential habitat for Koala (*Phascolarctos cinereus*)

Habitat definition	Potential habitat type	Total area (ha) within the Project Site	Area (ha) within Project Footprint
• Contiguous remnant eucalyptus open forest to woodlands near a permanent or ephemeral water source, and • Where primary or secondary food trees are dominant in the canopy. Primary food trees across the entire Central Queensland region include Eucalyptus camaldulensis and E. tereticornis.	Preferred	374.66	163.40
• Remnant and regrowth eucalyptus open forest to woodlands where primary or secondary food trees are present (but not necessarily dominant) in the canopy and that have connectivity to other areas of suitable or preferred habitat.	Suitable	1,735.88	978.54
• All other fragmented and sparsely distributed woodlands and open woodlands, shrub lands and forests in modified agricultural-grazing landscapes that may provide food resources or aids to movement.	Marginal	234.33	77.05
Total		**2,344.87**	**1,218.99**

[1] Permanent and ephemeral water may originate from a variety of sources e.g. groundwater aquifers, nearby wetlands/watercourses, rainfall seepage/runoff. In central Queensland, it is known that riparian vegetation is highly utilised.

[2] Primary food and secondary food trees vary on the location within Central Queensland. Refer to https://www.savethekoala.com/sites/savethekoala.com/files/uploads/20150212_AKF_National_Koala_Tree_Planting_List.pdf for guidance



LEGEND

- Project Site
- Project Footprint - Direct Impact
- Project Footprint - Indirect Impact
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Watercourse

Threatened fauna location

- Koala (URS 2014)
- Koala (AECOM 2020)

Potential

- Koala preferred habitat
- Koala suitable habitat
- Koala marginal habitat

N

Figure 19

Koala potential habitat within the Project Site

Saraji East Mining Lease Project

0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 22/09/2020 VERSION: 3

Grey Falcon (*Falco hypoleucos*)

The Grey Falcon (*Falco hypoleucos*) is listed as vulnerable under the NC Act.

The Grey Falcon (*Falco hypoleucos*) is endemic to mainland Australia, occurring across the arid and semi-arid regions including the Murray-Darling Basin, Eyre Basin, central Australia and western Australia (Threatened Species Scientific Committee, 2020). It is largely restricted to areas of high annual average temperatures and average annual rainfall of less than 500 mm. It has been recorded in timbered lowland plains, particularly *Acacia* shrublands that are crossed by tree-lined watercourses. They have also been observed foraging in treeless areas and in tussock grassland and open woodland, especially in winter.

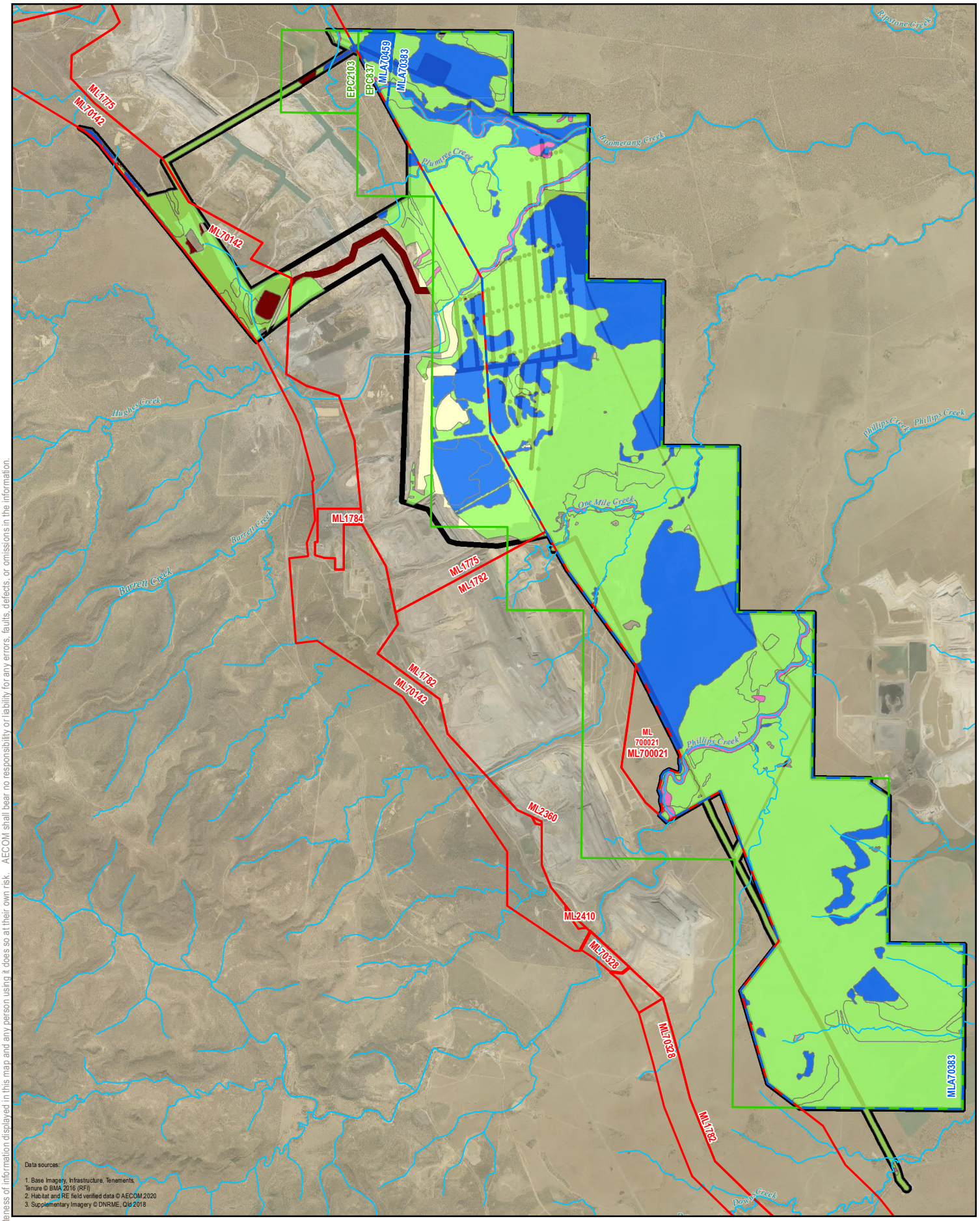
Breeding occurs from June to November, with eggs generally being laid in the old nests of other birds, namely those of other raptors or corvids. It is reported that nests in the tallest trees, especially *Eucalyptus camaldulensis* (River Red Gum) and *Eucalyptus coolabah* (Coolabah) along watercourses are preferred (Threatened Species Scientific Committee, 2020). However, like other falcons this species may also nest in telecommunication towers. There are no known breeding pairs.

This species was not confirmed within the Project Site during any of the field surveys. However, in 2005 EcoServe recorded the species on the adjacent Saraji Mine and as such this species is considered likely to occur. Due to the broad definition of suitable habitat for this species, all vegetation within the Project Site is considered to provide some value for the lifecycle requirements of the Grey Falcon (*Falco hypoleucos*).

The extent of potential habitat for the species is summarised in **Table 30** and displayed in Figure 20..

Table 30 Potential habitat for Grey Falcon (Falco hypoleucos)

Habitat definition	Potential habitat type	Total area (ha) within the Project Site	Area (ha) within the Project Footprint
• Remnant vegetation that is dominated by Eucalyptus sp. In the canopy and associated with a water source (i.e. watercourses or wetlands).	Preferred	208.72	90.76
• Remnant or regrowth vegetation that contains Acacia sp..	Suitable	2,453.78	1,001.13
• All other vegetation that does not contain Acacia sp., including regrowth and non-remnant areas	Marginal	7,979.30	2,081.28
	Total	**10,641.81**	**3,173.17**



LEGEND

- Project Site
- Project Footprint - Direct Impact
- Project Footprint - Indirect Impact
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Watercourse

Potential habitat

- Grey Falcon marginal habitat
- Grey Falcon preferred habitat
- Grey Falcon suitable habitat

Figure 20

Grey Falcon potential habitat within the Project Site

Saraji East Mining Lease Project

0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 10/11/2020 VERSION: 1

Short-beaked Echidna (*Tachyglossus aculeatus*)

The Short-beaked Echidna (*Tachyglossus aculeatus*) is listed as Special Least Concern under the NC Act, due to its special cultural significance.

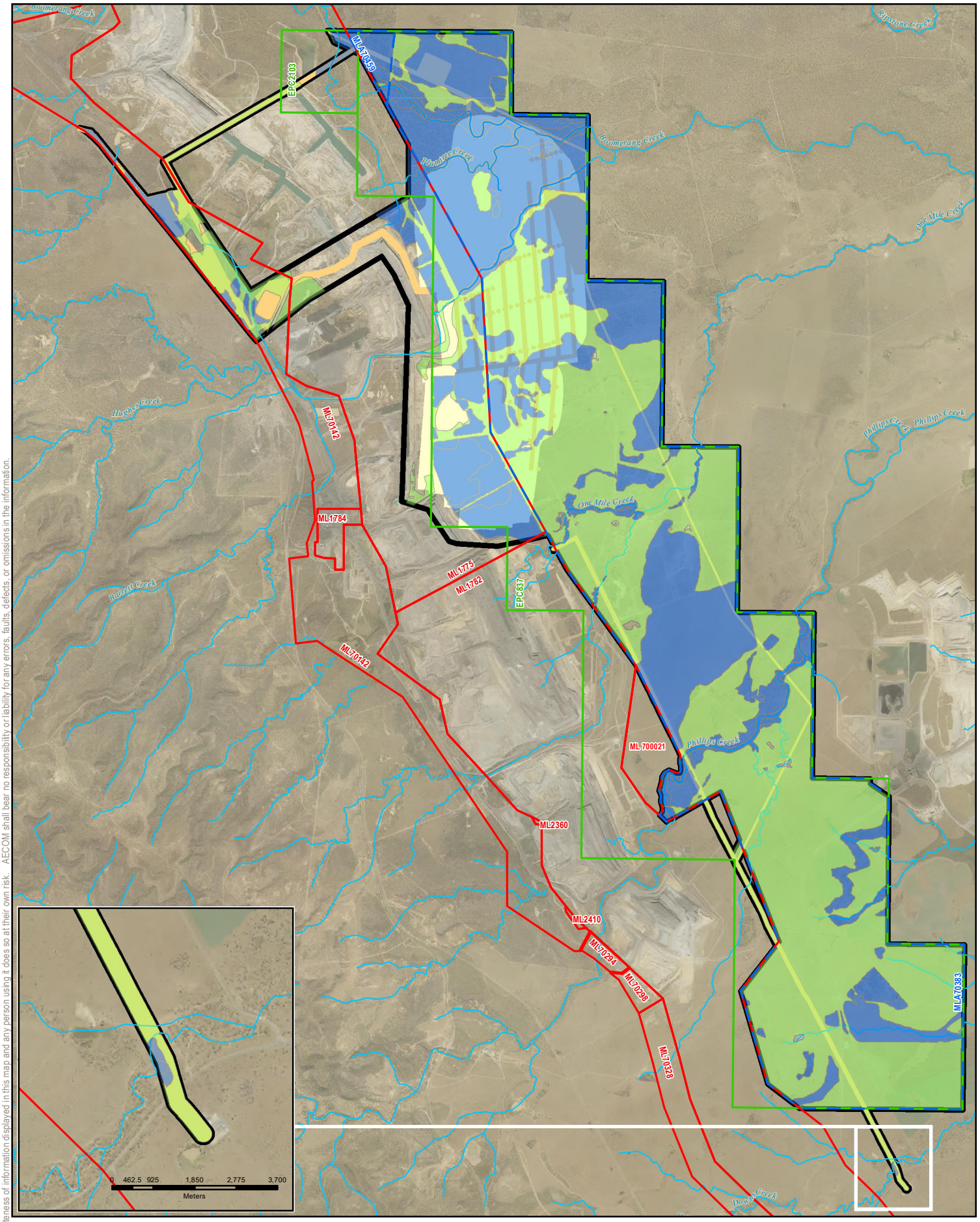
The Short-beaked Echidna (*Tachyglossus aculeatus*) is found throughout Australia, including Tasmania. It is Australia's most widespread native animal (The Australian Museum, 2018). No systematic study of the ecology of the Short-beaked Echidna (*Tachyglossus aculeatus*) has been published, but studies of several aspects of their behaviour have been conducted. Individuals are solitary, wanderers: they have large, overlapping home ranges (up to 50 ha) and only maintain a fixed shelter or nest site when rearing their young in a burrow (Augee, Gooden, & Musser, 2006). They avoid extremes in temperature by sheltering in hollow logs, rock crevices and vegetation. Limited only by an insufficient supply of ants or termites, Short-beaked Echidnas (*Tachyglossus aculeatus*) live in a range of climates and habitats.

The Short-beaked Echidna (*Tachyglossus aculeatus*) has been confirmed within the Project Site. Given the very broad utilisation of habitat by this species, all vegetation within the Project Site is considered to provide potential habitat.

The extent of potential habitat for Short-beaked Echidna (*Tachyglossus aculeatus*) is summarised in **Table 31** and displayed in Figure **21**.

Table 31 Potential habitat for Short-beaked Echidna (Tachyglossus aculeatus)

Habitat definition	Potential habitat type	Total area (ha) within the Project Site	Area (ha) within the Project Footprint
• All remnant and regrowth vegetation that contains variety of sheltering opportunities present.	Suitable	4,389.38	1,943.54
• Non-remnant vegetation; area's where sheltering opportunities are largely restricted to grass cover.	Marginal	6,252.43	1,229.62
	Total	**10,641.81**	**3,173.16**



LEGEND

- Project Site
- Project Footprint - Direct Impact
- Project Footprint - Indirect Impact
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Watercourse

Potential habitat

- Short-beaked Echidna marginal habitat
- Short-beaked Echidna suitable habitat

N

Figure 21
Short-beaked Echidna potential habitat within the Project Site
Saraji East Mining Lease Project

0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)
Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 22/09/2020 VERSION: 0

5.2.4.2 Migratory fauna

The literature review and desktop searches identified fourteen migratory species as potentially occurring in the survey area (Section 4.1.3). Four of these species have been previously recorded by EcoServe in 2005 during surveys of Saraji Mine. These species included Fork-tailed Swift (*Apus pacificus*), Latham's Snipe (*Gallinago hardwickii*), White-throated Needletail (*Hirundapus caudacutus*) and Caspian Tern (*Hydroprogne caspia*).

Fork-tailed Swift (*Apus pacificus*) primarily occurs over inland plains but is known to utilise diverse habitat from coastal foothills, cliffs, beaches, urban areas, riparian woodland, heathland, treeless grassland, spinifex covered sandplains, open farmland, dunes, low scrub, heathland, saltmarsh and tea-tree swamps (DoEE, 2016). The species is found across northern Australia and may use the airspace above wooded areas and open plains within Project Site. They are almost exclusively aerial and do not breed in Australia.

Latham's Snipe (*Gallinago hardwickii*) uses a variety of freshwater or brackish wetlands, preferring to be close to protective vegetation cover. Small patches of suitable habitat are available within the Project Site in wetlands in the northeast of the Project Site and ponds to the east of Saraji mine.

The White-throated Needletail (*Hirundapus caudacutus*) is almost exclusively aerial and is known to occur over a variety of habitats. Foraging habitat is at heights of up to cloud level over a variety of habitats. The species may be found in the airspace above all areas within the Project Site.

A pair of Caspian Terns (*Hydroprogne caspia*) were observed foraging over the evaporation dam on the eastern side of Saraji Mine during SKM surveys in 2007. Suitable habitat for this species within the Project Site includes dams and wetlands.

5.2.5 Pest animals

Nine introduced vertebrate fauna species were recorded within the Project Site, of which eight are mammals and one an amphibian. This included five species which are considered to be 'Restricted Matter' under the *Biosecurity Act 2014* and three species noted within Isaac Regional Biosecurity Plan. These are listed in Table 32. All of these species are commonly encountered in central Queensland.

The survey area is used for grazing domesticated cattle (*Bos taurus**). All other introduced species noted are present as true pest animals. European Rabbit (*Oryctolagus cuniculus**) is abundant throughout the site, as are Cane Toads (*Bufo marinus**). Feral Cats (*Felis catus**) were observed, whilst Wild Dogs (*Canis lupus dingo/familiaris**) were recorded by SKM in 2007. Signs of Feral Pigs (*Sus scrofa**) were common throughout the Project Site, especially as wallows in creek beds and dam verges, while a herd of up to 20 animals was recorded moving through natural grasslands south of Phillips Creek in August 2016. House Mouse (*Mus musculus**) was trapped in grasslands by SKM in 2007 and are likely to be widespread over the Project Site. Foxes (*Vulpes 101ossyp**) were observed during nocturnal surveys and by analysing scats found in *Eucalyptus populnea* (Poplar Box) open woodland.

Table 32 Pest animals identified within the Project Site

Scientific Name	Common Name	Biosecurity Matter[1]	Isaac Regional Council Biosecurity Plan – Priority Weeds	Source[2]
*Bos taurus**	Cattle	-	-	AECOM, SKM, ES, WL
*Canis lupus dingo/ familiaris**	Wild Dog	Restricted Matter (Category: 3, 4, 5, 6)	Yes	ES
*Felis catus**	Feral Cat	Restricted Matter (Category: 3, 4, 6)	Yes	ES
*Lepus europaeus**	European Hare	-	-	ES
*Mus musculus**	House Mouse	-	-	ES
*Oryctolagus cuniculus**	European Rabbit	Restricted Matter (Category: 3, 4, 5, 6)	-	AECOM, ES
*Bufo marinus**	Cane Toad	-	-	AECOM, SKM, ES, WL
*Sus scrofa**	Pig	Restricted Matter (Category: 3, 4, 6)	Yes	AECOM, ES
*Vulpes Vulpes**	Fox	Restricted Matter (Category: 3, 4, 5, 6)	-	AECOM

[1] Biosecurity matter refer to matters which are listed under the *Biosecurity Act 2014.* 'Prohibited' matters are biosecurity matter that are not currently present in Queensland, but would have a significant adverse social, economic, health or environment impact on if it entered the state. 'Restricted matter' refer to biosecurity matter found in Queensland which have a significant impact on social, economic, health or environmental issues.

[2] Source: AECOM, SKM (Field Surveys), ES (EcoServe 2005), WL (Wildlife Online).

6.0 Environmentally sensitive areas

6.1 Introduction

This section of the report describes the ESAs present within the Project Site and surrounding region. ESAs include national parks, state forests, world heritage areas, Ramsar wetlands and nationally important wetlands. In addition, they feature areas of elevated natural and cultural value such as habitat for conservation significant flora and fauna and places of Aboriginal and European cultural heritage.

6.2 Approach

Accessible, current and reliable data sources were used to prepare this section. Datasets provided by DES were obtained to determine the location of ESAs in relation to the Project Site. A 100 km search radius from the Project Site was used to identify any ESAs in the surrounding region. As impacts on REs outside the Project Site are unlikely, and state RE mapping can be relatively coarse, REs were excluded from searches outside the Project Site. ESAs within the search area were identified and the potential impacts that the Project may have on those ESAs were determined. It is considered that any ESAs outside the 100 km radius are unlikely to be impacted by the Project. However, due to the dynamic nature of waterways and aquatic habitats, the potential for impact on ESAs such as wetlands and fish habitats lying downstream of the proposed mine development beyond the 100 km radius was determined. The level of protection applied to each ESA as declared under current legislation is discussed in Section 6.3.

6.3 Description of environmentally sensitive areas

6.3.1 Classification of environmentally sensitive areas

The EP Act and its subordinate EP Regulation place ESAs into two categories: Category A and Category B. Category A and B ESAs appear in Queensland legislation and are easily identified as they are typically based on land tenure. Category C ESAs are defined in DEHP's (2014) Code of Environmental Compliance for Exploration and Mineral Development Projects – Version 1.1[1]. The ESAs that make up each category are described in the following sections.

6.3.2 Category A ESAs

Category A ESAs, as defined by the EP Regulation, are displayed in Table 33. The occurrence of these areas in relation to the Project Site is described below. In Queensland, mining activities may not be undertaken in land comprising Category A ESAs.

Table 33 Category A ESAs and Administering Legislation

Category A Protected Areas	Administering Legislation
National Park National Park (Scientific) National Park (Aboriginal land) National Park (Torres Strait Islander land) National Park (Cape York Peninsula Aboriginal Land) National Park (Recovery)	NC Act
Conservation Park	NC Act
Forest Reserve	NC Act
Wet Tropics World Heritage Area	*Wet Tropics World Heritage Protection and Management Act 1993*

[1] Category C ESAs have been defined in the Code of Environmental Compliance for Exploration and Mineral Development Projects – Version 1.1 (DEHP). This document has been superseded however Category C ESAs are still relevant as confirmed by DES on 5 March 2018

Category A Protected Areas	Administering Legislation
Great Barrier Reef Region	*Great Barrier Reef Marine Park Act 1975* (Commonwealth)
Marine Parks (other than general use zones)	*Marine Parks Act 2004*

Geographic information system (GIS) interpretation was undertaken to determine if Category A ESAs exist within or in close proximity to the Project Site. The results of this interpretation are discussed below. There are no Category A ESAs in the Project Site (Figure 22).

National Parks

National Parks are declared under the NC Act and defined as Category A protected areas (Table 33). There are no National Parks within the Project Site however there are four that occur within a 100 km radius of the Project Site (refer to Figure 22):

- Homevale National Park
- Junee National Park
- Mazeppa National Park
- Peak Range National Park.

Forest reserves and conservation parks

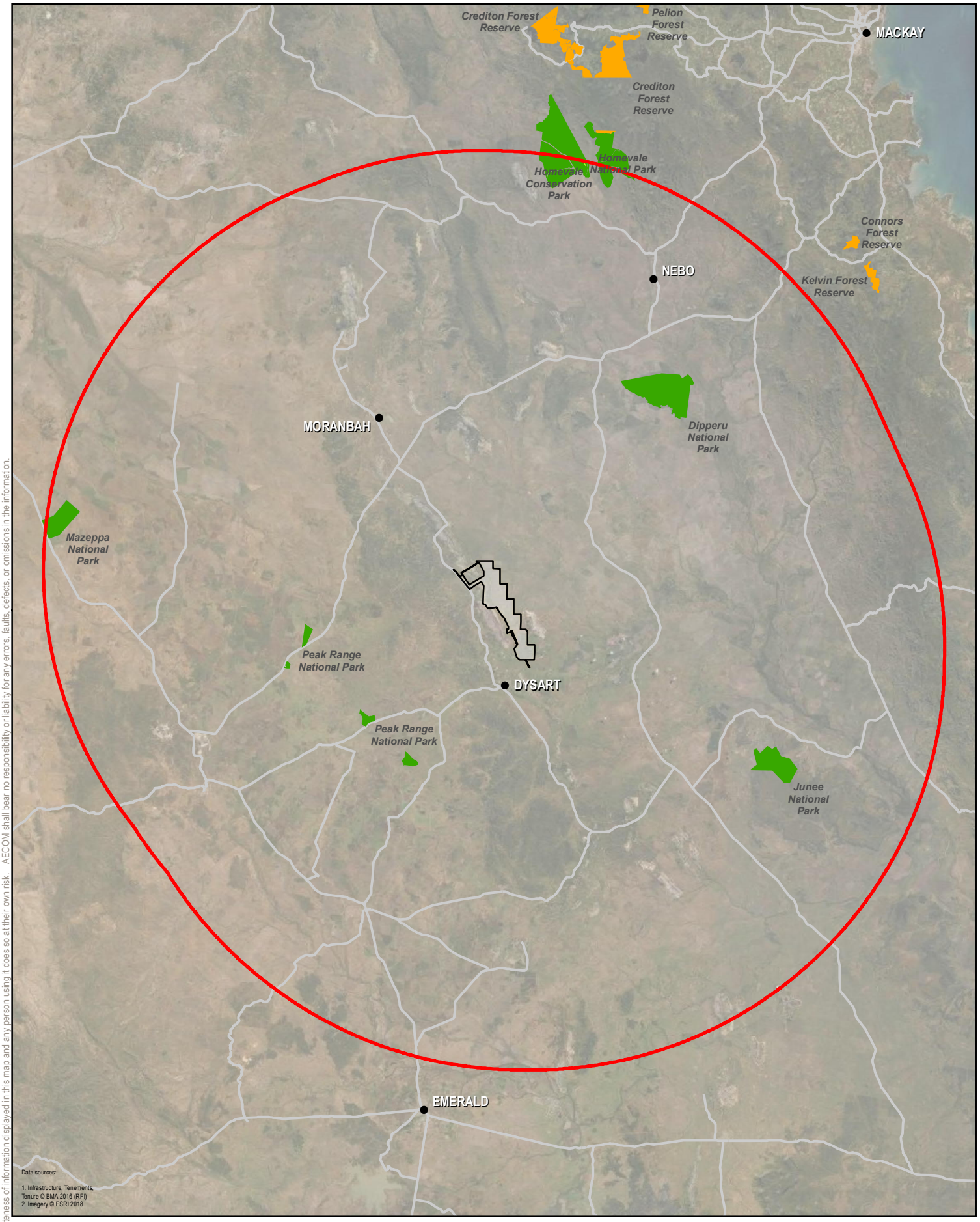
Conservation parks, as listed under the Nature Conservation (Protected Areas) Regulation 1994 and forest reserves are protected areas under the NC Act. The Homevale Conservation Park is situated approximately 95 km north east of the Project Site (Figure 22).

Wet tropics World Heritage Area

The Wet Tropics World Heritage Area is declared under the *Wet Tropics World Heritage Protection and Management Act 1993* and is administered by the Wet Tropics Management Authority. The Wet Tropics World Heritage Area is located approximately 400 km north-east of the Project Site.

Great Barrier Reef Marine Park and other marine parks (other than general use zones)

The Great Barrier Reef Marine Park (GBRMP) is declared under the *Great Barrier Reef Marine Park Act 1975*. The Project is situated approximately 130 km directly west of the GBRMP. However, the Project is situated within the Fitzroy Catchment which discharges into the GBRMP, approximately 490 km downstream of the Project Site. The potential impacts on downstream ESAs are discussed in Section 9.2.



LEGEND

- Project Site
- Locality
- Major Road
- 100km Project Area radius

Category A ESA

- National Park
- Conservation Park
- Forest Reserve

N

Figure 22
Category A Environmentally Sensitive Areas

Saraji East Mining Lease Project

0 5 10 20
Kilometres

Scale: 1:1,200,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 10/11/2020 VERSION: 3

6.3.3 Category B ESAs

Category B ESAs are defined in the EP Regulation, and are presented in Table 34. The occurrence of these areas in relation to the Project Site is described below. In Queensland, mining activities can be undertaken in land comprising Category B ESAs, if they are authorised under the Environmental Authority (EA).

Table 34 Category B ESAs and Administering Legislation

Category B Protected Areas	Administering Legislation
Endangered Regional Ecosystems (Biodiversity Status)	VM Act
Coordinated Conservation Areas	NC Act
Critical Habitat Areas	NC Act
Areas of Interim Conservation Order	NC Act
Ramsar Wetlands	Ramsar Convention
World Heritage Areas	NC Act
International Agreement Areas	International Conventions
Marine Parks	*Marine Parks Act 2004*
Queensland Heritage Registered Places	*Queensland Heritage Act 2004*
Aboriginal Cultural Heritage Areas Torres Strait Islander Cultural Heritage Areas	*Aboriginal Cultural Heritage Act 2003* *Torres Strait Islander Cultural Heritage Act 2003*
Special Forestry Areas – feature protection areas, State forest park or scientific area	*Forestry Act 1959*
Fish Habitat Areas	*Fisheries Act 1994*
Marine Plants	*Fisheries Act 1994*
An Area to the Seaward Side of the Highest Astronomical Tide	Nil

GIS interpretation was undertaken to determine if the above ESAs are situated within or in close proximity to the Project Site. The results of this interpretation are discussed below.

Endangered regional ecosystems

REs listed as endangered (biodiversity status) are Category B protected ESAs. Three EREs are mapped by DES as occurring within the Project Site. These are listed in Table 35 below.

Table 35 Endangered Regional Ecosystems as Mapped by DES

RE	Short Description
11.3.1	*Acacia harpophylla* open woodland on alluvial plains
11.4.8	*Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains
11.4.9	*Acacia harpophylla* shrubby open forest to woodland; *Terminalia oblongata* on Cainozoic clay plains

AECOM field surveys identified these three EREs during field surveys of the Project Site (refer to Section 4.2.1). The locality of these EREs is depicted in Figure 23. No additional EREs were identified during AECOM field surveys.

Coordinated conservation areas and wilderness areas

Coordinated conservation areas and wilderness areas as declared under the NC Act are Category B protected areas. There are no coordinated conservation areas or wilderness areas within the Project Site or the greater region.

Ramsar wetlands

The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Ramsar wetlands are those that are representative, rare or unique wetlands, or are important for conserving biological diversity (DoE, 2016). There are no wetlands declared under the Ramsar Convention within the Project Site. The nearest Ramsar wetland (Shoalwater and Corio bays) is approximately 220 km south-east of the Project Site. The Shoalwater and Corio bays occur within a separate catchment (Shoalwater and Waterpark Basin) to the Project.

World heritage and international agreement areas

World heritage is the designation for places on earth that are of outstanding universal value to humanity and, as such, have been inscribed on the World Heritage List (UNESCO 2011). International agreement areas include areas such as internationally significant sites for migratory shorebirds. As detailed above, the Project occurs within the Fitzroy Basin which discharges into the Great Barrier Reef World Heritage Area (GBRWHA), approximately 490 km adopted middle thread distance downstream of the Project Site.

General use zones of a marine park

General use zones of a marine park are declared under the *Marine Parks Act 2004*. As stated above, the Project occurs within the Fitzroy Basin which discharges into the GBRWHA. The GBRWHA borders a general use zone of the GBRMP.

Places of cultural heritage significance and areas recorded in the Aboriginal and Torres Strait Islander cultural heritage register

Places of cultural heritage significance are protected by the *Queensland Heritage Act 1992*, and listed on the heritage register. Aboriginal and Torres Strait Islander cultural heritage is protected under the *Aboriginal Cultural Heritage Act 2003* (ACH Act) and the *Torres Strait Islander Cultural Heritage Act 2003*. These areas are listed on the Aboriginal and Torres Strait Islander Cultural Heritage Register.

Refer to Chapter 16 Cultural Heritage of this EIS for a discussion on cultural heritage values within and surrounding the Project Site.

Special forestry areas

Special forestry areas, including state plantation forests, state forests (scientific) and state parks, are declared under the *Forestry Act 1959*, and are administered by DES. There are no special forestry areas within the Project Site or the surrounding area.

Fish habitat area and marine plants

A declared fish habitat area (FHA) is an area protected against physical disturbance from coastal development (DAFF, 2012). No declared fish habitat areas are situated within 100 km of the Project Site. The Fitzroy River FHA extends along the Fitzroy River from the Fitzroy Barrage at Rockhampton to the coast, however this FHA is considered sufficiently far enough downstream to not be affected by the proposed project.

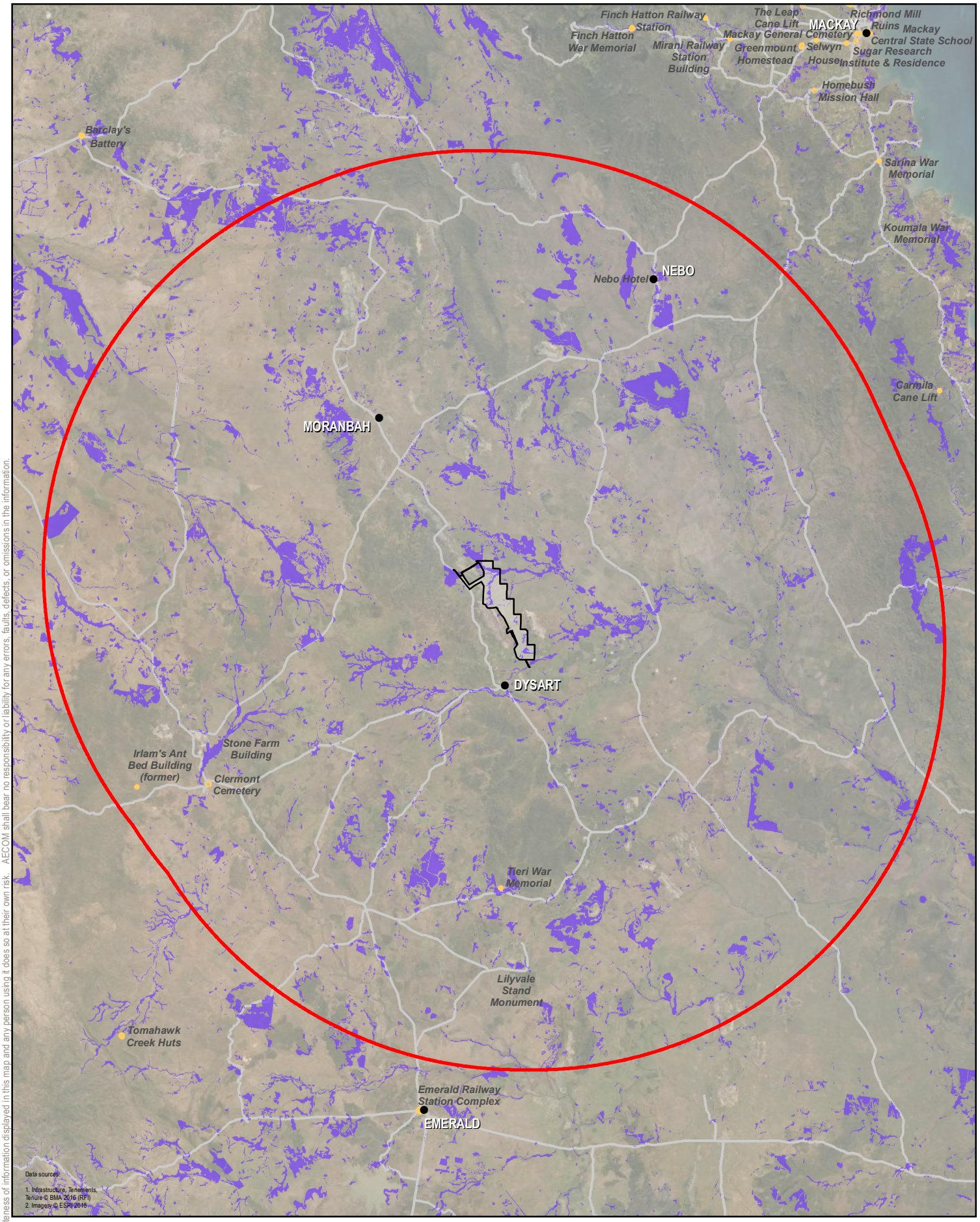
All marine plants are protected under Queensland law through provisions of the *Fisheries Act 1994*. There are no marine plants within a 100 km radius of the Project Site.

Critical habitat

Critical habitat is habitat that is essential for the conservation of a viable population of protected wildlife or community of native wildlife, whether or not special management considerations and protection are required. A critical habitat may include an area of land that is considered essential for the conservation of protected wildlife, even though the area is not presently occupied by the wildlife (NC Act). There are no declared critical habitats within or surrounding the Project Site.

An area to the seaward side of the highest astronomical tide

Areas that face the seaward side of the highest astronomical tide are a Category B protected areas. No areas within the Project Site meet this criterion.



LEGEND

- Project Site
- Locality
- Major Road
- 100km Project Area radius

Category B ESA

- Endangered Regional Ecosystem (Biodiversity Status)
- Queensland Heritage Register Place

N

Figure 23
Category B Environmentally Sensitive Areas

Saraji East Mining Lease Project

0 5 10 20
Kilometres

Scale: 1:1,200,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 22/09/2020 VERSION: 3

Filename: \\aubne1fp003\Projects\605X\60507031\4. Tech Work Area\4.99 GIS\02_MXDs\06 Environmental Impact Statement\C-1 Ecology\60507031_G101_v3_A4P.mxd

6.3.4 Category C ESAs

Category C ESAs are defined in DEHP's Code of Environmental Compliance for Exploration and Mineral Development Projects – Version 1.1[2] (Table 36). The occurrence of these areas in relation to the Project Site is further described below. In Queensland, mining activities can be undertaken in Category C ESAs.

Table 36 Category C ESAs and Administering Legislation

Category C Protected Areas	Administering Legislation
Nature Refuges and Resource Reserves	NC Act
Declared Catchment Areas; Declared Irrigation and Irrigation Project Areas; and Water Reservoirs and Drainage Areas	*Water Act 2000*
River Improvement Areas	*River Improvement Trust Act 1940*
Stanbroke Designated Landscape Area	ACH Act
State Forests or Timber Reserves	*Forestry Act 1959*
Coastal Management Districts	*Coastal Protection and Management Act 1995*
Erosion Prone Areas and Coastal Management Control Districts	*Beach Protection Act 1968*
Dams and Weirs	Nil

GIS interpretation was undertaken to determine if the above ESAs are situated within or in close proximity to the Project Site. The results of this interpretation are described below.

Nature refuges and resource reserves

A nature refuge is a voluntary agreement between a landholder and the Queensland Government that acknowledges a commitment to manage and preserve land with significant conservation values while allowing compatible and sustainable land uses to continue (DEHP, 2017b).

There are no nature refuges or resource reserves within the Project Site. Nine nature refuges and one resource reserve exist within 100 km of the Project Site. These are as follows:

- Eaglefield Creek Nature Refuge
- Bluegrass Nature Refuge
- German Creek Nature Refuge
- Lords Table Mountain Nature Reserve
- Nibbereena Creek Nature Refuge
- Norwich Park Nature Refuge
- Burwood Nature Refuge
- Caroa Island Paddock Nature Refuge
- Coolibah Nature Refuge.

A resource reserve is an area of land dedicated under the NC Act, and is administered by DES. The Homevale Resource Reserve is situated approximately 95 km from the Project Site.

None of these areas are downstream of the Project Site.

[2] Category C ESAs have been defined in the Code of Environmental Compliance for Exploration and Mineral Development Projects – Version 1.1 (DEHP). This document has been superseded however Category C ESAs are still relevant as confirmed by DES on 5 March 2018

State forests

State forests are declared under the *Forestry Act 1959* and administered by DES. There are no state forests within the Project Site. Thirteen state forests are situated within 100 km of the Project Site. These are:

- Apsley State Forest
- Blair Athol State Forest
- Bundoora State Forest
- Carminya State Forest
- Copperfield State Forest
- Crystal Creek State Forest
- Epsom State Forest 2
- Epsom State Forest 3
- Glencoe State Forest
- Junee State Forest
- Llandillo State Forest
- Rosedale State Forest
- Tierawoomba State Forest.

Declared catchment and irrigation areas

Areas of land that immediately surround water storage areas are termed ‘declared catchments’. Certain types of development proposed within declared catchment areas are referred to DES during the integrated development assessment system (IDAS) process to ensure the quality of water entering the storage facility is not degraded by proposed development (DNRM, 2010).

Within Queensland there are 20 declared catchment areas administered by DES, none of which are situated within 100 km of the Project Site.

There are no declared irrigation areas within the Project Site or downstream of the Project. There are no declared drainage areas within the Project Site.

River improvement areas

River improvement areas (RIA) are areas protected under the *River Improvement Trust Act 1940*. There are no RIAs within the Project Site.

Designated landscape area – Stanbroke Pastoral Holding

The Stanbroke Pastoral Holding designated landscape area does not occur within the Project Site. It is located approximately 60 km to the south of the township of Mount Isa.

Timber reserves

A timber reserve is land set apart and declared or deemed to be set apart and declared under the *Forestry Act 1959* as a timber reserve. There are no timber reserves in or within 100 km of the Project Site.

Critical areas and public purpose reserves

Critical areas and public purpose reserves are legislated under the *Land Act 1994* and administered by the DNRME. No critical areas and public purpose reserves were mapped within the Project Site or surrounding region.

Coastal management districts

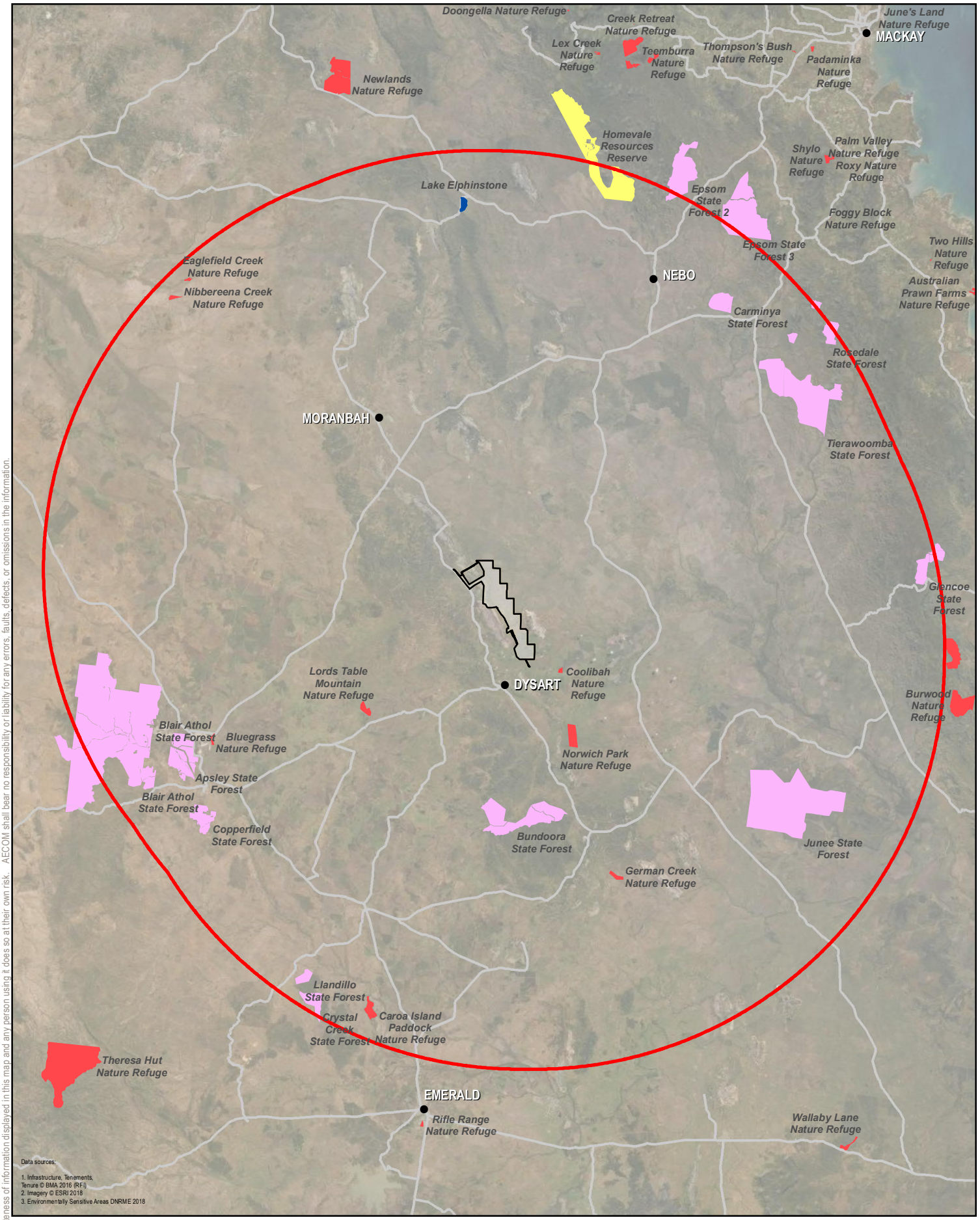
Coastal management districts occur over all tidal waters and on most land adjacent to tidal waters in Queensland (DEHP, 2012). Coastal management districts are declared under the *Coastal Protection and Management Act 1995*. There are no coastal management districts within 100 km of the Project Site.

Erosion prone areas

Erosion prone areas are declared under the *Beach Protection Act 1968*. There are no erosion prone areas within 100 km of the Project Site.

Dams and weirs

Dams and weirs owned and controlled by the Queensland Government are considered Category C ESAs. There are no dams or weirs controlled by the Queensland Government within the Project Site or the surrounding region.



LEGEND

- Project Site
- Locality
- Major Road
- 100km Project Area radius
- Wetland (Directory of Important Wetlands)

Category C ESA

- Nature Refuge
- Resource Reserve
- State Forest

N

Figure 24
Category C Environmentally Sensitive Areas

Saraji East Mining Lease Project

0 5 10 20
Kilometres

Scale: 1:1,200,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 22/09/2020 VERSION: 3

Filename: \\aubne1fp003\Projects\605X\60507031\4. Tech Work Area\4.99 GIS\02_MXDs\06 Environmental Impact Statement\C-1 Ecology\60507031_G102_v3_A4P.mxd

7.0 MNES

A detailed review of MNES occurring within the Project Site is provided as a standalone chapter in this EIS (Chapter 21 – MNES).

8.0 MSES

Matters of State Environmental Significance (MSES) include certain environmental values that are protected under Queensland legislation including:

- NC Act
- *Marine Parks Act 2004*
- *Fisheries Act 1994*
- EP Act
- *Regional Interests Planning Act 2014*
- VM Act
- EO Act.

MSES values affected by the Project are presented below in Table 37

Table 37 MSES values within the Project Footprint

MSES	Description	Present in the Project Footprint
Regulated vegetation (Endangered / Of Concern REs)	Regional ecosystems which: • are listed in schedule 1 of the *Vegetation Management Regulation 2012* • are listed in schedule 1 of the *Vegetation Management Regulation 2012* • occur within a Category B area on the regulated vegetation management map • fit the description for the regional ecosystem contained in the Regional Ecosystem Description Database.	**Yes** Regulated vegetation (Endangered and Of Concern REs) as per the MSES description occurs within the Project Site (313.29 ha).
Regulated vegetation (within the defined distance of a watercourse)	Regional ecosystems which: • occur within a Category B area on the regulated vegetation management map; and • intersect or occur within a wetland area as identified on the vegetation management wetlands map. • are located within the defined distance from the defining banks of a relevant watercourse or relevant drainage feature (being those that are identified on the vegetation management watercourse and drainage feature map).	**Yes** Regulated vegetation (intersecting a watercourse) as per the MSES description occurs within the Project Site (88.69 ha).
Regulated Vegetation (within a Vegetation Management Wetland Area)	Regional ecosystems which: • are mapped as a Category B area on the regulated vegetation management map; and • identified as a wetland on the vegetation management wetlands map.	**Yes** Wetlands as per the MSES description are mapped in the north of the Project Site, associated with RE 11.3.27b, RE 11.3.2 and RE 11.5.3.

MSES	Description	Present in the Project Footprint
Wetland and Watercourses	Means an area shown as a wetland: • in a wetland protection area; or • of high ecological significance on the Map of Referrable Wetlands • or watercourse in high ecological value waters (as defined under the Environmental Protection (Water and Wetland Biodiversity) Policy 2019, schedule 2.	**No** No wetland or watercourse protection areas occur within the Project Site.
Connectivity areas	Areas which consist of vegetation mapped as prescribed regional ecosystem that: • are of sufficient size or configured in a way that maintains ecosystem functioning; and • will remain despite a threatening process within the meaning of the Nature Conservation Act 1999.	**Yes** Connectivity areas occur within the Project Site as per the MSES description.
Protected wildlife habitat	Protected wildlife habitat includes: • an area of Essential Habitat on the Essential Habitat map for an animal or plant that is endangered or vulnerable wildlife • a high risk area on the flora survey trigger map which also contains endangered, vulnerable or near threatened (EVNT) plant species • an area which contains EVNT plants and is not shown on the flora survey trigger map • an area of habitat (e.g. foraging, roosting, nesting or breeding habitat) for an animal that is endangered, vulnerable or a special least concern animal	**Yes** Habitat for state listed species occurs within the Project Site, including: • Koala (*Phascolarctos cinereus*) (1,218.99 ha potential habitat) • Ornamental Snake (*Denisonia maculata*) (including Essential Habitat) (925.73 ha potential habitat) • Greater Glider (*Petauroides volans*) (806.67 ha) • Squatter Pigeon (*Geophaps scripta scripta*) (including Essential Habitat) (1,951.12 ha potential habitat) • Australian Painted Snipe (*Rostratula australis*) (750.14 ha potential habitat) • Grey Falcon (*Falco hypoleucos*) (2,132.17 ha potential habitat) • Short-beaked Echidna (*Tachyglossus aculeata*) (2,132.17 ha potential habitat). Estimated areas for protected fauna have been undertaken through habitat mapping where applicable.
Protected areas	This relates to protected areas as declared under the NC Act, including: • National parks • National parks (Aboriginal land) • National parks (Torres Strait Islander land) • National parks (Cape York Peninsula Aboriginal land) • Regional parks • Nature refuges.	**No.** No protected areas as per the MSES definition are present within the Project Site.

MSES	Description	Present in the Project Footprint
Fish Habitat Areas and Highly Protected Zones of State marine parks	• An area declared under the *Fisheries Act 1994* to be a fish habitat area.	**No** No state marine parks or fish habitat areas occur within the Project Site.
Waterway providing for fish passage	Any part of a waterway providing for passage of fish if the construction, installation or modification of waterway barrier works carried out under an authority will limit the passage of fish along the waterway.	**Yes** Waterways which provide for fish passage are present within the Project Site. The detailed design of the Project will determine if construction, installation or modification of waterway barrier works within these waterways will limit the passage of fish.
Marine plants	A marine plant within the meaning of the *Fisheries Act 1994.*	**No** Marine plants do not occur within the Project Site.
Legally secured offset area under State legislation	An offset area approved by the administering authority associated with a legislative or policy requirement for the provision of an offset.	**No** No legally secured offset areas are present within the Project Site.

9.0 Potential impacts

The following sections outline the potential impacts associated with the Project on terrestrial ecological values. The impact assessment discussed below is based on the maximised footprint. Disturbance calculations incorporate an additional buffer of between 50-100 m around the Project Footprint. Therefore, described impacts reflect a worst-case scenario and maximum extent of disturbance to terrestrial ecological values.

The impacts have been assessed in relation to disturbance relating to:

- surface facilities and ancillary infrastructure (direct)
- incidental mine gas (IMG) drainage network (direct).
- subsidence from underground mining (indirect).

9.1 Potential impacts on terrestrial ecology

9.1.1 Construction

Facilities and infrastructure associated with the Project includes the MIA, CHPP, water management infrastructure, roads, the IMG drainage network, as well as water and power supply to the Project Site. The construction of this infrastructure will occur in three stages:

- site preparation
- civil works including water storage and transport network and powerlines/connections
- MIA building and CHPP construction.

To manage and facilitate the construction of Project infrastructure, temporary facilities, including offices, will be constructed close to the work centres such as the MIA. The facilities will be located within the Project Footprint which may include previously disturbed areas.

The Project Site covers approximately 11,427 ha, within which 2,613.24 ha of remnant and 8,136.23 ha non-remnant vegetation exist (Table 38). Of this, 1,290.93 ha of remnant and 1,952.97 ha of non-remnant vegetation fall within the Project Footprint and may be disturbed. Eight of the nine fauna habitat types identified in Section 5.2.1 and nine of the ten REs identified in Section 4.2.1 may be impacted by the Project. Potential impact areas are quantified in **Table 40** and delineated in Figure 25 and Figure 26. This includes disturbances from all Project components, including:

- surface facilities and ancillary infrastructure (construction village, CHPP, ROM pad, MIA, process water dam, raw water dam, proposed product stockpiles, conveyor, 66 kV powerline connection, transport infrastructure corridor)
- IMG drainage network.

9.1.1.1 Potential direct impacts

Flora and vegetation communities

The total worst case disturbance area from surface facilities, ancillary infrastructure and IMG drainage is 1,071.37 ha. This area comprises approximately 179.98 ha of remnant vegetation. Table 38 below presents the breakdown of the potential direct impacts to vegetation communities and habitat types. Disturbance to each vegetation community is indicated as a percentage of the community found within the Isaac Comet Downs sub-region of the Brigalow Belt Bioregion.

Impacts on vegetation and habitat will occur throughout the life of the Project. On commencement of construction, areas required for the proposed infrastructure will be cleared. The IMG drainage infrastructure will be installed as early as possible to allow adequate time to drain gas prior to mining. This is discussed further in **Chapter 3 Project Description** of this EIS. As the footprints of these facilities will be fully developed, 100% of vegetation will be cleared from these areas with the exception of the powerline connection where clearing will only be required for towers and a narrow easement.

Surface facilities and ancillary infrastructure

The Project Footprint intersects seven REs, three of which are listed as least concern, two of concern and three endangered under the VM Act. The endangered REs, RE 11.3.1 and RE 11.4.8, are also analogous with the *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC. The proposed construction village has been located in non-remnant vegetation to reduce impact on Res. The vegetation community present in these areas is low (approximately 1 m in height) *Acacia harpophylla* (Brigalow) regrowth.

The CHPP, conveyors, product stockpiles are located within the existing Saraji Mine area and while vegetation clearing is required for all of these areas this vegetation is partly disturbed and fragmented. The future MIA and the raw water dam are located in a highly disturbed area within the Saraji Mine area and will not require removal of remnant vegetation.

It is likely that clearing impacts associated with the powerline connection and the transport and infrastructure corridor will be lower than estimated for the maximised footprint. Clearing for the powerline connection will only be required for footings and a narrow easement and as such high value biodiversity values within the powerline connection footprint will be avoided or impacts minimised. The width of the infrastructure corridor is also expected to reduce during the detailed design process.

Approximately 0.075 ha of *Dichanthium setosum* (Bluegrass) habitat occurs within the Project Footprint (also mapped as *Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin* TEC). This habitat occurs within and adjacent to the transport infrastructure corridor where the proposed overhead power transmission line is expected to span overhead with limited to no clearing required for its construction. In this area, there is low likelihood that vehicle traverses during construction will lead to increased or new weed incursions, excessive dust or the contamination of soils and water.

IMG drainage network

The IMG drainage network will disturb remnant vegetation across seven REs, three with endangered status and one of concern status under the VM Act. The endangered RE 11.4.8 and analogous TEC will experience some clearing for the network, however, the majority of the infrastructure is situated within modified grassland, shrubby *Acacia harpophylla* (Brigalow) regrowth and *Eucalyptus populnea* (Poplar Box) woodland.

Of the endangered REs, also listed as the endangered TEC *Brigalow (Acacia harpophylla dominant and co-dominant)*, approximately 43.14 ha will be cleared. In terms of total area of remnant *Acacia harpophylla* (Brigalow) communities cleared, the largest affected area is of RE 11.4.8, of which 41.02 ha will be cleared. In a regional context, this equates to approximately 0.2% of the subregional extent of RE 11.4.8 (Table 38).

In addition to reduction in extent of endangered REs and TECs, disturbance to the riparian communities which border Boomerang Creek, Hughes Creek and Plumtree Creek must also be considered. Vegetation communities associated with these creeks include *Eucalyptus* and/or *Corymbia* woodlands on alluvial plains (RE 11.3.2, RE 11.3.25, RE 11.3.4 and RE 11.3.27b). These REs form a west-east corridor for fauna movement within the Project Site. This corridor is recognised as significant at the State level under the Biodiversity Planning Assessment for the Brigalow Belt.

While design of the layout of the IMG drainage infrastructure has not yet been finalised, it is intended to restrict the number of times that the infrastructure crosses these creeks to minimise direct disturbance to this corridor. Some pipeline crossings will be required and these will be trenched crossings, with disturbed areas reinstated to stabilise the river bed and banks. Wherever possible, the wells required for IMG drainage will be installed outside of the riparian zone. With these design measures in place, riparian vegetation connectivity will largely be retained along these creek systems during the construction phase of the Project.

The gas drainage network will be constructed in a grid like pattern. As a result, vegetation will still occur in patches between the gas drainage infrastructure. While a number of patches of vegetation communities including TECs and REs will be retained within the grid formed by the IMG management infrastructure, these patches will be isolated and fragmented and may not contribute significantly to the conservation of these vegetation communities at a local or regional level.

Indirect impacts such as dust from gas management infrastructure construction activities may result in the degradation of vegetation adjacent to works. These impacts are also discussed in Section 9.1.2.

Table 38 Potential Disturbance to Vegetation Communities during construction

RE	Status [1]			Relevant areas (ha)				Total Extent within Subregion	Total Direct Impacts	
	EPBC	Biodiv	VMA	Project Site	Project Footprint[2]	Surface Facilities	IMG drainage network		Total Direct Impact Area (ha)	% of Subregion
RE 11.3.1	E	E	E	15.76	6.58	0.45	1.51	22,355	1.96	0.01
RE 11.3.2	NL	OC	OC	151.15	73.33	16.43	2.70	37,797	19.13	0.05
RE 11.3.4	NL	OC	OC	23.05	0.01	0.01	-	9,062	0.01	0.01
RE 11.3.25	NL	OC	LC	192.08	79.60	6.50	5.41	47,044	11.91	0.02
RE 11.3.27b	NL	OC	LC	16.64	11.17	-	3.05	976	3.05	0.32
RE 11.4.4	E	OC	LC	1.73	0.075	0.075	-	1,931	0.075	0.01
RE 11.4.8	E	E	E	322.16	236.02	24.13	16.89	20,023	41.02	0.20
RE 11.4.9	E	E	E	188.57	32.57	-	6.66	23,782	6.66	0.03
RE 11.4.13	NL	OC	LC	222.06	37.94	37.94	-	4,863	37.94	0.78
RE 11.5.3	NL	NCP	LC	1,480.04	813.63	34.72	23.50	71,713	58.22	0.08
Non –remnant	NL	NL	NL	8,136.23	1,952.97	602.23	289.16	NA	891.39	NA
Total				**10,749.47**	**3,244.0**	**722.49**	**348.88**	**NA**	**1,071.37**	**NA**

Note 1: Status E – endangered; OC – of concern; LC – least concern; NCP – no concern at present; Non-remnant – non- remnant vegetation; NL – not listed

Note 2: Project Footprint impact areas are comprised of direct impacts (surface infrastructure and IMG drainage network) as quantified in this table and indirect impacts (subsidence)..

Fauna and habitats

Surface facilities and ancillary infrastructure

Clearing for the proposed infrastructure will have direct impacts on fauna and fauna habitat during vegetation clearing activities. Habitat types directly impacted include *Eucalyptus* and/or *Corymbia* Open Woodland, Brigalow or Belah Woodland, River Red Gum Riparian Woodland, Dawson Gum and Brigalow Woodland, modified grasslands, shrubby brigalow regrowth with gilgai, oxbow wetlands and dams (see Figure 26). The locations for the proposed construction village has been situated where no remnant vegetation is mapped. However, the area does provide suitable habitat for Ornamental Snake (*Denisonia maculata*) with gilgai and cracking clay present in both areas, although ground timber was absent.

The proposed transport and infrastructure corridor may cause some severance of fauna dispersal opportunities. The road alignment passes largely through modified grassland habitat however the alignment will bisect a large patch of *Eucalyptus populnea* (Poplar Box) woodland and will require crossings over Boomerang Creek, Hughes Creek, Plumtree Creek, Spring Creek and Phillips Creek. The riparian communities surrounding these creek crossings have a comparatively high faunal diversity. Clearing of these areas will reduce fauna dispersal as well as food and roosting/nesting resources associated with this corridor. Fauna groups at most risk include ground mammals, reptiles and amphibians. Unlike birds, these groups generally have lower mobility and require the protection of vegetated corridors to disperse. However given the width of the proposed clearing, the impact on fauna from the construction of the transport and infrastructure corridor is likely to be minimal.

The proposed infrastructure to the west of the Saraji Mine including the CHPP, MIA, conveyor, ROM pad, stock piles and dams are located close to existing mining areas and while there is some remnant vegetation in the footprints of these facilities, this vegetation has limited connectivity and habitat value. Clearing associated with these facilities is likely to have minimal impacts on fauna species utilising the Project Site.

Essential Habitat for Squatter Pigeon (*Geophaps scripta scripta*) exists in the north of the Project Site which will be intersected by the proposed rail loading balloon loop and the transport and infrastructure corridor. This is discussed further in Section 9.1.4.2.

IMG drainage network

Impacts on fauna from installation and operation of the IMG drainage infrastructure may occur from:

- loss of habitat from direct clearing of vegetation, including habitat trees, which will restrict the ability of fauna to move across the Project Site
- injury or mortality to fauna present during vegetation clearing activities and surface infrastructure construction.

Potential impacts on different habitat types across the Project Site are discussed in Table 39 below.

Table 39 Potential direct impacts associated with the IMG drainage network on habitat types within the Project Site

Vegetation Community	Impact Description
Brigalow – Dawson Gum and Brigalow Woodland/Brigalow or Belah Woodland/Shrubby Brigalow regrowth with gilgai	Remnant Brigalow habitat within the IMG occurs largely as several patches of RE 11.4.8 and RE 11.4.9; however, significant areas of shrubby brigalow regrowth will also be disturbed. IMG management infrastructure will be required to cross through these patches at a number of locations, creating gaps in the brigalow habitat of 10 m to 20 m in width, as well as cleared pads for gas wells. This will reduce the extent of this habitat as well as reducing connectivity and restricting animal movement. As outlined in Section 5.2.1, abundance and diversity of fauna in the Brigalow habitat was generally low; however, brigalow habitat is associated with several reptiles of conservation significance.
River red gum riparian woodland and oxbow wetlands	Riparian and alluvial woodlands were identified during field surveys as supporting a high abundance and diversity of fauna, especially arboreal mammals and also form the majority of the State biodiversity listed corridor through the Project Site. Large, mature *Eucalyptus camaldulensis* (River Red Gum) trees present in riparian habitats frequently contained hollow limbs which provide denning sites for arboreal mammals and microbats and nesting sites for many bird species such as parrots, owls and Dollarbird (*Eurystomus orientalis*). Riparian and alluvial woodlands within the IMG drainage network are largely associated with Boomerang Creek, Plumtree Creek, Hughes Creek and the oxbow wetlands in the north-west of the Project Site and as such, direct impacts will be limited to the crossings at these locations. Placement of IMG infrastructure in riparian areas will also be avoided wherever possible. While crossings of these creeks will reduce connectivity by creating gaps of 20 m to 50 m in width in the case of vehicle tracks, and 10 m to 20 m in width in the case of pipeline crossings, Overall, the loss of riparian habitat is minimal. Arboreal mammals will be able to move across the crossings provided that tall trees are retained on either side. Fauna using the riparian corridor may also be discouraged by noise, light and other activity associated with the installation and management of the IMG drainage infrastructure, although such disturbance will be intermittent and noise levels are not predicted to be particularly significant. Overall, significant degradation of habitat values is not expected, and minor degradation of connectivity will occur.
Eucalyptus and/or *Corymbia* open woodlands	Within the IMG drainage network, this habitat type consists of *Eucalyptus populnea* (Poplar Box) woodlands on alluvium or Cainozoic sandy plains. This community was identified as supporting a range of woodland bird species and a high density of hollows that may support arboreal mammals particularly where a diversity of myrtaceous tree species persist. Despite this, arboreal mammal diversity was found to be relatively low in this habitat type with the exception of microchiropteran bat species which were regularly recorded. Of the remnant vegetation communities within the Project Site, *Eucalyptus* and/or *Corymbia* open woodlands will experience the most significant clearing and fragmentation for the IMG drainage network. Although some reduction in fauna dispersal opportunities is expected, this community was typically open and as such impacts from clearing for tracks, wells and pipelines will not be as pronounced as some other communities. Movement for small bodied species may be impeded however the species assemblage noted to be using this habitat type largely comprised highly mobile species. Overall, impacts to this community as a result of the IMG drainage network are not considered to be significant to fauna. Retention of habitat trees and felled timber

Vegetation Community	Impact Description
	for microhabitat will reduce impacts by promoting dispersion and providing habitat resources.
Natural grasslands	Natural grassland habitat is not affected by the IMG drainage infrastructure.
Modified grassland	Large areas of modified grassland will be affected by the IMG management infrastructure. This habitat type is identified as having relatively low habitat values due to a lack of native vegetation. However, it is utilised by Eastern Grey Kangaroo (*Macropus giganteus*), Squatter Pigeon (*Geophaps scripta scripta*) and other bird species such as Brown Quail (*Coturnix ypsilophora*) which do not have specific habitat preferences and utilise a wide range of native and modified habitats. Given the widespread extent of this habitat throughout the Project Site and sub-region, it is unlikely that loss of this habitat will have any significant impacts on fauna.
Dams	No dams are expected to be impacted by the IMG drainage network. Water resulting from the IMG network will be collected and transferred to the process water dam. The process water dam is not likely to provide important habitat.

The above impacts on fauna are based on the area of vegetation cleared once the construction of the IMG drainage network is completed (Table 40). However, the gas drainage network will be undertaken progressively, such that loss of habitat values will be gradual and there will be opportunities for fauna to move into adjacent habitat or into areas that will have already undergone partial rehabilitation. Suitable habitat is available to the north and east of the proposed mining footprint. Competition for resources and territory within these new areas may affect some species; however, most species present on site are relatively resilient and do not have highly specific habitat preferences. Additionally, an increase in predation may occur as a result of dispersing.

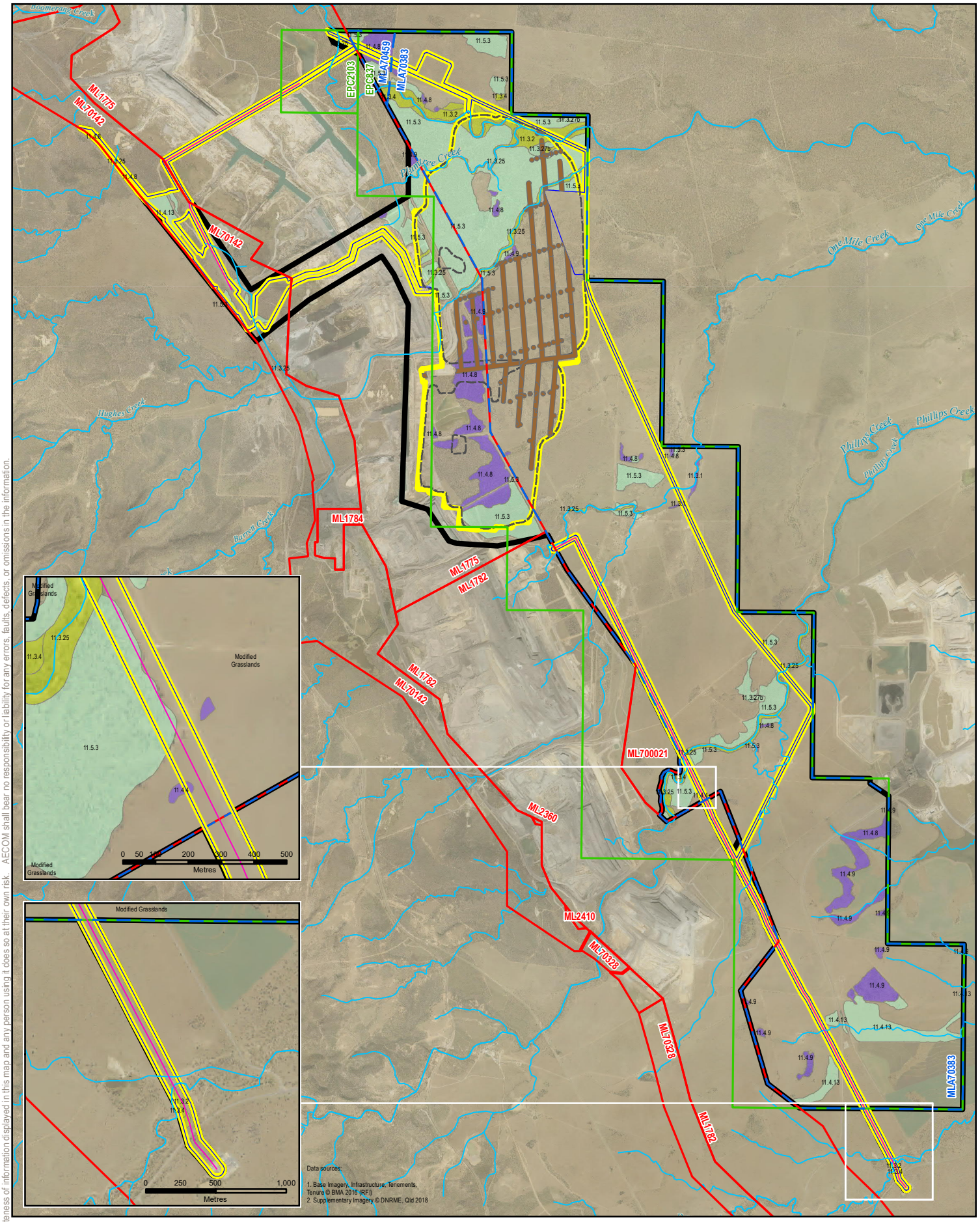
Many of the fauna species observed within the Project Site are relatively tolerant to disturbed habitats and may continue to utilise remaining habitat in spite of fragmentation and noise, light and activity disturbance. As installation of the IMG infrastructure progresses, food and shelter resources will be diminished and density of fauna in the area may also diminish.

The main west-east corridor associated with Boomerang Creek, Plumtree Creek and Hughes Creek, will be largely retained and fauna use and movement along this corridor should remain possible.

Overall, impacts on fauna from the IMG management infrastructure are largely related to loss of habitat trees and reduced connectivity.

Table 40 Potential disturbance to fauna habitat types during construction

Fauna Habitat Type	RE associations	Project Site (ha)	Project Footprint (ha)	Surface Facilities (ha)	IMG drainage network (ha)	TOTAL disturbance surface facility and IMG drainage network (ha)
River Red Gum Riparian Woodland	RE11.3.25	192.08	79.60	6.50	5.41	11.91
Eucalypts and/or *Corymbia* open woodland	RE11.3.2, RE11.3.4, RE11.4.13, RE11.5.3	1,876.30	924.91	89.10	26.20	115.30
Dawson Gum and Brigalow Woodland	RE11.4.8	322.16	236.02	24.13	16.89	41.02
Brigalow or Belah Woodland	RE11.3.1, RE11.4.9	204.33	39.15	0.45	8.17	8.62
Oxbow Wetland	RE11.3.27b	16.64	11.17	0	3.05	3.05
Natural Grasslands	RE11.4.4	1.73	0.075	0.075	0	0.075
Modified Grasslands	NA	6,252.43	1,229.62	383.25	193.75	577.0
Shrubby Brigalow regrowth with gilgai	NA	1,776.14	652.63	188.82	95.21	234.03
Dams	NA	107.66	70.72	30.16	0.20	30.36
Total		**10,749.6**	**3,243.90**	**722.49**	**348.88**	**1,071.37**



LEGEND

- Project Site
- Project Footprint
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Limit Of Subsidence
- IMG Drainage Network
- Surface Facilities and Ancilliary Infrastructure
- 66kV Powerline
- Watercourse

Biodiversity Status Regional Ecosystems

- Endangered
- Of Concern
- Not of Concern

N

Figure 25
Potential Impacts on Vegetation Communities and Flora

Saraji East Mining Lease Project

0 0.5 1 2
Kilometres

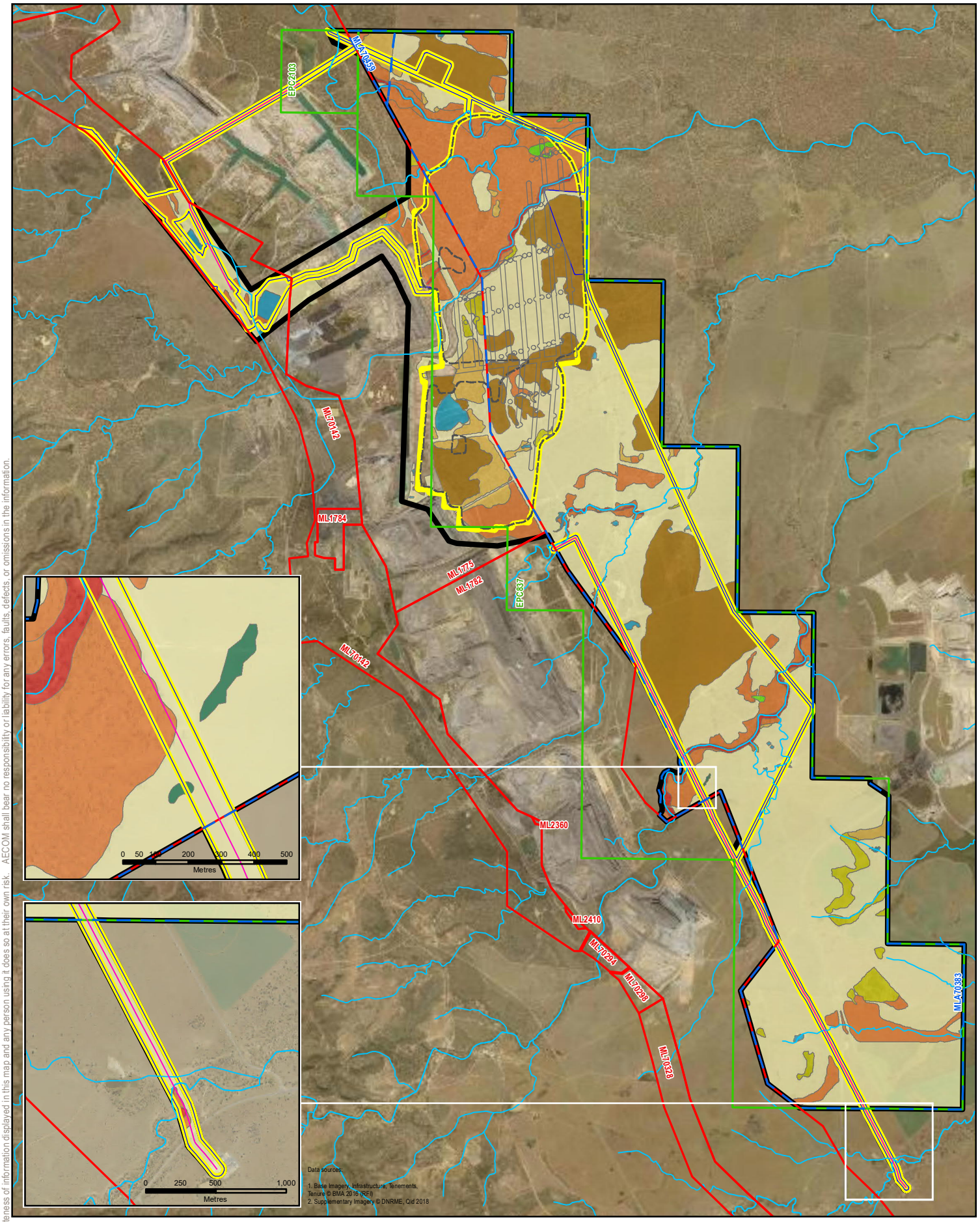
Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 10/11/2020 VERSION: 6

Filename: \\aubne1fp003\Projects\605X\60507031\4. Tech Work Area\4.99 GIS\02_MXDs\06 Environmental Impact Statement\C-1 Ecology\60507031_G104_v6_A4P.mxd



LEGEND

- Project Site
- Project Footprint
- Exploration Permit Coal (EPC)
- Mining Lease (ML)
- Mining Lease Application (MLA)
- Limit Of Subsidence
- IMG Drainage Network
- Surface Facilities and Ancilliary Infrastructure
- 66kV Powerline
- Watercourse

Fauna Habitat Type

- River red gum riparian woodland
- Eucalyptus and Corymbia open woodland
- Dawson gum and brigalow woodland
- Brigalow and belah woodland
- Oxbow wetland
- Natural grasslands
- Modified Grasslands
- Shrubby Brigalow Regrowth with Gilgai
- Dams

N

Figure 26
Potential Impacts on Fauna Habitat Types

Saraji East Mining Lease Project

0 0.5 1 2
Kilometres

Scale: 1:110,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

BHP

DATE: 16/10/2020 VERSION: 5

9.1.1.2 Potential indirect impacts

Potential indirect impacts associated with disturbance during the construction phase include:

- erosion and soil loss
- dust impacts
- edge effects
- noise and light impacts
- mortality or injury of fauna from traffic
- pests and feral fauna
- weeds.

Erosion and soil loss

Soil erosion may occur in areas disturbed by activities associated with the Project. Where these activities occur on dispersive soils and/or on slopes, mobilisation of sediment into watercourses can occur. Impacts to aquatic ecosystems can include build-up of sediment in waterholes with a resultant reduction in available microhabitat, and smothering of aquatic plants and substrate (refer to **Chapter 7 Aquatic Ecology** of the EIS for further details).

Erosion can remove the most productive part of the soil profile, the topsoil, resulting in a greatly reduced opportunity for natural regeneration of vegetation communities (unless stock piled). Impacted areas most susceptible to erosion include floodplain areas and riparian vegetation associated with Boomerang Creek, Plumtree Creek, Hughes Creek, One Mile Creek, Spring Creek and Phillips Creek, as well as those vegetation communities associated with erosive sand or silt land zones.

Topsoil resources can be protected by removing topsoil altogether from areas of high disturbance and setting the topsoil aside for reuse in rehabilitation programs. Where topsoil is left in situ in disturbed areas, erosion and sediment control measures are required to minimise loss of topsoil. These are discussed in more detail in **Chapter 5 Land Resources and Soil** of this EIS.

Dust impacts

Dust impacts generated during the construction of the Project may negatively affect vegetation.

Localised dust effects are likely to arise during the following activities:

- vegetation clearing and earthworks associated with construction of surface facilities such as the construction village and access road, the MIA, CHPP, ROM pad, rail balloon loop and conveyor. Dust from these activities will occur over a relatively short duration, typically several months. Dust plumes may affect vegetation adjacent to these areas.
- vegetation clearing, earthworks and vehicle movements associated with installation of the IMG management infrastructure. This will occur at varying locations across the underground mine footprint throughout the life of the mine and will affect vegetation in the immediate vicinity of works for several months at a time.
- dust from stockpiles at the MIA, CHPP and train load out. Dust control measures are proposed as specified in **Chapter 11 Air Quality** of the EIS, and should minimise any significant dust impacts in adjacent areas.

Deposition of airborne dust, sand and soil may have potential impacts on vegetation if excessive levels are sustained over extended periods. When dust settles on plant foliage, it can reduce the amount of light penetration on the leaf surface, block and damage stomata, and slow rates of gas exchange and water loss. Diminished ability to photosynthesise due to physical effects may result in reduced growth rates of vegetation and decreases in floral vigour and overall community health. The potential effects of dust deposition on vegetation are determined by a number of factors including:

- the characteristics of leaf surfaces, such as surface roughness, influencing the rate of dust deposition on vegetation
- concentration and size of dust particles in the ambient air and its associated deposition rates
- local meteorological conditions and the degree of penetration of dust into vegetation.

Some additional localised dust deposition across the proposed underground mine footprint may occur immediately adjacent to access roads, drilling pads and other areas disturbed by the IMG drainage network and surface infrastructure.

The dominant woodland species within the Project Site typically exhibit physiological qualities that limit sensitivity to dust deposition. The sclerophyllous foliage of *Eucalyptus*, *Acacia* and *Corymbia* species is generally pendulous (i.e. points down), with a thick smooth cuticle that does not encourage particulate matter to remain on the surface. The dominant woodland species are also generally hardy and well adapted to adverse conditions such as extended dry conditions and low nutrient soils. Grassland species are generally more tolerant of dust due to the lack of surface area available for dust particles to settle on.

Vegetation situated in close proximity to construction activities may become coated with dust and suffer some of the impacts discussed above; however, this will be short term and unlikely to cause any significant damage. Vegetation immediately adjacent to access tracks used for the IMG drainage network may also suffer some dust deposition from vehicle movements, however, will not be continuously exposed to dust. The transport/infrastructure corridor will provide the primary access to the construction village and therefore adjacent vegetation will suffer from more continuous exposure to dust impacts. However, vegetation adjacent to the transport/infrastructure corridor is primarily non-remnant shrubby regrowth and modified grasslands with several disparate patches of remnant vegetation.

Use of water sprays to control dust in exposed areas is likely to be sufficient to prevent any long term impacts.

Edge effects

Fragmented vegetation communities will be subjected to increased edge effects, which when considered in combination can reduce the effective size of habitat fragments. The proposed IMG infrastructure will, in particular, lead to creation of a large number of habitat patches which may be subject to edge effects. To a lesser extent, construction of other surface facilities and infrastructure will also create edges adjacent to remnant vegetation patches.

Edge effects can include:

- increased risk of weed invasion from disturbed areas
- increased exposure of fauna to predation due to increased visibility
- microclimatic changes associated with increased sunlight
- increased weed proliferation.

Weeds are already prevalent and distributed across the Project Site. However, there is a risk that disturbance to native vegetation, changes to microhabitat and mobilisation of earthmoving equipment and materials may introduce or exacerbate weeds within the Project Site.

Ground dwelling fauna are most at risk from increased predation around the edges of remnant habitat as fauna are more visible and accessible. Although there is limited ground dwelling fauna present in the Project Site, this may further reduce populations.

As most of the vegetation within the proposed underground mine footprint is open woodland to grassland, significant vegetation changes are not likely to occur as a result of increased exposure to sunlight along the edges of remnant vegetation.

Noise and light impacts

Secondary impacts to fauna include disturbance from noise and light during construction of surface facilities and infrastructure and IMG management infrastructure. Fauna will generally move away from noise and light sources as these may be perceived as a threat. Acclimatisation by some species is likely to occur over the medium to long term and many of the species identified in the Project Site are known to occur in areas subject to noise, light and general activity.

Construction of the IMG management infrastructure will result in noise disturbance and, in the case of well installation, which will occur as a 24-hour activity, light disturbance. This disturbance will be short term in each location as the infrastructure is installed progressively from west to east across the proposed mine footprint and fauna disturbed by noise or light will be able to temporarily move into adjacent habitat. Fauna present within the mine footprint area are expected to either habituate to the disturbance or temporarily move away.

Overall, some disturbance to fauna is expected from light and noise across the Project Footprint and this may have short term impacts on feeding and resting behaviour which in turn can affect animal health. It is also possible that fauna particularly sensitive to noise and light will become locally extinct within the Project Footprint. Long term effects are not anticipated for most fauna species identified as these species are expected to habituate to higher noise and brighter light levels.

Mortality or injury

Conflict between site traffic and fauna is expected to occur, particularly within the gas drainage footprint and at the construction villages and transport/infrastructure corridor.

Development of the gas drainage network will require the construction of access roads for installation and future maintenance of infrastructure. Construction and maintenance activities will be undertaken predominantly during daylight hours. Given this, reptiles are the fauna group most likely to be affected, as they utilise roads to gather warmth and seek prey. Macropods (kangaroos and wallabies) are more likely to be collided with at sunrise, sunset and periodically during the night.

Pests and feral fauna

The survey area supports populations of Rabbits (*Oryctolagus cuniculus**), Foxes (*Vulpes Vulpes**), Pigs (*Sus scrofa**), Feral Cats (*Felis catus**), Wild Dogs (*Canis lupus dingo/ familiaris**), house mouse (*Mus musculus**) and Cane Toads (*Bufo marinus**). Ponds are likely to be created from subsidence impacts and may vary from areas of intermittent inundation to semi-permanent ponds. Ponds will potentially create new habitat opportunities for some of the pest fauna species recorded including Cane Toad (*Bufo marinus**) and pig (*Sus scrofa**). It is unlikely that the proposed works will significantly result in the further proliferation of the remainder of these species or the introduction of further feral vertebrate species.

The introduction of exotic ant fauna is a risk due to import of construction materials. Yellow Crazy Ants (*Anoplolepis gracilipes**) and Fire Ants (*Solenopsis invicta**) are exotic ants that have the potential to affect native flora, fauna and ecological communities. These ants are capable of being transported from infested sites to new construction sites on equipment or within materials. While efforts to control spread of both of these ant species have been quite effective, the spread of ants to new areas is a potential issue and needs to be monitored. No exotic ants are known to occur within the Project Site.

The construction of water storages and dams has the potential to create conditions suitable for a build-up of biting insects. Biting pests such as mosquitoes can rapidly increase populations when appropriate breeding conditions are provided.

Weeds

A diversity of weeds are already prevalent and distributed across the Project Site, including 40 exotic species, 11 of which are considered to be 'Restricted Matter' under the *Biosecurity Act 2014*, eight of which are WoNS and nine considered weed species under the Isaac Regional Biosecurity Plan.

There is a risk that disturbance to native vegetation and mobilisation of earthmoving equipment and materials may introduce or exacerbate weeds within the Project Site.

The most likely causes of weed dispersal will be through the movement of soil and attachment of seed (and other propagules) to construction vehicles and machinery involved with clearing of vegetation and stockpiling mulch and topsoil during earthworks.

9.1.2 Operation

Mining for the Project will occur progressively in a west to east direction. Once the coal gas seam has undergone pre-drainage of IMG, the gas drainage surface infrastructure will be decommissioned and above ground infrastructure removed. Longwall mining will then be undertaken in these areas. It should be noted that the period of time between installation of the gas wells and the commencement of underground longwall mining will vary. In some cases, an estimated 15 years may occur between the two activities. Mining of each longwall is expected to take one to three years, and subsidence will be progressive as mining advances. Potential subsidence impacts within the IMG management infrastructure footprint have been excluded from the subsidence impact calculations as impacts for these areas have already been captured in the vegetation clearing and habitat loss calculations.

The proposed underground longwall mining operations will result in a varying degree of ground surface subsidence. Current modelling indicates the potential of ground subsidence between 0 m and 3.5 m. More information is provided in **Appendix B-2 Subsidence Modelling** of this EIS.

Subsidence does not require actual clearing of vegetation, but changes to local topography soils and hydrology as a result of subsidence can potentially affect vegetation and impact on habitat resources. The impacts described below assume full extent of subsidence and that all impacts will result in a negative impact to habitats. As such they are considered worst case scenario.

9.1.2.1 Potential indirect impacts

Flora and vegetation communities

Prior to subsidence, vegetation will already have been disturbed by installation of IMG management infrastructure as described in Section 9.1.1, leaving a mosaic of remnant and modified vegetation across the proposed underground mine footprint. Subsidence may cause a range of additional changes in remaining flora and vegetation communities:

- trees and other plants will be subject to localised changes in topography and tension cracking may occur at the surface, which could affect individual plant health
- localised changes in topography will alter drainage characteristics across the Project Site and could lead to water ponding within surface water drainage lines.

The vegetation communities within the predicted subsidence footprint include seven REs, as well as the *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC. These REs occur in several patches within the subsidence area with a combined total area of 1,110.95 ha. A total of 202.92 ha of this figure is attributed to *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC which may potentially be subjected to subsidence-related changes. It should be noted that this area does overlap with the direct impacts from the IMG drainage network.

Soil movement and tension cracking

Tension cracks may develop adjacent to the pillars where slopes are greatest. These tension cracks form as the panel area subsides and the areas supported by the pillars remain in place. Movement in soil profiles and the formation of cracks and fissures can lead to stress on the roots of trees and shrubs and localised root shearing. In turn, these effects can lead to the decline and death of trees and shrubs. Where cracking occurs in grassland, minimal impact is expected as root systems are small and restricted to the surface soil layers. This will be the case for the modified grasslands and much of the low shrubby brigalow regrowth with gilgai within the subsidence footprint.

For individual trees and shrubs, disturbance of the root ball from tension cracking, mechanical shaking during active subsidence, or ground tilt can all result in tree mortality or tree fall. Less immediate changes such as vegetation stress from either mechanical disturbance or water table change can result in foliar discolouration, partial defoliation or increased susceptibility to pathogenic attack (Coops *et al.* 2004). The effects of these changes are not always immediate (Ives, 1995). Given the general resilience of Eucalypts to extreme environmental conditions (e.g. fire, drought and intense rainfall), subsidence effects associated with gradual changes may not become apparent for several years, but may be more likely in areas where moisture conditions are more critical, particularly in riparian corridors. Effects on vegetation condition as a result of subsidence, particularly in deep rooted canopy species, can take years to manifest, and may even go unnoticed until drought stress induces crown dieback (NSW Scientific Committee, 2005).

The extent to which surface cracking and associated changes will occur as a result of the Project is difficult to predict as this is influenced by a wide range of characteristics. Therefore, it is difficult to estimate the extent to which vegetation may be adversely affected as a result of the Project. While it may be possible to manage subsidence related effects to some extent, for example by repairing cracks in areas of native vegetation, some impacts will be unavoidable. In areas where earthworks are required to reduce surface cracking, vegetation may be impacted during the resurfacing process. Remnant woodland areas requiring infilling or grouting may be at risk of impacts from mitigation procedures.

Ongoing monitoring of the occurrence of and effects of surface cracking and rapid ground movement will be required to identify the potentially affected vegetation and to allow management measures to be implemented. As there will be permanent changes in the land surface, rehabilitation with the same species occurring pre-mining may not be practical.

Changes in drainage characteristics

Depression of the surface due to subsidence can lead to water ponding after heavy rain or in areas traversed by creeks or ephemeral streams. Vegetation in ponded areas will be inundated periodically or, in some areas, for longer periods of time. Where ponding is temporary, species (such as *Eucalyptus tereticornis*) that can tolerate periodic inundation will remain (Jackson, 2005). Where vegetation is intolerant to this inundation (such as *Eucalyptus populnea*), it will die back and, in areas subject to temporary inundation, may be replaced by more tolerant vegetation, including weeds.

Subsidence will also affect the riparian corridors of Boomerang Creek, Plumtree Creek and Hughes Creek. In the short to medium term, these watercourses will become more pond-like in nature, with flows potentially restricted and changes in inundation levels along riparian zones.

Through a combination of erosion of pillars and the main heading and infilling due to sediment transport, these creek channels are expected to re-establish over time. During this time, changes in riparian vegetation are expected as vegetation that is not tolerant to ponding will tend to die back in the subsided areas, potentially being replaced by vegetation more tolerant to inundation. Along the pillars and main heading, water availability to riparian vegetation may be reduced and erosion may also destabilise large trees along these sections of the creeks. A Subsidence Management Plan has been developed to address management of subsidence.

Drawdown from water extraction

Vegetation within the Project Site is not considered groundwater dependent and no known aquatic, terrestrial or subterranean groundwater dependent ecosystems have been mapped within the Project Site as per the National Atlas of groundwater dependent ecosystems. The majority of floral assemblages within the area are characterised by drought tolerant species with low physiological sensitivity to water availability. Froend and Loomes (2004) suggest that groundwater is of reduced importance to vegetation when the water table is at depths greater than 10 m. They assume, however, that at depths between 10 m and 20 m there is still a probability of vegetation groundwater use, but this is thought to be negligible in terms of total plant water use.

The Tertiary and Permian sediments within the Project Site have groundwater levels at depths greater than 15 m below ground level (refer to **Chapter 9 Groundwater** of the EIS). This depth is also outside the accessible reach for Eucalypt vegetation (Zolfagher et al, 2014) and the root biomass of *Acacia harpophylla* (brigalow) which is typically shallows <2m (Moore *et al.*, 1967). Open woodland communities would obtain groundwater from the soil moisture stored in the capillary fringe of predominantly clay soils. Riparian communities of the Project Site utilise soil moisture retained in stream banks (alluvium material) from ephemeral flows.

The proposed underground mining and gas drainage operations will necessitate dewatering and depressurisation; however, underground mining will take place at depths of up to 780 m. This is unlikely to have significant effects on the shallow perched groundwater resources associated with the Quaternary alluvium and Tertiary sediments (refer to **Chapter 9 Groundwater** of the EIS for further details).

Fauna

Although some habitat within the proposed underground mine footprint will have been cleared or fragmented by IMG infrastructure as discussed in Section 9.1.1.2, it is likely that a number of native fauna tolerant to disturbance may still be present. As subsidence occurs, further changes to vegetation and habitats on the underground mine footprint may occur. These include:

- the loss of habitat trees that provide roosting and nesting habitat as well as food resources
- the conversion of some areas from grassland or woodland to ponds
- modification of riparian zones along Boomerang Creek, Plumtree Creek and Hughes Creek.

These changes are gradual and this may provide opportunity for fauna to move to adjacent areas to the north and east as food and nesting resources in the Project Site are diminished.

As detailed above, in areas of maximum subsidence, significant alteration to vegetation can occur, with surface cracking likely to result in root failure and premature death of individual trees. Vegetated areas at risk of subsidence include the *Eucalyptus* and/or *Corymbia* Open Woodlands, River Red Gum Riparian Woodlands and Brigalow communities in the remaining vegetated patches situated between the gas drainage wells and associated infrastructure. As detailed in Section 5.2.1, the river red gum riparian and alluvial woodlands provide important local habitat for a number of species, especially arboreal mammals such as the Common Brushtail Possum (*Trichosurus vulpecula*) and the Greater Glider (*Petauroides volans*).

Brigalow communities including Brigalow or Belah woodland, Dawson gum and brigalow woodland and shrubby brigalow regrowth with gilgai as well as river red gum riparian woodland all provide potential habitat for the Ornamental Snake (*Denisonia maculata*). Eleven records of this species are known from within this area and consequently Essential Habitat has been mapped for this species within the Project Footprint (811.01 ha).

It is likely that the nature of the wildlife corridor provided by the Boomerang Creek, Plumtree Creek and Hughes Creek complex will change significantly during the course of mining. In particular, a number of fauna habitat trees may be lost. This will affect the ability of arboreal mammals to disperse through the landscape. Generally bird species are highly mobile and will be able to fly over or through disturbed areas in order to access alternative habitat. Microchiropteran bats will be able to continue to forage over disturbed areas if their roosts remain unaffected.

Ground dwelling fauna will be less affected by subsidence impacts as ground cover is not likely to be significantly affected and may in fact be increased if dead trees fall to the ground. Loss of shade trees may increase ground temperatures which may be problematic for some ground dwelling fauna, although reptiles are not likely to be particularly sensitive to this. Any exposed areas caused by vegetation clearing or die back will expose ground dwelling fauna to predation by native and non-native predators. Progressive rehabilitation of mined areas will offer alternative habitat to many fauna species and thus impacts may be reduced. However re-colonisation of rehabilitated areas by ground fauna may be slow where feeder sources (such as remnant woodland) are isolated from the rehabilitated areas.

A number of ponds are likely to be created from subsidence impacts and may vary from areas of intermittent inundation to semi-permanent ponds. Ponds will potentially create new habitat opportunities for some fauna groups. A relatively high diversity of amphibians was recorded in the Project Site and an increase in aquatic habitats will potentially benefit this fauna group in turn increasing food resources for their predators such as the conservation significant species, Ornamental Snake (*Denisonia maculata*). Cane Toads (*Bufo marinus**) are present, and availability of aquatic habitat may increase their numbers. The availability of permanent water will also benefit larger fauna using the site, including Eastern Grey Kangaroo (*Macropus giganteus*) and pest species such as Feral Pigs (*Sus scrofa**).

The maximum extent these impacts will affect fauna habitat and vegetation communities is outlined in Table 41 and described in the following sections.

Table 41 Impacts to vegetation and fauna habitat during operation

Fauna habitat type	RE associations	Project Site (ha)	Project Footprint (ha)	Subsidence impact area (ha)
River Red Gum Riparian Woodland	RE11.3.25	192.08	79.60	67.69
Eucalyptus and/or *Corymbia* Open Woodland	RE11.3.2, RE11.3.4, RE11.4.13, RE11.5.3	1,876.30	924.91	809.61
Dawson Gum and Brigalow Woodland	RE11.4.8	322.16	236.02	195.00
Brigalow or Belah Woodland	RE11.3.1, RE11.4.9	204.33	39.15	30.53
Oxbow Wetland	RE11.3.27b	16.64	11.17	8.12
Natural Grasslands	RE11.4.4	1.73	0.075	0
Modified Grasslands	NA	6,252.43	1,229.62	652.62
Shrubby Brigalow regrowth with gilgai	NA	1,776.14	652.63	368.60
Dams	NA	107.66	70.72	40.36
Total		**10,749.47**	**3,243.90**	**2,172.53**

9.1.2.2 Additional indirect impacts

Potential indirect impacts during the operational phase are similar to those described during the construction phase but will primarily relate to activities, maintenance and subsequent vehicle associated with the surface facilities and IMG management infrastructure.

Surface facilities such as the future MIA, CHPP, ROM pad and conveyors are located in areas which are already highly modified. Noise and light from these areas is unlikely to increase impacts on fauna due to lower densities of fauna utilising these areas and due to noise and light impacts from existing operations.

During operation of the IMG management infrastructure there will be some low level noise from the gas wells. However, fauna are expected to habituate to this noise. There will also be some activity and noise from maintenance activities but, as with construction works this will be relatively low impact in terms of noise levels and duration. Fauna present within the mine footprint area are expected to either habituate to the disturbance or move away.

Once operational, traffic to and from the Project will increase, occurring both day and night. As a result, it is anticipated that mortality or injury to fauna will occur. As above, reptiles and macropods are the fauna groups most likely affected. Some birds, such as the Squatter Pigeon (*Geophaps scripta scripta*), the Cumbersome Pheasant Coucal (*Centropus phasianinus*) and raptors feeding on carrion on the road side may also be involved in vehicle collisions.

Elsewhere on the Project Site, internal roads are already formed and occur within disturbed areas. It is anticipated that fauna mortality from vehicle strikes will not significantly increase in these areas.

9.1.3 Decommissioning and rehabilitation

The decommissioning phase will involve the removal of mine infrastructure and rehabilitation of the landform. As such further direct disturbance is not anticipated during this stage or if required, will be temporary in nature.

There is the potential for indirect impacts to occur if the decommissioning process in not managed appropriately. These indirect impacts can include contaminate release from soil or water into the surrounding environment, dust, noise, light, erosion weed and pest proliferation. However, all proposed decommissioning works will be undertaken in accordance with detailed plans and as such these impacts are considered to be low.

As rehabilitation of the post mining land surface is closely connected with subsidence effects, management of ecological impacts from IMG drainage requirements will be closely linked to the overall management approach to subsidence impacts. In particular, it is expected that remnant vegetation that is not directly affected by the IMG management network will become important in terms of ongoing management of subsidence impacts and rehabilitation. The Rehabilitation and Subsidence Management Plans can be found in **Appendix K-1 and K-2** of this EIS.

9.1.4 Conservation significant flora and fauna

9.1.4.1 Flora and vegetation communities

Regional ecosystems

Conservation significant REs are those that have a biodiversity status of, of concern or endangered and those that are analogous with EPBC Act listed TECs. Table 13 lists the nine conservation significant REs that were confirmed within the Project Site during field surveys. Six of these REs will experience direct impacts from the proposed surface activities. Impacts to REs with an endangered biodiversity status (11.3.1, 11.4.8 and 11.4.9) include disturbance to 275.17 ha. Impacts to, REs with an of concern biodiversity status (11.3.2, 11.3.4, 11.3.25, 11.3.27b, 11.4.4 and 11.4.13) include disturbance to 202.13 ha. The greatest impact to an individual conservation significant vegetation unit is RE 11.4.8.

Potential direct and indirect impacts to the endangered RE 11.4.8 of approximately 236.02 ha (41.02 ha direct impacts and 195.0 ha indirect impacts) constitutes approximately 1.2% of this vegetation community within the Isaac-Comet Downs subregion. Of concern RE 11.3.25, subject to second largest area of impact of approximately 79.60 ha (11.91 ha direct impacts and 67.69 ha indirect impacts) constitutes 0.2% of this vegetation community found within the Isaac-Comet Downs subregion.

Disturbance to RE 11.3.27b is minimal (11.17 ha); however, the occurrence of this RE within the sub-region is similarly sparse and as such this disturbance equates to approximately 1.1% of this community in the Isaac-Comet Downs subregion. RE 11.5.3, which has a biodiversity status of no concern at present will experience much larger impacts across the site (813.63 ha) however this is much more widely available in the region and as such the impact only constitutes 1.1% of this community in the subregion.

A number of patches of REs will be retained over the proposed underground mine, particularly in the south of the Project Site. However many large and significant patches will be impacted by clearing and fragmentation associated with the IMG management infrastructure or modified by subsidence effects.

The area of potential impacts on all remaining conservation significant REs in context to the extent in which they occur across the subregion is less than 1%.

HVR which is regulated under the VM Act may also be impacted by the Project. A total of 6 ha of HVR Endangered RE (RE 11.4.8/11.4.9) is mapped within the Project Footprint.

EPBC threatened ecological communities

Within the Project Site, two EPBC TECs have been identified. These communities are:

- EPBC TEC *Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin* (of concern RE 11.4.4)
- EPBC TEC *Brigalow (Acacia harpophylla dominant and co-dominant)* (endangered REs 11.3.1, 11.4.8 and 11.4.9).

Potential impacts to both these TECs often associated with the construction and operational phase of mining projects are associated with both direct disturbances and indirect effects, including:

- vegetation clearing and loss
- fragmentation and edge effects
- weed incursion
- dust
- alterations to hydrological regime, including water quality
- erosion and sedimentation.

Development of mining operations within the Project Footprint will involve direct clearing for surface facilities and ancillary infrastructure as well as direct clearing and fragmentation for the incidental mine gas (IMG) drainage network. Ongoing operational impacts may include subsidence due to the development of the Project.

Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin

Vegetation reflecting the *Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin* TEC is located in the Project Footprint, within and adjacent to the transport infrastructure corridor. Some impact is mapped within the Project Footprint based on overlapping infrastructure (0.075 ha), however the proposed overhead power line is expected to span overhead with limited to no clearing required for its construction. As there is unlikely to be above ground disturbance, indirect impacts associated with vegetation clearing such as fragmentation and edge effects, erosion and sedimentation will not occur. In this area, there is low likelihood that vehicle traverses during construction will lead to increased or new weed incursions, excessive dust or the contamination of soils and water. As underground works are occurring to the north of this TEC, subsidence impacts are unlikely to affect vegetation conforming to this TEC.

Brigalow (Acacia harpophylla dominant and co-dominant)

A total of 246.07 ha of the *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC falls within the Project Footprint.

The proposed construction village has been located in non-remnant vegetation with vegetation in these areas predominantly low (approximately 1 to 2 m in height) *Acacia harpophylla* (Brigalow) regrowth. The transport and infrastructure corridor dissect several REs, including *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC conforming areas of RE 11.3.1 and RE 11.4.8. The location of the rail loading balloon loop will also require clearing of RE 11.4.8.

Installation of the IMG drainage network will require clearing of vegetation for the construction of gas wells and corresponding infrastructure including gas pipelines, water pipelines and service roads. The nature of the clearing required will mean that the area will be divided into a grid like pattern. Vegetation conforming to *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC in the form of RE 11.4.8 will experience some clearing for the network, which may facilitate additional fragmentation of small areas of *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC. Fragmentation will also likely have an impact through the potential for weed incursion. *Cenchrus ciliaris** (Buffel Grass) is widespread through the Project Footprint and may more readily infiltrate *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC areas fragmented from construction of the mining project.

Dust impacts generated during the construction and operation of the Project may negatively affect vegetation, particularly if excessive levels are sustained over extended periods. Excessive dust on plant foliage can reduce the amount of light penetration on the leaf surface, block and damage stomata, and slow rates of gas exchange and water loss. Diminished ability to photosynthesise due to

physical effects may result in reduced growth rates of *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC vegetation and decrease floral vigour and overall community health.

Subsidence may cause a range of additional changes in remaining flora and vegetation communities as well as direct site rehabilitation. Areas of RE11.4.8 and RE11.4.9 analogous to *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC occur with the subsidence area and may potentially be subject to subsidence related changes. These changes may include localised changes in topography, tension cracking and altered drainage characteristics. As subsidence occurs, some further changes may affect the viability of this TEC, although brigalow is generally relatively tolerant of periodic inundation.

Flora species of conservation significance

One significant flora species was recorded within the Project Site; Bluegrass (*Dichanthium setosum*). One additional conservation significant species, King Bluegrass (*Dichanthium queenslandicum*) is considered likely to be present within the Project Site (Section 4.1.5) although not identified in field surveys.

Potential impacts to Bluegrass (*Dichanthium setosum*) and King Bluegrass (*Dichanthium queenslandicum*) often associated with the construction and operational phase of mining projects are associated with both direct and indirect impacts, including:

- vegetation clearing and loss
- fragmentation and edge effects
- weed incursion
- dust
- alterations to hydrological regime, including water quality
- erosion and sedimentation.

Habitat for these species is located in the Project Footprint, within and adjacent to the transport infrastructure corridor where an overhead powerline will be constructed. Approximately 0.075 ha of potential habitat is mapped within the Project Footprint based on overlapping infrastructure, however the proposed overhead powerline is expected to span overhead with limited to no clearing required for its construction. With limited to no ground disturbance required, indirect impacts associated with vegetation clearing such as fragmentation and edge effects, erosion and sedimentation will also be limited. In this area, there is low likelihood that vehicle traverses during construction will lead to increased or new weed incursions, excessive dust or the contamination of soils and water. As underground works are occurring to the north of this TEC, subsidence impacts are unlikely to affect Bluegrass (*Dichanthium setosum*) and King Bluegrass (*Dichanthium queenslandicum*)..

9.1.4.2 Fauna

A number of fauna species of conservation significance were identified from the literature review and field surveys as occurring or likely to occur within the Project Site (Section 9.1.4.2). These species and their likelihood of presence are presented in Table 21. Comments on potential impacts to these species are provided below. Potential significant residual impacts have been assessed in Section 11.0.

Squatter Pigeon (*Geophaps scripta scripta*)

A total of 1,9521.12 ha of potential habitat for this species is mapped within the Project Footprint. This includes 699.10 ha of preferred habitat, 285.25 ha of suitable habitat and 967.77 ha of marginal habitat. The potential impacts on the Squatter Pigeon (*Geophaps scripta scripta*) include habitat loss and/or fragmentation and direct mortality from vehicle strike or destruction of nests.

Ornamental Snake (*Denisonia maculata*)

A total of 925.73 ha of suitable habitat for this species is mapped within the Project Footprint. Negative project related impacts on the Ornamental Snake (*Denisonia maculata*) may arise from habitat loss due to clearing, mortality or injury during vegetation clearing, subsidence and from vehicle traffic. Although subsidence is likely to alter habitat for this species, it is expected that much of this habitat will still retain habitat functionality for this species. This habitat alteration may result in the creation of subsidence ponds which may benefit prey populations (Frogs) within the area. However, increased

pooling would also support other pest species such as Feral Pigs (*Sus scrofa**) and Cane Toads (*Bufo marinus**). Destruction of wetland habitat by Feral Pigs (*Sus scrofa**) and lethal toxic ingestion of Cane Toads (*Bufo marinus**) have been identified as threats to Ornamental Snake (*Denisonia maculata*).

Australian Painted Snipe (*Rostratula australis*)

A total of 750.14 ha of suitable habitat is mapped for Australian Painted Snipe (*Rostratula australis*) within the Project Footprint. This habitat lacks the required microhabitat features to provide breeding habitat for this species. The species is likely to be a vagrant visitor only and may use wetlands in the Project Site on passage to more suitable breeding or foraging grounds Based on the lack of preferred habitat for this species within the Project Footprint, it's highly mobile nature and the availability of suitable habitat within the region, Project related impacted are expected to be minimal..

Koala (*Phascolarctos cinereus*)

A total of 1,218.99 ha of potential habitat for Koala (*Phascolarctos cinereus*) is mapped within the Project Footprint. This includes 163.4 ha of preferred habitat, 978.58 ha of suitable habitat and 77.05 ha of marginal habitat. Koalas (*Phascolarctos cinereus*) are likely to be present in low densities and may experience the following impacts:

- loss and fragmentation of habitat
- mortality or injury during vegetation clearing and vehicle strikes
- increased predation risk by domesticated and wild dogs.

A fragmented landscape will result in Koalas (*Phascolarctos cinereus*) being required to travel on the ground in order to traverse between habitats. This will increase their risk from predators such as wild dogs and increase the potential for mortality from vehicle strikes. Mortality during vegetation clearing may also occur. However, the use of mitigation measures such as fauna spotter-catchers will assist in reducing impacts during clearing of potential Koala (*Phascolarctos cinereus*) habitat.

While Koala (*Phascolarctos cinereus*) will be able to move away from the progressive disturbance arising from the IMG management infrastructure, the overall fragmentation, loss of habitat and disturbance may make their continued presence untenable across much of the Project Footprint.

Greater Glider (*Petauroides volans*)

A total of 203.81 ha of potential habitat for Koala (*Phascolarctos cinereus*) is mapped within the Project Footprint. This includes 78.18 ha of preferred habitat, 203.81 ha of suitable habitat and 524.68 ha of marginal habitat. Potential impacts to Greater Glider (*Petauroides volans*) include the loss and/or fragmentation of habitat. Fragmentation will occur at creek crossings for the transport and infrastructure corridor and powerline connection and within the IMG drainage network and subsidence areas in the north. This may locally restrict movement of the species, particularly where the clearing impact width exceeds the volplane distance of the species (greater than 100 m). Given the availability of similar habitat in the region, the expected clearing impact will not typically exceed 100 m.

Indirect impacts as a result of subsidence may include localised dieback of denning trees or canopy trees that provide connectivity and alteration of stream flows, which overall may impact on the health of riparian vegetation and Greater Glider (*Petauroides volans*) habitat. Increased noise and light, particularly during construction, may have impact on breeding, foraging and dispersal behaviours

Grey Falcon (*Falco hypoleucos*)

A total of 2,132.17 ha of potential habitat for Grey Falcon (*Falco hypoleucos*) is mapped within the Project Footprint. This includes 75.81 ha of preferred habitat, 648.33 ha of suitable habitat and 1,408.03 ha of marginal habitat. This species inhabits woodland, shrubland and grassland in arid and semi-arid zones with a preference for wooded riparian habitats. Habitat is widely available for this species throughout the Project Site and the wider region.

Short-beaked Echidna (*Tachyglossus aculeatus*)

A total of 2,132.17 ha of potential habitat for this species is mapped within the Project Footprint. This includes 1,479.55 ha of suitable habitat and 652.62 ha of marginal habitat. This species has a wide distribution in Australia and can tolerate a broad range of habitats. Habitat for this species includes remnant vegetation throughout the Project Site and can also persist in natural or modified grasslands and regrowth, provided that a suitable food source is available. This species is widespread in the area and is a habitat generalist. As such the impacts to this species should be minimal.

Latham's Snipe (*Gallinago hardwickii*)

The preferred habitat for Latham's Snipe (*Gallinago hardwickii*) is permanent and ephemeral wetlands of which small areas are available associated with RE 11.3.27b. Watercourses such as Phillips Creek and Boomerang Creek, ephemeral wetlands following heavy rain and artificial dams may provide temporary stopover opportunities during dispersal to preferred habitat. It is possible that disturbance adjacent to wetlands within the Project Site may deter the species from utilising the habitat. However, impacts from the Project to this species in a regional context are considered minimal.

White-throated Needletail (*Hirundapus caudacutus*)

This species breeds in northern Asia and migrates to Australia during early October (DoEE, 2017d)). The White-throated Needletail (*Hirundapus caudacutus*) occupies open spaces of sky over almost any habitat. This species is not expected to suffer from habitat loss impacts.

Fork-tailed swift (*Apus pacificus*)

The Fork-tailed Swift (*Apus pacificus*) is a non-breeding migrant to Australia and exclusively aerial, spending day and night on the wing. This species flies above a wide range of habitats and may potentially occur in the airspace across the Project Site but is not associated with particular habitat types. Similarly to the White-throated Needletail (*Hirundapus caudacutus*), this species is not expected to suffer from habitat loss impacts.

Caspian tern (*Hydroprogne caspia*)

Suitable habitat for this species within the Project Site includes dams and wetlands. This species has a widespread occurrence in both coastal and inland habitats. The Project is not expected to result in significant habitat loss for the species.

9.2 Potential impact on ESAs

Section 6.0 detailed the ESAs within the Project Site and surrounding region. Except where ESAs may occur downstream of the Project Site, ESAs more than 100 km from the Project Site have been excluded from further consideration. Described below are the potential impacts of the Project on ESAs.

9.2.1 Overview of impacts

Three Category B ESAs were identified as occurring within the Project Site, while additional ESAs were identified as occurring downstream of the Project. Table 42 below details these ESAs and the likelihood that the Project may potentially impact them.

Table 42 Likelihood of Impact on ESAs from the Project

ESA	Classification	Likelihood of impact	Potential impact
National Parks	Category A	**Nil**. Impacts on national parks are considered unlikely due to distance from the Project Site and lack of connective vegetation.	Nil
Conservation Park	Category A	**Nil.** Impacts on conservation parks are considered unlikely due to distance from the Project Site and lack of connective vegetation.	Nil
Great Barrier Reef Marine Park	Category A	**Unlikely**. The Fitzroy River discharges to the GBRMP 490 km downstream of the Project Site. Water quality impacts are not likely to be detectable.	Nil
World Heritage Areas	Category B	**Unlikely**. The Fitzroy River discharges to the GBRWHA 490 km downstream of the Project Site. Water quality impacts are not likely to be detectable	Nil
Endangered Regional Ecosystems	Category B	**Confirmed**. Three endangered RE comprising 275 ha exists within the Project Footprint with potential for 24.5 ha to be directly impacted by surface infrastructure.	Direct
Places of Cultural or Aboriginal Heritage Significance	Category B	**Unlikely.** There are known Aboriginal cultural heritage sites within the Project Site which includes a combination of recorded places and sites identified during exploration works. This EIS assumed that any Project impacts to Aboriginal cultural heritage will be identified and managed under the existing Cultural Heritage Management Plan (CHMP) between BMA and the Aboriginal Party (CLH012020).	Nil
Nature Refuges	Category C	**Unlikely** due to distance from the Project Site and lack of connective vegetation.	Nil
Resource Reserves	Category C	**Unlikely** due to distance from the Project Site and lack of connective vegetation.	Nil
State Forests	Category C	**Unlikely** due to distance from the Project Site and lack of connective vegetation.	Nil
General Use Zones of a Marine Park	Category C	**Unlikely**. The Fitzroy River discharges to the GBRWMP 490 km downstream of the Project Site. Water quality impacts are not likely to be detectable Further discussion provided in Appendix D-1 of the EIS (Surface Water Technical Report).	Nil

It is considered that national parks, conservation parks, nature refuges, resource reserves and state forests will not be impacted by the Project due to the distance of these areas from the Project Site and the lack of connectivity in relation to wildlife movement.

9.2.2 ESAs within the Project Site

As noted in above, three Category B ESAs occur within the Project Site will be potentially impacted by the Project (totalling 275.17 ha including 49.66 ha attributed to direct impacts and 275.17 ha attributed to indirect impacts). Figure 22 to Figure 24 depicts the proposed footprint and the location of each ESA situated within the Project Site. The potential impacts on these ESAs have been discussed previously within the flora and fauna component of the report (Section 9.1.1, 9.1.2 and 9.1.3).

10.0 Mitigation measures and monitoring

The application of mitigation measures will minimise impacts from the Project on flora, fauna and ESAs. Where impacts are unable to be avoided or mitigated (e.g. clearing of vegetation) offsets may be required. Mitigation measures associated with the potential impacts from each activity are presented below.

10.1 Avoidance

The implementation of avoidance strategies is limited by the location of the coal resource and mining methods; however, the placement of associated infrastructure required to support the project does have greater flexibility. Surface infrastructure has been located to avoid areas of ecological value as far as practical.

10.2 Minimise

The Project has been designed to utilise existing mine infrastructure and previously disturbed land at Saraji Mine in order to minimise further disturbance and further impact to the environment. Where disturbance to areas is required, this will be restricted to the minimum necessary.

The CHPP, conveyors and product stockpiles are located within the existing Saraji Mine ML and, while vegetation clearing is required, this vegetation is disturbed and fragmented. The proposed MIA and the raw water dam are to be located in a disturbed area within Saraji Mine and are not anticipated to require removal of remnant vegetation.

Clearing for the powerline connection will only be required for footings and a narrow easement. As such, impacts to high biodiversity values within the powerline connection footprint will be minimised. The width of the corridor is also expected to reduce during the detailed design process.

While design of the layout of the IMG drainage infrastructure has not yet been finalised, it is intended to restrict the number of times that the infrastructure crosses these creeks to minimise direct disturbance to this corridor. Wherever possible, the wells required for IMG drainage will be installed outside of the riparian zone. Required crossings will be selected where natural breaks in vegetation occur where practical. Some pipeline crossings will be required and these will be trenched crossings, with disturbed areas reinstated to stabilise the river bed and banks. The required crossings will be reduced to the minimal width required.

10.3 Mitigation

10.3.1 Mitigation measures specific to surface facilities and infrastructure

10.3.1.1 Flora and vegetation communities

When clearing vegetation for any of the surface facilities, the following mitigation measures will be implemented:

- areas for clearing will be clearly delineated to avoid inadvertent clearing
- if habitat trees can be retained without compromising safety, these will be identified and clearly marked
- habitat features such as felled trees and logs will be considered for relocation to other areas where practical to provide microhabitat
- vehicles and equipment will be cleaned to remove weed seeds before being brought to the site
- workers will be made aware of mitigation management requirements in induction training.

Throughout construction, the following mitigation measures will be utilised to manage impacts from construction activities:

- vehicles and equipment will be cleaned to remove weed seeds before being brought to the site
- topsoil will be removed and used to rehabilitate existing disturbed areas
- erosion and sediment control measures will be installed and maintained as described in Chapter 5 Land Resources of the EIS

- dust suppression measures will be utilised to minimise deposition of dust on adjacent vegetation

Weed monitoring and management will be ongoing throughout construction and operation.

As it will not be possible to avoid impacts on vegetation communities of conservation significance, offsets may be required to mitigate residual impacts. Offsets are discussed further in Section 10.4.2.

10.3.1.2 Fauna

Measures set out above to minimise impacts on flora and vegetation communities will also assist to some extent in minimising impacts on fauna. Other measures which will be implemented include:

- the workforce will be provided with contact details of suitably qualified spotter catchers in the event that fauna is present and needs to be removed, or fauna are accidentally injured. This will be covered in induction training and work instructions
- heavy vehicles (and where practical, light vehicles) will not traverse vegetated areas outside designated construction zones, and will be required to remain on existing tracks
- during detailed design, lighting will be designed so that light spill into adjacent habitat areas is minimised.

Suitably qualified spotter catchers will be required during vegetation clearing (all spotter catchers will hold appropriate permits under the NC Act). If fauna are injured by vehicles during operations, the RSPCA or local wildlife carers will be contacted for assistance.

10.3.2 Mitigation measures specific to the gas drainage network

10.3.2.1 Flora and vegetation communities

While the extent of infrastructure required for IMG drainage will mean that impacts on significant vegetation communities and plants are unavoidable, there are a range of measures that will be taken to potentially reduce the level of impact of clearing and manage associated impacts. These include the following:

- avoiding placement of IMG extraction wells and infrastructure within Endangered RE 11.3.1, RE 11.4.8 and RE 11.4.9 where practical. Where unavoidable, offsets will be sourced
- designing and constructing IMG management infrastructure to minimise disturbance to riparian zones along the Boomerang Creek, Plumtree Creek, Hughes Creek and oxbow wetlands and avoiding placement of wells within 50 m of these waterways wherever possible
- wherever practical, locating infrastructure alignments and gas drainage wells to avoid remnant vegetation
- minimise creek crossings
- selecting river and creek crossings where natural breaks in vegetation occur where practical
- areas where clearing is planned should be distinctly delineated, so that inadvertent clearing of additional areas does not occur
- before being brought onsite, all vehicles and equipment should be cleaned to remove weed seeds
- dust suppression measures will be undertaken to minimise dust deposition on vegetation adjacent to tracks and construction areas
- utilising erosion and sediment control measures as set out in Chapter 5 Land Resources and Soils of the EIS for all ground disturbance activities and stream crossings.

10.3.2.2 Fauna

The primary impacts on fauna during construction of the IMG drainage network are the loss of habitat and potential risk of mortality associated with the works. Measures to reduce habitat impacts will include:

- selecting already disturbed areas for crossings of creeks and drainage lines where practical
- minimising the width of clearing required for crossing, and particularly retaining tall trees on either side of crossing locations wherever this is safe to do so
- minimising placement of gas wells in riparian and woodland areas wherever possible.

Suitably qualified spotter catchers will be required during all clearing activities. Spotter catchers will hold appropriate permits under the NC Act. When working remote to the spotter catchers, workers will be provided with contact details for the spotter/catchers in the event that fauna is present and needs to be removed, or are accidentally injured. This will be covered in the induction training and work instructions.

Vehicles will not be allowed to traverse vegetated areas but will be required to remain on existing tracks. Speed limits will be placed on all roads and tracks associated with the IMG drainage network.

As potential animal breeding places are present within the Project Site, a Species Management Program (SMP) will be obtained for the Project for approval to tamper with animal breeding places (e.g. nests and hollow bearing trees), as required under Section 335 of the NC (Animal) Regulation. As breeding places for least concern species, least concern colonial breeders and wildlife prescribed as threatened under the NC (Animal) Regulation (i.e. Greater Glider (*Petauroides volans*)) are likely to be present within the Project Footprint, a High Risk SMP will be required.

Where lighting is required, lighting will be directed away from vegetated areas where practical.

10.3.3 Mitigation measures specific to subsidence

Management strategies which will include lessons learnt from subsidence monitoring results from other BMA owned underground operations in the region (e.g. Broadmeadow Mine).

Where works are required to repair surface cracks from subsidence, this will be in accordance with the measures within the Subsidence Management Plan. Clearing of vegetation will be minimised through the use of smaller machinery where practical. Grasses and other groundcover will be slashed rather than cleared to allow access.

Where machinery is required to repair cracks or construct subsidence pond drainage channels, vehicles and equipment will be cleaned of all weed seeds and other potential contaminants before entering the site.

Progression rehabilitation will be undertaken as detailed in the Rehabilitation Management Plan.

10.4 Management and monitoring

A number of specific management plans will be prepared to address specific impacts and outline mitigation measures to be implemented during the construction and operational phase of the project. This includes:

- Weed and Pest Management Plan (construction phase only)
- Rehabilitation Plan (construction and operational phase)
- Topsoil Management Plan (construction and operational phase)
- High Risk Species Management Plan (construction phase only)
- Subsidence Management Plan, including vegetation health monitoring (operational phase)
- Offset Management Plan (operational phase).

An overarching Construction Environmental Management Plan (CEMP) will also be prepared to mitigation and manage impacts. This plan will be developed to outline and describe the following:

- objectives
- risk assessment
- environmental management activities and mitigation measures
- the timing of actions
- a monitoring program, which will include:
    - performance indicators (clear and concise criteria against which achievement of
    - outcomes are to the measured), which are capable of accurate and reliable
    - measurement
    - outcomes (time bound outcomes as measured by performance indicators), which might
    - include milestones (interim outcomes)
    - monitoring requirements (timing and frequency of monitoring to detect changes in the
    - performance indicators, to determine if outcomes are being achieved, and to inform
    - adaptive management)
    - trigger values for corrective actions.
- potential corrective actions to be implemented if trigger values are reached, and how environmental incidents and emergencies will be managed
- roles and responsibilities (clearly stating who is responsible for activities)
- auditing and review mechanisms.

Monitoring of retained vegetation areas will be undertaken throughout the life of the Project. As the subsidence ultimately changes the hydrology of the area, a floristic change will naturally occur over time in areas of retained vegetation. Monitoring will need to focus on whether this change can occur naturally through regrowth of native vegetation from seed stock, or whether intervention is required to replace plants that die at a greater rate than natural reestablishment.

Remnant vegetation will be monitored for foliar discolouration, partial defoliation, increased pathogenic attack, or tree death as signs of vegetation impacts from subsidence. Tree deaths and regrowth in areas affected by subsidence will be monitored to assess whether rehabilitation is required. In areas where natural regrowth is not sufficient to replace dead trees, replanting will be undertaken.

10.4.1 Weed and pest management plan

The Weed and Pest Management Plan will detail specific management measures in accordance with BMA weed management and mitigation guidelines, recommended Biosecurity Queensland (BQ) methods (Department of Agriculture and Fisheries 2020) and the Isaac Regional Council Biosecurity Plan 2020-2023 management for species highlighted in Section 4.2.6 and 5.2.5. Control measures that will be outlined within the Plan include:

- eradication measures to remove localised populations where feasible
- containment and treatment measures including:
    - managing pests and weeds through documented procedures on new infestations, consultation with stakeholders prior to implementation and removal in accordance with Local Government measures
    - prioritising control programs based on risk levels
    - containing the spread through best practise controls
    - monitoring for response to controls or future control methods

The Weed and Pest Management Plan will cover construction, rehabilitation and operation periods and will include:

- all staff will undergo a site-specific induction including the identification, prevention, minimisation and management requirements of weed and pest species on-site
- management methods to control spread of weed species (in particular *Parthenium hysterophorus**), in keeping with regional management practice or Queensland Department of Agriculture and Fisheries pest control prescriptions
- ongoing monitoring of the Project Site to identify any new incidence of weed infestation
- provision of information for project staff on the identification of WONS, Restricted Matter weed species and Priority Weed Species and their dispersal methods
- wash down protocols for any vehicles or machinery entering and leaving site
- methods for weed eradication from the site in accordance with local management practice from the IRC and/or the Queensland Government Pest Fact sheets
- promotion of awareness of weed management, by inclusion of weed issues, pictures and procedures into the Project's site induction program.

Details of weed and pest monitoring will be outlined in the Weed and Pest Management Plan. Monitoring will occur throughout the life of the Project to ensure their ongoing effectiveness. Any significant findings, such as new pest or weeds species, new outbreaks or any actions resulting from Project activities will be incorporated into a review of the Weed and Pest Management Plan. This will allow the Weed and Pest Management Plan to be adapted if performance criteria are not met.

The monitoring program will include:

- pre-clearance surveys within and directly adjacent to the Project Footprint to record presence and abundance of invasive weeds and pests and to identify weed hot spots
- a schedule and details of methods and data collected during construction audits and ecological condition monitoring in retained vegetation adjacent to the Project Footprint
- details of how results from these monitoring activities may trigger a corrective action
- details of the corrective actions which will be triggered when predetermined weed/pest thresholds are exceeded. These will include but not be limited to:
    - treatment of new weed incursions
    - monitoring of success and treatment
    - review of site procedures for weed management
    - rehabilitate and stabilise disturbed non-operational areas
    - re-educate / train site personnel on management requirements, practices and site rules
    - develop a species specific control program for pest fauna where require and review as necessary to ensure it remains effective and applicable.
- monitoring for pest plants and fauna within subsided areas where ponding occurs will be undertaken to determine the need for specific management measures
- the monitoring will be undertaken in accordance with QLD state and federal survey guidelines for monitoring weed and pest species.

10.4.2 Rehabilitation

BMA has prepared a Rehabilitation Management Plan (Appendix K-1) in line with the Mined Land Rehabilitation Policy (DES, 2018). In accordance with the policy, land will be rehabilitated to achieve the following rehabilitation goals:

- safe to humans and wildlife
- non-polluting and does not cause environmental harm
- stable
- able to sustain an agreed post mining land use.

BHP's Queensland Coal Rehabilitation Completion Criteria outlines the completion criteria for meeting satisfactory rehabilitation for a number of post mining land uses. Post mining land uses may include:

- cattle grazing
- dryland cropping
- woodlands habitat
- watercourses
- water storage.

The completion criteria set out objectives, indicators and criteria for achieving acceptable rehabilitation in the post mining land uses. The completion criteria consider goals of safety, stability, minimal pollution and the ability to sustain an agreed post mining land use. **Chapter 5 Land Resources** of the EIS presents these completion criteria and rehabilitation goals in further detail.

The proposed post mining land use will be an undulating landscape that could be used as grazing land, consistent with the surrounding pastoral land use that dominates the region. Native vegetation outside of the surface infrastructure footprint will be retained in a way that is compatible with the pre-existing land use for biodiversity values. However, where vegetation mortality occurs as result of persistent ponding, associated with subsidence, it will be revegetated with species that are tolerant of inundation. There may be instances in which a mix of native and non-native species will be implemented.

11.0 Significant Residual Impacts and offsets

11.1 Commonwealth Significant Impact Assessment

For MNES with the potential to be impacted by the Project, the significance of these potential impacts has been assessed against the *EPBC Act Significant Impact Guidelines 1.1* (DotE, 2013). A detailed review of MNES including the outcome of impact assessment is provided as a standalone chapter in this EIS (Chapter 21 – MNES).

11.2 State Significant Residual Impact Assessment

As discussed in Section 7.0, the following MSES that relate to terrestrial ecology are found within the Project Site:

- Regulated vegetation:
  - Prescribed REs that are listed Endangered and Of Concern under the VM Act
  - Prescribed REs within a Vegetation Management Wetland area
  - Prescribed REs within the defined distance of a watercourse.
- Protected wildlife habitat:
  - Bluegrass (*Dichanthium setosum*)
  - King Bluegrass (*Dichanthium queenslandicum*)
  - Ornamental Snake (*Denisonia maculata*)
  - Squatter Pigeon (*Geophaps scripta scripta*)
  - Koala (*Phascolarctos cinereus*)
  - Greater Glider (*Petauroides volans*)
  - Australian Painted Snipe (*Rostratula australis*)
  - Grey Falcon (*Falco hypoleucos*)
  - Short-beaked Echidna (*Tachyglossus aculeatus*).
- Connectivity areas
- Waterways providing fish passage.

After all reasonable avoidance and on-site mitigation measures for the Project have been or will be undertaken (Section 10.0), the Project may still impact on MSES. Therefore, the Significant Residual Impact Guideline prepared by the Department of the Environment and Heritage Protection (2014) has been used to determine the significance of the residual impact.

It is important to note that the below assessments are not to be used to determine if the Project requires assessment for potential impacts on MNES protected by the Commonwealth EPBC Act or if an offset would be required under that Act.

Regulated Vegetation

As detailed above, impacts to regulated vegetation which contains a prescribed regional ecosystem are assessed in three ways under the Significant Residual Impact Guideline (Department of the Environment and Heritage Protection, 2014):

- impacts to REs listed as ‘Endangered’ or ‘Of Concern’ under the VM Act
- impacts to REs that intersects an area shown on the Vegetation Management Wetlands map
- impacts to REs within the defined distance of a watercourse defined under the VM Act.

For the purpose of this assessment, the entire Project Footprint (including direct and indirect impacts) is considered the maximum impact area. To complete these assessments, three main criteria are utilised.

Criteria 1 is detailed in Table 43 below and is the only criteria relevant to each three assessments of regulated vegetation.

Table 43 Impact thresholds per RE structure

RE Structure Category	Impact Area Threshold (ha)
Dense and mid-dense[1]	0.5
Sparse and very sparse[1]	2
Grassland[1]	5

[1] Refer to the structure category within the REDD

Criteria 2 is "will clearing occur within 50 m of the defining bank", and is relevant only to REs that intersect areas on the Vegetation Management Wetlands map.

Criteria 3 is "will clearing occur within 5 m of the defining bank", and is relevant only to REs that are within the defined distance of a watercourse defined under the VM Act.

1. Endangered and Of Concern Prescribed Regional Ecosystems

The significant residual impact (SRI) assessment for impacts to Endangered and Of Concern REs is based on criteria one only. If the impact extent for the relevant RE structure categories detailed in Table 43 Below is exceeded, a SRI may occur.

Field surveying confirmed the presence of three REs listed endangered and one RE listed of concern occur within the state-mapped Regulated Vegetation category B areas of the Project Footprint. The total area of remnant vegetation containing Endangered or Of Concern REs that will be impacted by the Project is 313.29 ha. The SRI assessment of endangered and of concern REs is presented in Table 44 and indicates that a SRI is likely.

Table 44 SRI assessment for Endangered and Of Concern REs

RE	Structure Category	Maximum Impact Area (ha)	Impact Threshold Exceeded?	SRI Outcome
Endangered				**Yes**
11.3.1	Mid-dense	0.44	No	
11.4.8	Sparse	209.38	Yes	
11.4.9	Sparse	30.31	Yes	
Of Concern				
11.3.2	Sparse	73.16	Yes	

2. Prescribed Regional Ecosystem within a Mapped Wetland

A review of the Vegetation Management Wetlands Map determined that three small wetlands occur in the north-east of the Project Site and two of which are located within the Project Footprint. These wetlands areas contain ground-truthed remnant vegetation, and occur within a Regulated Vegetation category B area as per the state mapping.

The SRI assessment of prescribed REs occurring within a wetland area is detailed in Table 45. As specified by Section 2.1 of the Significant Residual Impact Guideline (Department of the Environment and Heritage Protection, 2014), for a prescribed activity to have a SRI on a regional ecosystem that lies within a mapped wetland, both criteria 1 (Table 43) and criteria 2 (clearing within 50 m of a defining bank) must be exceeded.

A total of 5.65 ha of ground-truthed remnant vegetation comprising three REs (RE 11.3.27b, RE 11.3.2 & RE 11.5.3) occurs within the areas of mapped wetland within the Project Footprint (direct and indirect impact areas). The maximum areas of each RE that may be impacted and their corresponding structure category as defined by the REDD are as follows:

- 5.14 ha of RE 11.3.27b – 'Other'
- 0.49 ha of RE 11.3.2 – Sparse
- 0.02 ha of RE 11.5.3 – Sparse

The structure category of 'Other' is not included in criteria 1. As such, the structural formation of the community determined during the field assessment was used instead (mid-dense). For the two sparse Res (RE 11.3.2 and 11.5.3), maximum Project impact areas do not exceed criteria 1 threshold levels detailed in Table 43. In contrast, the maximum potential impact area of RE 11.3.27b does exceed threshold levels. Given this, and that clearing will occur within 50 m of a defining bank for both wetland areas, an SRI will occur (Table 45).

Table 45 SRI assessment for REs within a mapped wetland area

SRI Criteria	Result	SRI Outcome
1 – Is clearing of prescribed RE's above area thresholds detailed in **Table 43**?	Yes – the maximum impact area of RE 11.3.27b exceeds threshold levels detailed in Table 43 (when assessed as having a mid-dense structure category).	**Yes**
2 – Will clearing occur within 50 m of a defining bank?	Yes	

3. Prescribed Regional Ecosystem within the Defined Distance of a Watercourse

A review of the Vegetation Management Watercourse Map determined that multiple major and minor watercourses traverse the Project Site, ranging from 1 to 4 in stream order. These watercourses occur within or intersect the Project Footprint in over 20 locations. Areas adjacent to these watercourses contain ground-truthed remnant vegetation and occur within a category B Regulated Vegetation area as per the state mapping. In accordance with Schedule 2 clause 2, subsections (4) and (6) of the Environmental Offsets Regulation 2014, to determine the extent of the prescribed REs within the defined distance, watercourses with a stream order of 1 or 2 were buffered by 25 m while watercourses with a stream order of 3 or 4 were buffered by 50 m.

The SRI assessment of prescribed REs occurring within the defined distance of a watercourse is detailed in Table 46. As specified by Section 2.1 of the Significant Residual Impact Guideline (Department of the Environment and Heritage Protection, 2014), for a prescribed activity to have a SRI, both criteria 1 (Table 43) and criteria 3 (clearing within 5 m of a defining bank) must be exceeded.

A total of 88.69 ha of remnant vegetation comprising five REs (RE 11.3.2, RE 11.3.25, RE 11.4.8, RE 11.4.9 & RE 11.5.3) occurs within the defined banks of the watercourses within the Project Footprint (direct and indirect impact areas). The maximum impact areas of each RE and their corresponding structure category as defined by the REDD are as follows:

- 10.33 ha of RE 11.3.2 – Sparse
- 64.99 ha of RE 11.3.25 – Sparse
- 0.03 ha of RE 11.4.8 – Sparse
- 0.07 ha of RE 11.4.9 – Sparse
- 13.26 ha of RE 11.5.3 – Sparse

All prescribed REs that occur within the defined distance of a watercourse have a structure category of sparse. For three of the five prescribed REs, maximum Project impact areas exceed criteria 1 threshold levels (Table 43). Clearing for the Project will also occur within 5 m of the defining banks of the watercourses. Therefore, impacts to prescribed REs within the defined distance of a watercourse is likely to result in a SRI.

Table 46 SRI assessment for REs within a defined distance of a watercourse

SRI Criteria	Result	SRI Outcome
1 – Is clearing of prescribed RE's above area thresholds detailed in Table 43?	Yes – a total of 88.59 ha of remnant vegetation comprising three REs occurs within 25 m or 50 m of the defined banks of the relevant watercourses.	**Yes**
3 – Will clearing occur within 5 m of a defining bank?	Yes	

Connectivity areas

The Department of Environment and Science has developed a Landscape Fragmentation and Connectivity (LFC) tool to assist in identifying and quantifying any significant impact on connectivity for an individual impact area. The Project Footprint (including direct and indirect impact areas) covers a total area of approximately 3425 ha of which 1282.2 ha is mapped as remnant vegetation as per the Regulated Vegetation mapping. The measure of impact significance is based on how the prescribed activity will change the size and configuration of remnant vegetation areas and the level of fragmentation that will result at the local scale (5 km radius) given regard to the regional scale (20 km radius).

A significant residual impact assessment has been completed for connectivity against Section 3.2 of the Significant Residual Impact Guideline (Department of the Environment and Heritage Protection, 2014) (Table 47).

Table 47 Significant residual impact assessment for connectivity

Impact Criteria	SRI Outcome
An action is LIKELY to have a SRI on connectivity if the action will result in:	
1. The change in the core remnant ecosystem extent at the local scale (post impact) is greater than a threshold determined by the level of fragmentation at the regional scale **OR** 2. Any core area that is greater than or equal to 1 ha is lost or reduced to patch fragments (core to non-core)	**Yes.** An analysis of the state vegetation mapping within the Project Footprint (impact area) using the LFC tool determined a significant impact on connectivity areas is anticipated (a change from core to non-core remnant at the site scale is true). Therefore, the Project is likely to have a significant residual impact on connectivity.

Protected Wildlife Habitat

Protected wildlife habitat is defined as an area of habitat (e.g. foraging, roosting, nesting or breeding habitat) for an animal or plant that is Endangered or Vulnerable, or a Special Least Concern (non-migratory) animal under the NC Act. As of 9 May 2018, under the *Vegetation Management and Other Legislation Amendment Bill 2018*, the definition of protected wildlife has been extended to include Near Threatened wildlife.

Offsets may be required for the following protected wildlife habitat:

- an area that contains plants that are 'endangered' or 'vulnerable' wildlife;
- a habitat for an animal that is 'endangered', 'vulnerable' or 'near threatened' wildlife or a special least concern animal (non-migratory), including areas or features used by an animal for foraging, roosting, nesting or breeding;

To avoid duplication of offset conditions between jurisdictions, state and local governments can only impose an offset condition in relation to a prescribed activity if the same or substantially the same impact and the same or substantially the same matter has not been subject to assessment under the EPBC Act. As such, SRI assessments for protected wildlife habitat have only been completed for the known or likely conservation significant species that have not already been assessed under the EPBC Act policy statement 'Significant Impact Guidelines 1.1 – Matters of National Environmental Significance' (DotE, 2013) (refer to Section 11.1). These species are:

- Grey Falcon (*Falco hypoleucos*)
- Short-beaked Echidna (*Tachyglossus aculeatus*).

Grey Falcon (*Falco hypoleucos*)

The Grey Falcon (*Falco hypoleucos*) is listed as Vulnerable under the NC Act.

The Grey Falcon (*Falco hypoleucos*) is endemic to mainland Australia, occurring across the arid and semi-arid regions including the Murray-Darling Basin, Eyre Basin, central Australia and western Australia (Threatened Species Scientific Committee, 2020).

This species is elusive and rare, occurring at low densities across its distribution. It is largely restricted to areas of high annual average temperatures and average annual rainfall of less than 500 mm. It has been recorded in timbered lowland plains, particularly *Acacia* shrublands that are crossed by tree-lined watercourses. They have also been observed foraging in treeless areas and in tussock grassland and open woodland, especially in winter. Grey Falcons (*Falco hypoleucos*) are almost exclusively a predator of birds, however they may also consume other prey such as small mammals and reptiles.

Breeding occurs from June to November, with eggs generally being laid in the old nests of other birds, namely those of other raptors or corvids. It is reported that nests in the tallest trees, especially *Eucalyptus camaldulensis* (River Red Gum) and *Eucalyptus coolabah* (Coolabah) along watercourses are preferred (Threatened Species Scientific Committee, 2020). However, like other falcons this species may also nest in telecommunication towers. There are no known breeding pairs.

Occurrence and Potential Habitat

This species was not confirmed within the Project Site during any of the field surveys. Given this species is rare and occurs in low densities throughout its range, recorded occurrences are limited. The nearest publicly available record occurs approximately 85 km to the north west (undated, spatial uncertainty of 500 m). However, in 2005 EcoServe recorded the species on the adjacent Saraji Mine and as such this species is considered likely to occur.

Due to the broad definition of suitable habitat for this species, all vegetation within the Project Site is considered to provide some value for the lifecycle requirements of the Grey Falcon (*Falco hypoleucos*). Habitat present is comprised of preferred (areas of RE 11.3.25 and 11.3.27b suitable for breeding), suitable (remnant and regrowth vegetation containing *Acacia sp.* Likely suitable for foraging) and marginal (remaining vegetative areas including non-remnant grassland which may potentially be utilised for foraging and dispersal). No Essential Habitat for this species occurs within the Project Site.

The extent of potential habitat for the species is summarised in Table 48 and displayed in Figure 20.

Table 48 Potential habitat for Grey Falcon (Falco hypoleucos)

Habitat Description	Potential Habitat Type	Total Area (ha) within the Project Site	Area (ha) within the Project Footprint (Direct Impacts)	Area within the Project Footprint (Indirect Impacts)
Remnant vegetation that is dominated by *Eucalyptus sp.* In the canopy and associated with a water source (i.e. watercourses or wetlands).	Preferred	208.72	14.95	75.81
Remnant or regrowth vegetation that contains *Acacia sp.*.	Suitable	2,453.78	352.80	648.33
All other vegetation that does not contain *Acacia sp.*, including regrowth and non-remnant areas	Marginal	7,979.30	673.25	1,408.03
	Total	**10,641.81**	**1,041.00**	**2,132.17**

An assessment against the Significant Residual Impact Guideline for this species is provided in Table 49.

Table 49 Significant residual impact assessment for Grey Falcon (Falco hypoleucos)

Impact Criteria	Assessment
An action is LIKELY to have a significant residual impact on habitat for an animal that is 'Endangered' or 'Vulnerable' or 'Near Threatened' wildlife if the action will:	
Lead to a long-term decrease in the size of a local population?	**No.** This species was not recorded during field surveys however is considered likely to occur based on the presence of potential habitat and a 2005 record at the adjacent Saraji Mine. Any individuals that may utilise the Project Site are considered to constitute a local population. All vegetation within the Project Site is considered to provide some habitat opportunities to the species (a total area of 10,641.81 ha), largely due to it's broad foraging requirements and highly mobile nature. Potential habitat within the Project Site comprises preferred (suitable for breeding), suitable (preferred foraging areas) and marginal (potential foraging opportunities and dispersal). A total of 3,173.17 ha of potential habitat may be impacted by the Project, including 2,132.17 ha which may be indirectly impacted by subsidence and 1,041.0 ha which will be directly impacted by vegetation clearing. Potential habitat that will be directly impacted includes 14.95 ha of preferred, 352.80 ha of suitable and 673.25 ha of marginal habitat. The area of total potential habitat being directly impacted constitutes approximately 10% of the available potential habitat within the Project Site. However, of this impacted area only 14.95 ha is suitable for breeding (preferred). This loss of breeding habitat constitutes just over 7% of the available preferred habitat within the Project site. In contrast to the foraging and dispersal requirements of the species, breeding and nesting requirements are specific and as such this habitat is likely to be important for the persistence of the local population. Of the potential habitat that may be indirectly impacted, 75.81 ha comprises preferred habitat. Indirect impacts to potential habitat via subsidence will not be immediate, potentially occurring as mining

Impact Criteria	Assessment
An action is LIKELY to have a significant residual impact on habitat for an animal that is 'Endangered' or 'Vulnerable' or 'Near Threatened' wildlife if the action will:	
	progresses over time. Potential impacts to all potential habitat will be managed in accordance with the Project's Subsidence Management Plan. As the overall reduction in potential habitat, and namely preferred habitat is low relative to the amount of habitat that will remain, the Project is considered unlikely to lead to a significant reduction in the foraging or breeding success of a local population or a long-term decrease in the size of a local population.
Reduce the extent of occurrence of the species?	**No.** This species primarily occurs across the arid and semi-arid regions including the Murray-Darling Basin, Eyre Basin, central Australia and western Australia. It has a very large extent of occurrence (estimated 6.1 million km^2). Approximately 10% of the potential habitat within the Project Site will be directly impacted via vegetation clearing (1,041.0 ha). A total of 2,132.17 ha will be indirectly impacted by subsidence, however any potential impacts associated with this will occur over time and be managed in accordance with the Project's Subsidence Management Plan. Given this species is highly mobile, the availability of potential habitat that will remain within the Project Site and the likely large availability of potential habitat in the wider area, it is unlikely the Project will reduce the extent of occurrence of the species.
Fragment an existing population?	**No.** As the Grey Falcon (*Falco hypoleucos*) has a very large distribution, it is considered that all individuals are part of a single population. However, no population trend data is available. This species occurs at low densities across its range, indicating that any individuals present within the Project Site are likely to only constitute a small portion of the total population. Approximately 10% of the potential habitat within the Project Site will be directly impacted via vegetation clearing (1,041.0 ha). Indirect impacts associated with subsidence may occur across 2,132.17 ha but will be gradual and managed in accordance with the Project's Subsidence Management Plan. However, this species is highly mobile and is unlikely to rely on ground vegetation for dispersal. Areas of potential subsidence and surface infrastructure constructed for the Project are unlikely to create a barrier to movement. As such, the Project is considered unlikely to fragment an existing population.
Result in genetically distinct populations forming as a result of habitat isolation?	**No.** This species is widely distributed and already occurs at low densities. It has broad foraging and dispersal requirements and as such impacts to this potential habitat (suitable and marginal) is unlikely to have population-level impacts. Indirect impacts associated with subsidence may occur to a total of 2,132.17 ha potential habitat. The Project will also result in direct impacts to breeding and nesting habitat (preferred), however this loss of habitat constitutes just over 7% of the available preferred habitat within the Project Site. Furthermore, this species is highly mobile and the Project is unlikely to create a barrier to movement. Therefore, the Project will not result in a genetically distinct populations forming as a result of habitat isolation.
Result in invasive species that are harmful to an endangered, vulnerable or near-threatened species	**No.** No focused studies on the Grey Falcon (*Falco hypoleucos*) have been completed at this time. As such, all potential threats to this species are

Impact Criteria	Assessment
An action is LIKELY to have a significant residual impact on habitat for an animal that is 'Endangered' or 'Vulnerable' or 'Near Threatened' wildlife if the action will:	
becoming established in the endangered, vulnerable or near-threatened species' habitat?	based on general considerations and extrapolations from better studied falcons. As per the species' Conservation Advice, predation by cats and grazing by exotic herbivores are both considered 'very high' priority threats to the species. Cattle grazing occurs within the Project Site and feral cats (*Felis catus**) are known to occur in the Project Site, however construction and operation of the Project is unlikely to exacerbate pest levels beyond current levels. Nonetheless, a Weed and Pest Management Plan will be implemented which will include measures to contain or eradicate pests. As such, the Project is unlikely to result in invasive species that are harmful to Grey Falcon (*Falco hypoleucos*).
Introduce disease that may cause the population to decline?	**No.** Disease is not a considered a potential threat to the species. Nonetheless, best practice weed and pest hygiene measures will be developed and implemented for all Project related activities.
Interfere with the recovery of the species?	**No.** A recovery plan is not required as per the species' Conservation Advice. However, priority conservation actions have been developed and include: • Support improved fire and grazing management in areas where Grey Falcons are known to occur. • Protect known nesting trees and include adequate exclusion buffers with regard to proposed developments and land clearing activities. • Support the establishment and survival of replacement nest trees in areas where Grey Falcon in known to breed. • Retain artificial structures with known or potential Grey Falcon nests. • Control invasive cats and camels in areas where Grey Falcons are known to occur, especially in known roosting and nesting areas. Although 14.95 ha of potential preferred habitat suitable for nesting will be directly impacted by the Project, the species is not a known occurrence and it is currently unclear if Grey Falcon (*Falco hypoleucos*) breed within the Project Site. An additional 75.81 ha preferred habitat may also be indirectly impacted over time through subsidence, however impacts will be managed in accordance with the Project's Subsidence Management Plan. Any potential Grey Falcon (*Falco hypoleucos*) nests will not be tampered with unless the species is included in a high-risk species management program approved by DES. Based on this, the Project is unlikely to interfere with the recovery of the species.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species?	**No.** Potential habitat suitable for foraging (suitable) and breeding (preferred) occurs within the Project Site, however the species or signs of usage by the species were not recorded. As discussed, this species only has specific requirements for breeding and nesting however there is no information to suggest this habitat within the Project Footprint is ecologically significant. A total of 14.95 ha of preferred habitat will be directly impacted via vegetation clearing; a loss of just over 7% of the available preferred habitat within the Project Site. An additional 75.81 ha preferred habitat may be indirectly impacted over time through subsidence, however impacts will be managed in accordance with the Project's Subsidence Management Plan. Given this relatively small direct loss of preferred habitat, the species high mobility and wide distribution, the

Impact Criteria	Assessment
An action is LIKELY to have a significant residual impact on habitat for an animal that is 'Endangered' or 'Vulnerable' or 'Near Threatened' wildlife if the action will:	
	Project is considered unlikely to cause disruption to ecologically significant locations of the species.

Short-beaked echidna (*Tachyglossus aculeatus*)

The Short-beaked Echidna (*Tachyglossus aculeatus*) is listed as Special Least Concern under the NC Act.

The Short-beaked Echidna (*Tachyglossus aculeatus*) is found throughout Australia, including Tasmania. It is Australia's most widespread native animal (The Australian Museum, 2018). No systematic study of the ecology of the Short-beaked Echidna (*Tachyglossus aculeatus*) has been published, but studies of several aspects of their behaviour have been conducted. Individuals are solitary, wanderers: they have large, overlapping home ranges (up to 50 ha) and only maintain a fixed shelter or nest site when rearing their young in a burrow (Augee, Gooden, & Musser, 2006). They avoid extremes in temperature by sheltering in hollow logs, rock crevices and vegetation. Limited only by an insufficient supply of ants or termites, Short-beaked Echidnas (*Tachyglossus aculeatus*) live in a range of climates and habitats.

This species is not threatened with extinction, but human activities, such as hunting, vehicles, habitat destruction, and the introduction of foreign predatory species and parasites, have reduced its distribution in Australia (The Australian Museum, 2018). This species can live anywhere with a good supply of food, and regularly forages on ants and termites, and are most common in forested areas with abundant, termite-filled, fallen logs.

The solitary Short-beaked Echidna (*Tachyglossus aculeatus*) looks for a mate between May and September; the precise timing of the mating season varies with geographic location. The Short-beaked Echidna (*Tachyglossus aculeatus*) is an egg-laying mammal (monotreme) and lays one egg at a time. The eggs hatch after about 10 days and the young, emerge blind and hairless. Clinging to hairs inside the mother's pouch, the young echidna suckles for two or three months. Once it develops spines and becomes too prickly, the mother removes it from her pouch and builds a burrow for it. It continues to suckle for the next six months (The Australian Museum, 2018).

Occurrence and Potential Habitat

This species was confirmed within the Project Site during the field surveys.

Given the very broad utilisation of habitat by this species, all vegetation within the Project Site is considered to provide potential habitat. Habitat present is comprised of suitable (vegetation that provides a variety of sheltering opportunities) and marginal (vegetation that provides minimal sheltering opportunities). No Essential Habitat for this species occurs within the Project Site.

The extent of potential habitat for the species is summarised in Table 50 and displayed in Figure **21**.

Table 50 Potential habitat for Short-beaked Echidna (Tachyglossus aculeatus)

Habitat Description	Potential Habitat Type	Total Area (ha) within the Project Site	Area (ha) within the Project Footprint (Direct Impacts)	Area (ha) within the Project Footprint (Indirect Impacts)
All remnant and regrowth vegetation; a variety of sheltering opportunities present.	Suitable	4,389.38	463.99	1,479.55
Non-remnant vegetation; sheltering opportunities largely restricted to grass cover.	Marginal	6,252.43	577.00	652.62
	Total	**10,641.81**	**1,040.99**	**2,132.17**

An assessment against the Significant Residual Impact Guideline for this species is provided in Table 51.

Table 51 Significant residual impact assessment for Short-beaked Echidna (Tachyglossus aculeatus)

Impact Criteria	Assessment
An action is LIKELY to have a significant residual impact on habitat for an animal that is 'Special Least Concern' wildlife if the action will:	
Lead to a long-term decrease in the size of a local population?	**No.** This species is known to occur within the Project Site and potentially utilises all vegetation within (a total area of 10,641.81 ha). This species is common throughout its distribution and any individuals that occur within the Project Site are considered to constitute a local population. Potential habitat within the Project Site comprises suitable (remnant and regrowth vegetation which provides sheltering opportunities) and marginal (non-remnant vegetation which provides limited sheltering opportunities). A total of 3,173.15 ha of potential habitat may be impacted by the Project, including 2,132.17 ha which may be indirectly impacted by subsidence and 1,040.99 ha which will be directly impacted by vegetation clearing. Potential habitat that will be directly impacted includes 463.99 ha of suitable and 577.0 ha of marginal habitat. The area of total potential habitat being directly impacted constitutes approximately 10% of the available potential habitat within the Project Site. This loss of habitat relative to the amount of habitat that will be retained within the Project Site, as well as the extensive areas of potential habitat in the local area is considered minimal. Furthermore, where clearing occurs habitat features suitable for sheltering such as felled trees and logs will be relocated to adjacent habitat areas where practical. Indirect impacts to potential habitat via subsidence will not be immediate, potentially occurring as mining progresses over time. Potential impacts to all potential habitat will be managed in accordance with the Project's Subsidence Management Plan. As the species is likely to occur in high numbers and the overall reduction in potential habitat is relatively low, the Project is considered unlikely to lead to a significant reduction in the foraging or breeding success of a local population or a long-term decrease in the size of a local population.
Reduce the extent of occurrence of the species?	**No.** This species occurs across Australia and is considered common. Approximately 10% of the potential habitat within the Project Site will be directly impacted via vegetation clearing (1,040.99 ha). A total of 2,132.17 ha may be indirectly impacted by subsidence, however any potential impacts associated with this will occur over time and be managed in accordance with the Project's Subsidence Management Plan. Given this species is relatively mobile, the availability of potential habitat that will remain within the Project Site and the likely large availability of potential habitat in the wider area, it is unlikely the Project will reduce the extent of occurrence of the species.

Impact Criteria	Assessment
An action is LIKELY to have a significant residual impact on habitat for an animal that is 'Special Least Concern' wildlife if the action will:	
Fragment an existing population?	**No.** Discrete sub-populations of short-beaked echidna are not known, and available population information indicates that this species is stable throughout its range. Any individuals present within the Project Site are likely to only constitute a very small portion of the total population. Approximately 10% of the potential habitat within the Project Site will be directly impacted via vegetation clearing (1,040.99 ha). Indirect impacts associated with subsidence may occur across 2,132.17 ha but will be gradual and managed in accordance with the Project's Subsidence Management Plan. However, as this species is relatively mobile and surface infrastructure that will be constructed for the Project is unlikely to create a barrier to movement, the Project is considered unlikely to fragment an existing population.
Result in genetically distinct populations forming as a result of habitat isolation?	**No.** This species is widely distributed and common. It has broad habitat requirements and as such impacts to potential habitat within the Project Site is unlikely to have population-level impacts. The functional habitat connectivity in an east to west direction is interrupted by the Saraji Mine complex directly west of the Project Site and the Project Site is already bisected by the Lake Vermont Road and railway corridor as well as Golden Mile Road in the south. However, the northern portion of the Project Site forms part of a large contiguous area of remnant vegetation which provides significant dispersal opportunities to the north and east. This species is relatively mobile and the Project is unlikely to create a barrier to movement between the Project Site and adjacent available habitat. Therefore, the Project is unlikely to result in a genetically distinct population forming as a result of habitat isolation.
Cause disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species?	**No.** Potential habitat suitable for breeding, foraging and dispersal occurs within the Project Site, however there is no information to suggest this habitat is ecologically significant. A total of 1,040.99 ha of potential habitat will be directly impacted via vegetation clearing, comprising approximately 10% of the available potential habitat within the Project Site. An additional 2,132.17 ha may be indirectly impacted by subsidence, however any potential impacts associated with this will occur gradually over time and be managed in accordance with the Project's Subsidence Management Plan. Given the relatively small direct loss of potential habitat, the extensive availability of likely high quality habitat in the region, as well as the species' mobility and common occurrence, the Project is considered unlikely to cause disruption to ecologically significant locations of the species.

Waterway Providing for Fish Passage

An environmental offset may be required for any part of a waterway that provides for passage of fish (other than that part of a waterway within an urban area) if the construction, installation or modification of waterway barrier works carried out under an authority will limit the passage of fish along the waterway. Barriers to fish passage can restrict and/or isolate fish communities, preventing access to, and benefits of fish habitats otherwise available to them. Poorly designed structures can injure or kill fish moving over or around them, or fish may become stranded and subjected to inappropriate water quality, lack of food, increased predation, crowding or other conditions that impact on their health, wellbeing and productivity.

Watercourses in and surrounding the Project Site range from stream order 6 (Boomerang Creek), stream order 5 (Phillips Creek) and stream order 3 (Plumtree, One Mile, Hughes and Barrett Creeks).

The main stem of these watercourses is mapped as having major (purple; Boomerang and Phillips Creeks), high (red; One Mile, Hughes and Barret Creeks) and amber (moderate; Plumtree Creek) risk of impact to fish passage by waterway barrier works, indicating that the State considers these watercourses to be important corridors for fish movement. Smaller upstream tributaries of these watercourses have low (green) risk of impact from waterway barrier works.

The detailed design of the Project will determine if construction, installation or modification of waterway barrier works within the waterways of the Project Site will limit the passage of fish. However, a preliminary aquatic ecology risk assessment has been completed by frc environmental and potential impacts to fish passage as a result of the Project were assessed. Potential impacts to fish passage may arise from subsidence, discharge of mine-affected water, construction of water crossings, vegetation clearing and earthworks and the operation and maintenance of the Project. Findings of the assessment determined that the risk of fish passage impacts in the watercourses of the Project Site is low. The full assessment is detailed in **Appendix D-1 Aquatic Ecology Technical Report**.

A significant residual impact assessment has been completed for the waterways against Section 10.1 of the Significant Residual Impact Guideline (Department of the Environment and Heritage Protection, 2014) (Table 52).

Table 52 Significant residual impact assessment for fish passage waterways

Impact Criteria	Assessment
An action is LIKELY to have a SRI on a waterway providing for fish passage if the action will result in:	
The mortality or injury of fish species; **OR**	**No.** All aquatic species recorded by frc environmental from watercourses in and surrounding the Project Site are tolerant of ephemeral flow and variable water quality, and all are common and widespread in the region. No sensitive aquatic environmental receptors are likely to occur in watercourses in, or surrounding, the Project Site. Potential impacts to fish and fish passage may occur as a result of subsidence, discharge of mine-affected water, construction of water crossings, vegetation clearing and earthworks and the operation and maintenance of the Project. However, with the implementation of mitigation measures including the Subsidence Management Plan, sensitive watercrossing design where practical, appropriate stream bed and bank rehabilitation and construction timing (during the dry season), the overall risk of impacts to fish (including reduced heath, injury or mortality) as a result of the Project activities is deemed low.
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; **OR**	
A reduced extent, frequency or duration of fish passage than previously found at site; **OR**	**No.** The detailed design of the Project will determine if construction, installation or modification of waterway barrier works within the waterways of the Project Site will limit the passage of fish. However, with the implementation of mitigation measures including the Subsidence Management Plan, sensitive watercrossing design where practical, appropriate bed and bank rehabilitation works and construction timing (during the dry season), changes to fish passage as a result of the Project activities are anticipated to be minimal.

Impact Criteria	Assessment
An action is LIKELY to have a SRI on a waterway providing for fish passage if the action will result in:	
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 being substantially modified, destroyed or fragmented; **OR**	**No.** The Project Site is on a floodplain, with watercourses having well-defined channels that follow an irregular sinuous pattern. Aquatic habitat is dominated by small isolated pools within the channel interspersed with large areas of dry stream bed, with larger pools typically found in artificial waterbodies. Larger pools are likely to be perennial or near-perennial and important refugial habitat for aquatic fauna. Sedimentation of watercourses can impact aquatic ecology by smothering stream beds with fine material, and decreasing bed roughness and reducing habitat diversity. Aquatic weeds can also reduce the habitat quality of watercourses for native fish, and dense growth of aquatic weeds can cause a barrier to fish passage. Mitigation of sedimentation impacts will be achieved by implementation of an Erosion and Sediment Control Plan (ESCP) during the construction, operation and rehabilitation phases of the Project, and implementation of a Rehabilitation Management Plan. All vehicles and machinery entering and leaving the Project Site will be subject to strict weed hygiene protocols to control the spread of weeds, including aquatic weeds. As such, areas of fish habitat within the Project Site are unlikely to be substantially modified, destroyed or fragmented as a result of the Project.
Substantial and measurable changed in the hydrological regime of the waterway, for example, a substantial change to the volume, depth, timing, duration and frequency of flows; **OR**	**No.** All aquatic species recorded by frc environmental from watercourses in and surrounding the Project Site are tolerant of ephemeral flow and are common and widespread in the region. Discharges of mine-affected water may impact flow patterns and aquatic ecology in the receiving environment, however no discharges of mine-affected water are planned as part of the Project. Impacts to flow patterns may also occur in lowered sections of stream bed (as a result of subsidence) and where construction of creek crossings leads to increased bank erosion. Potential impacts to watercourse flow patterns during all phases of the Project will be mitigated through the Subsidence Management Plan, the ESCP and the Rehabilitation Management Plan. As such, Project activities are unlikely to lead to substantial and measurable changes in the hydrological regimes of the Project Site waterways.
Significant changes in water quality parameters such as temperature, dissolved oxygen, pH and conductivitiy that provide cues for movement in local fish species.	**No.** All aquatic species recorded by frc environmental from watercourses in and surrounding the Project Site are tolerant of variable water quality and are common and widespread in the region. Unplanned discharges of mine-affected water (i.e. water with potentially high electrical conductivity, high or low pH, and potentially high concentrations of metals and sulfates) may impact water quality, flow patterns and aquatic ecology in the receiving environment. No discharges of mine-affected water are planned as part of the Project. Impacts to water quality may also occur where creek crossings are in areas with either pooled or flowing water. To minimise potential water quality impacts, isolation of the workspace will occur. Water quality will be monitored in accordance with a site Water Management Plan (WMP) to ensure that key water quality parameters remain within acceptable criteria. As such, Project activities are unlikely to lead to significant changes in water quality parameters.

11.3 Offsets

While mitigation and management measures for impacts on terrestrial ecology focus on maximising retention of vegetation across the underground mine footprint, offsets may be required for those areas where vegetation clearing is unavoidable, and in relation to fragmentation due to IMG management infrastructure and potentially from subsidence effects. The maximum estimated disturbance area for the Project includes both MNES and MSES. These include threatened ecological communities (TECs), habitat for listed threatened species and state protected vegetation communities. Watercourse and connectivity MSES also have the potential to be impacted.

The Project will be subject to the EPBC Act Environmental Offsets Policy and the Queensland Environmental Offsets Framework. Potential synergies exist between the EPBC Act Environmental Offsets Policy and offset policies administered by the Queensland Government. The EPBC Act Environmental Offsets Policy and EO Act support the development of complementary offset packages. The overlapping MNES and MSES will be considered when developing offset packages for the Project and offset delivery will preferentially secure offset areas which satisfy both MNES and MSES.

BMA propose to provide land based offsets through a staged offset strategy which will be finalised at issue of the environmental authority (mining) for the Project and will be based on determination of actual clearing areas as mining and associated IMG management and subsidence progress. This staged offset strategy will be aligned to BMA's mine planning cycle to allow accurate identification of actual offsets required in each stage of mining. BMA currently conducts mine planning on a five year cycle.

It is expected that the offsets may be staged as set out in **Appendix C-2 Offset Strategy** of this EIS.

A vegetation condition monitoring program with baseline performance targets will be conducted to support and inform this approach. This program will allow BMA to establish significant biodiversity values prior to clearing and subsidence and then, post subsidence; identify the net loss of values. This will be done on a five yearly cycle as set out in **Appendix C-2 Offset Strategy** of the EIS. As part of this program, BMA will establish the ecological equivalence of significant biodiversity values prior to any disturbance to inform replacement of these values either through rehabilitation or land based offsets.

12.0 Conclusions and recommendations

The desktop and ecological field surveys conducted for the Project have documented a range of flora and fauna. Several flora communities of conservation significance exist within the Project Site, including listed threatened ecological communities and endangered Res. Although some areas of remnant vegetation remain intact, most have been modified to some extent by historical and current land management practices. The most common modification is the removal of the shrub and ground layers and replacement with pasture grass species to support grazing.

The majority of the fauna habitat within the site is generally of low conservation value. Some habitats such as the riparian zones and alluvial woodland act as a wildlife corridor and the oxbow wetland and the *Acacia harpophylla* (Brigalow) woodland with gilgai possess greater potential for supporting conservation significant fauna.

Flora

Systematic flora surveys were carried out for the Project Site during 2007, 2008, 2010 by SKM, and in 2016, 2017 and 2020 by AECOM. Flora surveys were undertaken using guidelines established by the Queensland government. The aim of the flora study was to document the flora values with particular reference to the occurrence of conservation significant vegetation communities and species.

The ecological values of the Project Site are considered typical for the northern Bowen Basin with large areas of land historically cleared for grazing.

The literature review identified four EPBC Act TECs as potentially present within the Project Site. The presence of two of these communities has been confirmed on site: *Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin* and *Brigalow (Acacia harpophylla dominant and co-dominant)*. The TECs were surveyed using the methodology outlined by the DAWE for determining whether these met the criteria for classification as a TEC.

The Natural Grasslands community met the condition threshold of ‘good quality’ for the EPBC Act listed community and the Brigalow community met the condition thresholds for the TEC within most patches of analogous Res. Where analogous REs existed but did not meet the condition thresholds, the TEC was not mapped or considered in area calculations. The flora survey identified a total of ten REs, including three listed as endangered, six listed as of concern and one listed as ‘no concern at present’ as per the Biodiversity Status.

The literature review identified five flora species of conservation significance as potentially occurring in the survey area. Of the five species, field surveys confirmed the presence of one; bluegrass which is listed as vulnerable under the EPBC Act. Additional species of conservation significance; *Aristida annua, Cerbera dermicola* and *Dichanthium queenslandicum* (King Bluegrass) were identified as possibly being present given the habitat available.

Of the 40 exotic species recorded during the vegetation surveys, 11 species were identified as being of management concern. These are listed as ‘Restricted Matter’ under the *Biosecurity Act 2014* and are listed below:

- *Vachellia nilotica** (Prickly Acacia)
- *Harrisia martinii** (Harrisia Cactus)
- *Opuntia stricta** (Prickly Pear)
- *Opuntia tomentosa** (velvety Tree Pear)
- *Parthenium hysterophorus** (Parthenium)
- *Lantana camara** (Lantana)
- *Lantana montevidensis** (Creeping Lantana)
- *Hymenachne amplexicaulis** (Hymenachne)
- *Jatropha gossypiifolia** (Bellyache Bush)
- *Bryophyllum daigremontianum x delagoense** (Mother of Millions Hybrid)
- *Cryptostegia grandiflora** (Rubber Vine).

A total of 1,952.97 ha of remnant vegetation communities may be impacted by the proposed underground mining, surface facilities and infrastructure associated with the Project. This includes the indirect disturbance of remnant vegetation associated with subsidence from underground mining operations.

Clearing will cause direct loss of some remnant native vegetation as well as fragmentation of some vegetation communities. A total of 246.07 ha of the *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC, comprising endangered RE, will be directly and indirectly impacted by the Project. Less than one hectare of Natural Grassland TEC, also endangered RE, occurs within and adjacent to the transport infrastructure corridor and may not require direct clearing as powerlines may span above this vegetation.

Subsidence and gas drainage infrastructure may also impact on remnant native vegetation, particularly taller trees where ground movements and tension cracking may affect root zones. Grasses (native and introduced) and shrubs are expected to survive subsidence without intervention; however, taller trees may be affected and will need to be managed and potentially replaced to maintain riparian zones. Following subsidence, some areas may become ponded and this will change the nature of vegetation in these areas.

Disturbance to key biodiversity values including TECs and endangered and of concern REs will be avoided and managed wherever possible. However, it is inevitable that some remnant and high value regrowth native vegetation including TECs will be lost and offsets are proposed in accordance with the Queensland Environmental Offsets Framework and the EPBC Act Environmental Offsets Policy.

Fauna

Fauna surveys were conducted by SKM in 2007, 2009, 2010 and 2011. Supplementary fauna assessments were undertaken by AECOM in 2016, 2017 and 2020. The aim of the fauna surveys was to document the terrestrial vertebrate fauna and habitat, with particular reference to the occurrence of conservation significant fauna and to undertake an assessment of potential impacts.

A comprehensive literature review was undertaken prior to field survey to assist in targeting survey effort. Systematic fauna surveys were then conducted using methods including trapping, systematic searches, animal call recording and incidental sighting.

The studies identified a total (including exotic fauna) of 188 fauna species as occurring within the Project Site. This includes 117 bird, 33 mammal, 14 amphibian and 24 reptile species. Eleven conservation significant species were identified during ecological surveys including six endangered, vulnerable or near threatened (EVNT) species, one special least concern species and four migratory species (also listed as special least concern). These species and their status under the NC Act and EPBC Act are listed in Table 53. The literature review identified a further four species listed as threatened or migratory under the EPBC Act and or the NC Act as potentially occurring within the Project Site due to the availability of suitable habitat.

Table 53 Conservation significant species recorded within the Project Site

Common Name	Scientific Name	EPBC Act[1]	NC Act[2]
Ornamental Snake	*Denisonia maculata*	Vulnerable	Vulnerable
Australian Painted Snipe	*Rostratula australis*	Endangered	Vulnerable
Squatter Pigeon (Southern)	*Geophaps scripta scripta*	Vulnerable	Vulnerable
Greater Glider	*Petauroides volans*	Vulnerable	-
Grey Falcon	*Falco hypoleucos*	-	Vulnerable
Koala	*Phascolarctos cinereus*	Vulnerable	Vulnerable
Short-beaked Echidna	*Tachyglossus aculeatus*	-	Special Least Concern
Caspian Tern	*Hydroprogne caspia*	Migratory	-
Fork-tailed Swift	*Apus pacificus*	Migratory	Special Least Concern
Latham's Snipe	*Gallinago hardwickii*	Migratory	Special Least Concern
White-throated Needletail	*Hirundapus caudacutus*	Migratory	Special Least Concern

[1] Conservation status under the EPBC Act

[2] Conservation status under the NC Act

Essential Habitat is been mapped for two species within the Project Site. In the north-east corner of the Project Site, Essential Habitat for Squatter pigeon (*Geophaps scripta scripta*) has been mapped based on suitable habitat surrounding a previous record for this species (77.62 ha in Project Site and 24.79 ha in Project Footprint). Essential Habitat has also been mapped for Ornamental Snake (*Denisonia maculata*) in *Acacia harpophylla* (Brigalow) with *Casuarina cristata* or *Eucalyptus cambageana* (Dawson Gum) open woodlands, regrowth *Acacia harpophylla* (Brigalow) woodland and woodland communities on alluvium (1,985.44 ha in Project Site and 811.01 ha in Project Footprint). Ground-truthing confirmed habitat for both species within the Project Site and identified similar extents of habitat to the Essential Habitat mapping.

The BPA for the Brigalow Belt Bioregion identifies wildlife corridors within the Project Site:

- Boomerang Creek (and Plumtree Creek and Hughes Creek) riparian ecological corridor with fringing woodland and adjacent remnant eucalypt woodland (state significance)
- One Mile Creek riparian ecological corridor (state significance)
- Phillips Creek riparian ecological corridor (state significance)
- Downs Creek riparian ecological corridor (regional significance).

These wildlife corridors provide east–west fauna movement opportunities through the landscape and provide suitable habitat for a range of fauna species including the listed Koala (*Phascolarctos cinereus*) and Greater Glider (*Petauroides volans*).

Available habitats within the Project Site were generally degraded by land clearing, introduced pasture grasses and grazing. Nine habitat types were defined; River Red Gum Riparian Woodland, *Eucalyptus* and/or *Corymbia* Open Woodland, Dawson Gum and Brigalow Woodland, Brigalow or Belah Woodland, Oxbow Wetland, Natural Grasslands, Modified Grasslands, Shrubby Brigalow regrowth with gilgai and dams.

Impacts on native animals using the site will include habitat loss and fragmentation from direct impacts of vegetation clearing, as well as disturbance to animals using remnant habitat from noise, light and general activity and possible mortality during vegetation clearing or from vehicle strike. Mitigation measures are proposed to address these impacts and these measures are expected to be effective in avoiding or minimising impacts.

In the longer term, some habitat modification will also occur due to subsidence in some areas. The majority of fauna species using the site are generally resilient to disturbance and do not have highly specialised habitat requirements, and so it is envisaged that these animals will be able to adapt reasonably well to the habitat changes and also be able to utilise adjacent similar habitat.

However, it is possible that the Project will have a significant impact on four conservation significant fauna species; Koala (*Phascolarctos cinereus*), Ornamental Snake (*Denisonia maculata*), Greater Glider (*Petauroides volans*) and Squatter Pigeon (*Geophaps scripta scripta*) due to loss and degradation of habitat. Species specific mitigation measures and offsets will be required to reduce impacts on these species.

Offsets are proposed where significant residual impacts to threatened fauna are likely in accordance with the EPBC Act Environmental Offsets Policy 2012 and Queensland Environmental Offsets Framework. Subsidence management and rehabilitation will include a focus on retaining riparian corridors so that they can continue to provide opportunities for fauna dispersal.

Environmentally sensitive areas

The review of ESAs determined that there are no Category A ESAs or Category C ESAs within the Project Site; however these do occur within 100 km of the Project Site. There are a number of Category B ESAs within the Project Site and within 100 km of the Project Site. Desktop analyses and field surveys carried out by AECOM determined that three EREs are present within the Project Site. The total potential impact to EREs and hence Category B ESAs, is 275.17 ha. This is based on a combination of 49.64 ha of potential direct impact and an additional 225.53 ha of potential indirect impact. Mitigation measures are presented to reduce potential impacts to ESAs.

Matters of State Environmental Significance

A review of MSES determined that a number of values that relate to terrestrial ecology are found within the Project Site and may be affected by the Project (Table 54). After all reasonable avoidance and on-site mitigation measures for the Project have been or will be undertaken, the Project may still impact on MSES. Therefore, the Significant Residual Impact Guideline prepared by the Department of the Environment and Heritage Protection (2014) was used to determine the significance of the residual impact. The outcome of these assessments was that significant impacts are expected to five of the six MSES as outlined in Table 54.

Table 54 MSES within the Project Site

MSES Present within the Project Site	Significant Impact Expected
Regulated vegetation (Endangered and/or Of Concern REs)	Yes
Regulated vegetation (within the defined distance of a watercourse)	Yes
Regulated vegetation (within a Vegetation Management wetland area)	Yes
Connectivity areas	Yes
Protected wildlife habitat	No
Waterways providing for fish passage	No

13.0 References

Accad, A., Neldner, V.J., Kelley, J.A.R. and J. Li (2017). *Remnant Regional Ecosystem Vegetation in Queensland Analysis 1997-2015.* Queensland Department of Science, Information Technology and Innovation: Brisbane.

Advanced Environmental Dynamics (AED) (2020), Saraji East Mining Lease Project, Air Quality Assessment.

AECOM (2018). Saraji East Mining Lease Project Terrestrial Ecology Technical Report.

Anderson, E. (2016). *Plants of Central Queensland – Identification and Uses of Native and Introduced Species.* CSIRO Publishing, Victoria.

Augee, M.L. Gooden, B. Musser, A (2006) *Echidna: Extraordinary Egg-laying Mammal.* CSIRO Publishing, Victoria.

Aumann, T. and D. Baker-Gabb (1991). RAOU Report 75. *A Management Plan for the Red Goshawk.* RAOU. Royal Australian Ornithologists Union, Melbourne.

Atlas of Living Australia (2014). Occurance record: of of *Phascolarctos cinereus* | Koala recorded on 2014-10-24. Available at: https://biocache.ala.org.au/occurrences/7ab85874-2e5b-43f3-8f9d-9c2fc9f1623b

Australian Government (2020). *Atlas of Living Australia*, *Atlas of Living Australia*. Available at: http://www.ala.org.au/about-the-atlas/.

Ayers, D., S. Nash & K. Baggett (Eds) (1996). *Threatened Species of Western New South Wales*. Hurstville: NSW NPWS.

Barker, J., Grigg, G.C. and Tyler, M.J. (1995). A Field Guide to Australian Frogs. Surrey Beatty and Sons, Chipping Norton, New South Wales.

Blakers, M., S.J.J.F. Davies & P.N. Reilly (1984). *The Atlas of Australian Birds*. Melbourne, Victoria: Melbourne University Press.

Booker, I. and D. Kleinig (2006). *Field Guide to Eucalypts. Vol. 1, South-eastern Australia (Third Edition).* Bloomings Books, Hawthorn.

Bostock, P.D and A.E. Holland (eds) (2017). *Introduction to the Census of the Queensland Flora 2017.* Queensland Department of Science, Information Technology and Innovation: Brisbane.

Churchill, S. (2008). Australian Bats. Second Edition. Allen & Unwin. NSW, Australia.

Cogger, H.G., E.E. Cameron, R.A. Sadlier & P. Eggler (1993). The Action Plan for Australian Reptiles. [Online]. Canberra, ACT: Australian Nature Conservation Agency. Available from: http://www.environment.gov.au/biodiversity/threatened/action/reptiles/index.html.

Coops, N.C., Stone, C., Culvenor, D.S. and L. Chisholm (2004). *Assessment of Crown condition in Eucalypt Vegetation by Remotely sensed optical Indices.* Journal of Environmental Quality, 33 (3): 956-964.

Cropper, S. (1993) *Management of Endangered Plants*. Melbourne: CSIRO Publications.

Covacevich, J. A., Couper, P.J. and K.R. McDonald (1996). *Reptiles of Queensland's Brigalow Biogeographic Region: Distributions, Status and Conservation.* Page (s) 148. Canberra: Australian Nature Conservancy Agency (ANCA).

Curtis, L., Dennis, A., McDonald, K. & Kyne, P.D.S. (2012). *Queensland's Threatened Animals*. CSIRO, Collingwood.

DAFF (2012). *Declared Fish Habitat Area Network Assessment Report.* Queensland Government Department of Agriculture, Fisheries and Forestry. Available from: https://www.npsr.qld.gov.au/managing/pdf/assessment-report.pdf

Debus, S. (2012). *Birds of Prey Australia – A Field Guide* (Second edition). CSIRO Publishing, Victoria.

Department of Agriculture and Fisheries (2020). Invasive plant and animal fact sheets. Available at: https://www.daf.qld.gov.au/business-priorities/biosecurity/invasive-plants-animals/fact-sheets

Department of Agriculture Water and the Environment (2020a). *Protected Matters Search Tool*. Available at: http://www.environment.gov.au/epbc/protected-matters-search-tool.

Department of Agriculture Water and the Environment (2020b). *Species Profile and Threats Database*. Canberra. Available at: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl.

DEHP (2012). *Code of Environmental Compliance for Mining Lease Projects, Version 1.1.* Department of Environment and Heritage Protection, Brisbane.

DEHP (2013). *Protection of Wetlands in Great Barrier Reef Catchments from Effects of Earthworks.* Department of Environment and Heritage Protection. Available from:

DEHP (2017). Environmentally Sensitive Areas Mapping – Certified under the *Environmental Protection Regulation 2008/Environmental Protection Act 1994*). Department of Environment and Heritage Protection, Brisbane.

DEHP (2017b). *The Nature Refuges Program.* Queensland Government. Accessed January 2018. Available from: https://www.ehp.qld.gov.au/ecosystems/nature-refuges/the_nature_refuges_program.html

DEHP (2014). Biodiversity Assessment and Mapping Methodology – Version 2.2. Department of Environment and Heritage Protection, Brisbane.

DEHP (2019). EIS Guideline: Flora and fauna. Department of Environment and Heritage Protection, Brisbane.

Department of Environment and Science (2020a). *Biodiversity Planning Assessment for the Brigalow Belt Bioregion*. Brisbane: Department of Environment and Science. Available at: https://www.qld.gov.au/__data/assets/pdf_file/0029/68186/bb-bpa-summary-report.pdf.

Department of Environment and Science (2020b). *Wildlife Online Species List, Wildlife Online Dataset*.

DEWHA (2008). *Approved Conservation Advice for Natural Grasslands of Queensland Central Highlands and the northern Fitzroy Basin*. Canberra: Department of the Environment, Water, Heritage and the Arts.

Department of Environment and Science (DES) (2018), Mined Land Rehabilitation Policy, Queensland Government, Brisbane, AECOM accessed online on 20 November 2018 at: https://environment.des.qld.gov.au/management/pdf/mined-land-rehabilitation-policy.pdf

Department of the Environment Water Heritage and the Arts (2010a). *Survey guidelines for Australia's threatened bats: guidelines for detecting bats listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999*. Canberra, ACT: Australian Government. Available at: www.ag.gov.au/cca.

Department of the Environment Water Heritage and the Arts (2010b). *Survey guidelines for Australia's threatened birds: guidelines for detecting birds listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999*. Canberra, ACT: Australian Government. Available at: http://www.environment.gov.au/system/files/resources/107052eb-2041-45b9-9296-b5f514493ae0/files/survey-guidelines-birds-april-2017.pdf.

DNRM (2016). Essential Habitat Map—certified under the Ve*getation Management Act, 1999*. Department of Natural Resources and Mines, Brisbane.

Department of Natural Resources Mines and Energy (2019.) *Vegetation management watercourse and drainage feature map*. Queensland Government.

Department of Natural Resources Mines and Energy (2020). *Regulated vegetation managment map*. Department of Natural Resources, Mines and Energy. Queensland Government. Available at: https://www.dnrm.qld.gov.au/qld/environment/land/vegetation/vegetation-maprequest-%0Aform.

DoE (2013). *Approved Conservation Advice for Brigalow (Acacia harpophylla dominant and co-dominant) ecological community*. Canberra: Department of the Environment, Water, Heritage and the Arts.

DoE (2014). EPBC Act referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory).

DoE (2015a). *Approved Conservation Advice for Geophaps scripta scripta (Squatter pigeon (southern)*). Canberra: Department of the Environment.

DoE (2015b). *Referral Guideline for 14 Birds Listed as Migratory Species Under the EPBC Act.* Australian Government. Available from: http://www.environment.gov.au/system/files/resources/c05f5b87-0a99-4998-897e-7072c236cf83/files/migratory-birds-draft-referral-guideline.pdf

DoE (2016 – accessed). *Australian Ramsar Sites.* Australian Government. Available from: http://www.environment.gov.au/system/files/resources/0d08923b-a60d-4564-9af2-a7023b7aaf29/files/ramsar-sites_0.pdf

DoEE (2016). *Species Profile and Threats Database – Apus Pacificus – Fork-tailed Swift.* Australian Government: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=678

DoEE (2017). *Species Profile and Threats Database – Dasyurus hallucatus – Northern Quoll, Digul (Gogo-Yimidir), Wijingadda (Dambimangari), Wiminji (Martu).* Australian Government. Available form: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=331

DoEE (2017b). *Directory of Important Wetlands.* Australian Government. Accessed: January 2018. Available from: http://www.environment.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands

DoEE (2017c). *Species Profile and Threats Database – Gallinago hardwickii – Latham's Snipe.* Australian Government: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=863

DoEE (2017d). *Species Profile and Threats Database – Hirundapus cadacutus – White-throated Needletail.* Australian Government: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=682

DoEE (2017e). *EPBC Act Policy Statement 3.21: Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species*. Commonwealth of Australia. Available at: http://www.environment.gov.au/system/files/resources/67d7eab4-95a5-4c13-a35e-e74cca47c376/files/bio4190517-shorebirds-guidelines.pdf.

DoEE (2017f). Species Profile and Threats Database - *Calidris acuminata* — Sharp-tailed Sandpiper. Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=874

DoTE (2013) *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance*. Australian Government. Available from: https://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf

DotEE (2017g). *Species Profile and Threats Database – Dichanthium setosum — bluegrass .* Australian Government: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=14159

Department of Sustainability, Environment, Water, Population and Communities (2011). *Survey guidelines for Australia's threatened mammals: guidelines for detecting mammals listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999*. Canberra, ACT: Australian Government.

Department of Sustainability, Environment, Water, Population and Communities (2011a). *Survey guidelines for Australia's threatened reptiles: guidelines for detecting reptiles listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999*. Canberra, ACT: Australian Government. Available at: www.ag.gov.au/cca.

Department of Sustainability Environment Water Population and Communities (2011b). *Draft Referral guidelines for the nationally listed Brigalow Belt reptiles*. Available at: www.environment.gov.au/epbc/.

Department of Sustainability Environment Water Population and Communities (2012). *Environment Protection and Biodiversity Conservation Act 1999*, Environmental Offsets Policy.

EcoServe (2005). *A Review of Habitat Values for Biodiversity and Species of Conservation significance*. Final Report Submission for BMA Saraji Mine.

EcoServe (2007). *Biodiversity and Threatened Species Action Plan for Saraji Mine*. Final Report Submission 27th June 2007. An unpublished report prepared for BMA Saraji Mine.

EcoServe (2006). *2006 Winter Vertebrate Fauna Survey of Remnant Habitats on Saraji Mine*. Draft Submission. An unpublished report prepared for BMA Saraji Mine.

EcoServe (2008). *Baseline Fauna Surveys of Rehabilitated Lands on Saraji Coal Mine*. An unpublished report prepared for BMA Saraji Mine.

EcoServe (2009). *Baseline Fauna Surveys of Rehabilitated Lands on Saraji Coal Mine*. An unpublished report prepared for BMA Saraji Mine.

Environment Australia (2001). *Brigalow (Acacia harpophylla dominant and co-dominant) Nationally Threatened Species and Ecological Communities Information Sheet.*

Environment Australia (2001). *Brigalow Regrowth and the Environment Protection and Biodiversity Conservation Act 1999.* [Online]. Environment Australia, Canberra

Environmental Protection Agency (2008). *Biodiversity Planning Assessment: Brigalow Belt North Landscape Expert Panel Report v1.3.* Biodiversity Planning Unit, Brisbane.

Eyre, T. J. *et al.* (2018). *Terrestrial Vertebrate Fauna Survey Guidelines*. Brisbane.

Ferguson, D. and Mathieson, M. (2014) *Yakka skink, Egernia rugosa. Targeted species survey guidelines*. Brisbane: Department of Environment and Science.

Fitzgerald, M. B. Lazell and R. Shine (2010). *Ecology and Conservation of the Pale-headed Snake (Hoplocephalus bitorquatus, Elapidae).* Australian Zoologist.

Froend, R. and R. Loomes (2004). *Approach to Determination of Ecological Water Requirements of Groundwater Dependent Ecosystems in Western Australia* – A report of he Department of Environment, Edith Cowan University. Perth.

Garnett, S., Szaba, J. and G. Dutson (2011). *The Action Plan for Australian Birds 2010.* CSIRO Publishing. Available from: http://birdsindanger.net/taxatable.

Great Barrier Reef Marine Park Authority (2009). *Great Barrier Reef Outlook Report.* GBRMPA

Hourigan, C. (2011). *Ghost bat, Macroderma gigas. Targeted species survey guidelines*. Brisbane: Department of Environment and Science. Available at: https://www.qld.gov.au/__data/assets/pdf_file/0018/67140/ghost-bat.pdf.

Ives, A.R. (1995). *Predicting the Response of Populations to Environmental Change.* Ecology, 76 (3): 926-941.

Jackson, M.B. (2005). *Impacts of Flooding Stress on Plants and Crops.* Plant Stress. University of Bristol, UK. Available at: http://www.plantstress.com/, Accessed December, 2017.

Kerswell A, Kaveney T, Evans C and Appleby L. (2020) Habitat descriptions for 12 threatened species, specific to central Queensland. Report commissioned by BHP.

Lester, N. (2008). *Woodland to Weeds – Southern Queensland Brigalow Belt, Second Edition.* Copyright Publishing: Brisbane.

Menkhorst, P. and Knight, F. (2001). *A Field Guide to the Mammals of Australia*. Oxford University Press, South Melbourne, Victoria.

Melzer, A., Carrick, F., Menkhorst, P., Lunney, D. and B.S. John (2000). *Overview, critical assessment, and conservation implications of coal distribution and abundance.* Conservation Biology. 14:619-628.

Morcombe, M. (2004). *Field Guide to Australian Birds.* Pascal Press: Glebe.

Moore, P. (2005). *A Guide to Plants of Inland Australia.* New Holland Publishers: Sydney.

Neldner, V.J., Wilson, B. A., Thompson, E.J. and Dillewaard, H.A. (2005). Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland. Version 3.1. Updated September 2005. Queensland Herbarium, Environmental Protection Agency, Brisbane.

Neldner, V.J., Wilson, B. A., Thompson, E.J. and H.A. Dillewaard. (2012). *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland*. Version 3.2. Updated August 2012. Queensland Department of Science, Information, Technology, Innovation and the Arts, Brisbane.

NSW Scientific Committee (2005). *Alteration of Habitat Following Subsidence Due to Longwall Mining – Key Threatening Process Listing.* Office of Environment and Heritage. Accessed: December 2017. Available from: http://www.environment.nsw.gov.au/determinations/LongwallMiningKtp.htm

Queensland Herbarium (2007). *National Multi-species Recovery Plan for the cycads, Cycas megacarpa, Cycas ophiolitica, Macrozamia cranei, Macrozamia lomandroides, Macrozamia pauli-guilielmi and Macrozamia platyrhachis*. Report to Department of the Environment and Water Resources, Canberra. Queensland Parks and Wildlife Service, Brisbane. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/cycads.html.

Queensland Herbarium (2016). *Regional Ecosystem Description Database* (REDD). Version8.0 (December 2016), Department of Science, Information and Technology and Innovation: Brisbane).

Queensland Herbarium (2018). *Regional Ecosystem Description Database* (REDD). Version 10.0, Department of Science, Information and Technology and Innovation: Brisbane).

Reardon, T. (2003) *Standards in bat detector based surveys*, *Australasian Bat Society Newsletter 20*.

Rowland, J. (2012) *Painted honeyeater, Grantiella picta. Targeted species survey guidelines*. Brisbane: Department of Environment and Science.

Sattler, P., & William, R. (1999). *The conservation status of Queensland's bioregional ecosystems*. Brisbane: Environmental Protection Agency.

Shine, R. (1983). *Food habits and reproductive biology of the Australian elapid snakes of the genus Denisonia*. Journal of Herpetology 17 (2):171-175.

Simpson, K. and Day, N. (2004). Field Guide to the Birds of Australia. Seventh Edition. Penguin Group, Victoria.

SKM (2007 and 2010). Results from Comprehensive Fauna and Flora Surveys of MLA 70383 for BMA

SKM (2008). Results from Briglaow Mapping within BLA 70383 for BMA

SKM (2009). Results from Targeted Survey for Ornamental Snake on MLA 70383 for BMA

SKM (2010). Results from Flora Survey for RE Mapping on MLA 70383 for BMA

SKM (2011). Results from Winter Fauna Surveys conducted on MLA 70383 for BMA

The Australian Museum (2018). *Short-beaked Echidna*. NSW Government. Available from: https://australian.museum/learn/animals/mammals/short-beaked-echidna/

Threatened Species Scientific Committee (TSSC) (2001). *Commonwealth Listing Advice on Brigalow (Acacia harpophylla dominant and co-dominant*). Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/node/14496

Threatened Species Scientific Committee (TSSC) (2008a). *Commonwealth Listing Advice on Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin*. [Online]. Department of the Environment, Water, Heritage and the Arts.

Threatened Species Scientific Committee (TSSC) (2008b). *Commonwealth Conservation Advice on Dichanthium setosum*. [Online]. Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/14159-conservation-advice.pdf.

Threatened Species Scientific Committee (2009). *Commonwealth Listing Advice on Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin*. Department of the Environment, Water, Heritage and Arts, Commonwealth of Australia.

Threatened Species Scientific Committee (2012). *Approved Conservation Advice for Phascolarctos cinereus (combined populations of Queensland, New South Wales and the Australian Capital Territory)(koala northern disignatable unit)*. Available at:

http://www.environment.gov.au/biodiversity/threatened/species/pubs/197-conservation-advice.pdf.

Threatened Species Scientific Committee (TSSC) (2013). *Commonwealth Conservation Advice on Brigalow (Acacia harpophylla dominant and co-dominant) ecological community* [Online]. Department of the Environmental, Water, Heritage and the Arts. Available from: https://www.environment.gov.au/biodiversity/threatened/communities/pubs/028-conservation-advice.pdf

Threatened Species Scientific Committee (2014). *Approved Conservation Advice for Denisonia maculata (ornamental snake)*. Available at: http://www.environment.gov.au/biodiversity/threatened/species/pubs/1193-conservation-advice.pdf.

Threatened Species Scientific Committee (TSSC) (2015). *Commonwealth Conservation Advice on Grantiella Picta*. [Online]. Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/470-conservation-advice.pdf

Threatened Species Scientific Committee TSSC (2009). Commonwealth Listing Advice on Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin, Department of the Environment, Water, Heritage and the Arts, accessed online at: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/99-listing-advice.pdf

Threatened Species Scientific Committee and Department of the Environment (2013). *Commonwealth Conservation Advice for the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community*. Canberra. Available at: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/028-conservation-advice.pdf.

Threatened Species Scientific Committee (TSSC) (2016). *Commonwealth Conservation Advice on Petauroides volans – Greater Glider*. [Online]. Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/254-conservation-advice-20160525.pdf

UNESCO (2011). *What is World Heritage?* Available from: http://whc.unesco.org/en/faq/19

Wilson, S. (2005). *A Field Guide to Reptiles of Queensland*. Reed New Holland, Sydney.

Wilson, S.K. & D.G. Knowles (1988). *Australia's Reptiles: A Photographic Reference to the Terrestrial Reptiles of Australia*. Australia: Collins Publishers.

WBM Pty Ltd (1999). *Wet Season Survey of Terrestrial and Aquatic Fauna of Saraji Mine*. An unpublished report prepared for BHP Saraji Mine.

WBM Pty Ltd (2002). *Jacaranda Pit IAS – Terrestrial Vertebrate Fauna Assessments* – Saraji Mine. An unpublished report prepared for BHP Billiton Saraji Mine.

WBM Pty Ltd (2003). *Remnant Fauna Survey – Terrestrial Vertebrate Fauna Assessments – Saraji Mine*. An unpublished report prepared for BHP Billiton Saraji Mine.

Appendix A

Database Search Results

Queensland Government

Department of Environment and Heritage Protection

Environmental Reports

Biodiversity and Conservation Values

Biodiversity Planning Assessments and Aquatic Conservation Assessments

Area of Interest: Longitude: 148.3118 Latitude: -22.3729

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@ehp.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.

Table of Contents

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

Area of Interest	148.3118,-22.3729 with 2 kilometre radius
Size (ha)	1256.6
Local Government(s)	ISAAC REGIONAL
Bioregion(s)	Brigalow Belt
Subregion(s)	Isaac - Comet Downs
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 v1.3
Aquatic Conservation Assessment(s) (riverine)	Great Barrier Reef Catchment v1.1
Aquatic Conservation Assessment(s) (non-riverine)	Great Barrier Reef Catchment 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	127.8	10.2%
Of Concern	84.0	6.7%
No concern at present	101.3	8.1%

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 Heritage Protection'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	371.3	29.5%
Regional	0.0	0.0%
Local or Other Values	0.0	0.0%

Table 5: Non-riverine wetlands intersecting the AOI

Non-riverine wetland types intersecting the area of interest	#
(No Records)	

NB. The figures presented in the table above are derived from the relevant non-riverine Aquatic Conservation Assessment(s). Later releases of wetland mapping produced via the Queensland Wetland Mapping Program may provide more recent information in regards to wetland extent.

Table 6: Named waterways intersecting the AOI

(no results)

Refer to **Map 1** for general locality information.

The following two tables identify the extent and proportion of the user specified AOI which is mapped as being of "Very High", "High", "Medium", "Low", or "Very Low" aquatic conservation value for riverine and non-riverine wetlands via application of the Queensland Department of Environment and Heritage Protection'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	1256.6	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
(No Records)		

Biodiversity Planning Assessments

Introduction

The department of Environment and Heritage Protection (EHP) 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 EHP.

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	371.3	29.5%
Regional	0.0	0.0%
Local or Other Values	0.0	0.0%

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

Diagnostic Criteria

Diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion. These criteria are diagnostic in that they are used to filter the available data and provide a "first-cut" or initial determination of biodiversity significance. This initial assessment is then combined through a second group of other essential criteria.

A description of the individual diagnostic criteria is provided in the following sections.

Criteria A. Habitat for EVNT taxa: Classifies areas according to their significance based on the presence of endangered, vulnerable and/or rare (EVNT) taxa. EVNT taxa are those scheduled under the *Nature Conservation Act 1992* and/or the *Environment Protection and Biodiversity Conservation Act 1999*. It excludes highly mobile fauna taxa which are instead considered in Criterion H and brings together information on EVNT taxa using buffering of recorded sites or habitat suitability models (HSM) where available.

Criteria B. Ecosystem value: Classifies on the basis of biodiversity status of regional ecosystems, their extent in protected areas (presence of poorly conserved regional ecosystems), the presence of significant wetlands and intertidal zones; and areas of national importance such as World Heritage areas and Ramsar sites. Ecosystem value is applied at a bioregional (**B1**) and regional (**B2**) scale.

Criteria C. Tract size: Measures the relative size of tracts of vegetation in the landscape. The size of any tract is a major indicator of ecological significance, and is also strongly correlated with the long-term viability of biodiversity values. Larger tracts are less susceptible to ecological edge effects and are more likely to sustain viable populations of native flora and fauna than smaller tracts.

Criteria D. Relative size of regional ecosystems: Classifies the relative size of each regional ecosystem unit within its bioregion (**D1**) and its subregion (**D2**). Remnant units are compared with all other occurrences with the same regional ecosystem. Large examples of a regional ecosystem are more significant than smaller examples of the same regional ecosystem because they are more representative of the biodiversity values particular to the regional ecosystem, are more resilient to the effects of disturbance, and constitute a significant proportion of the total area of the regional ecosystem.

Criteria F. Ecosystem diversity: Is an indicator of the number of regional ecosystems occurring within an area. An area with high ecosystem diversity will have many regional ecosystems and ecotones relative to other areas within the bioregion.

Criteria G. Context and connection: Represents the extent to which a remnant unit incorporates, borders or buffers areas such as significant wetlands, endangered ecosystems; and the degree to which it is connected to other vegetation.

A summary of the biodiversity status based upon the diagnostic criteria is provided in the following table.

Table 10: Summary of biodiversity significance based upon diagnostic criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains at least 1 Endangered RE (B1)	125.7	10.0
Regional	Remnant contains at least 1 RE with 10-30 percent extent remaining in the subregion (B2) & Remnant is part of a Tract that is one of the largest in the bioregion (C)	142.6	11.3
Regional	Remnant contains at least one Of Concern RE (B1)	103.0	8.2

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							371.3	29.5
B1: Ecosystem Value (Bioregion)	125.7	10.0	103.0	8.2	142.6	11.3		
B2: Ecosystem Value (Subregion)	125.7	10.0	142.6	11.3	103.0	8.2		
C: Tract Size	246.9	19.6			85.9	6.8	38.5	3.1
D1: Relative RE Size (Bioregion)							371.3	29.5
D2: Relative RE Size (Subregion)	103.0	8.2					268.3	21.4
F: Ecosystem Diversity	103.0	8.2	125.7	10.0	142.6	11.3		
G: Context and Connection	9.5	0.8	237.4	18.9			124.4	9.9

Other Essential Criteria

Other essential criteria (also known as expert panel criteria) are based on non-uniform information sources and which may rely more upon expert opinion than on quantitative data. These criteria are used to provide a "second-cut" determination of biodiversity significance, which is then combined with the diagnostic criteria for an overall assessment of relative biodiversity significance. A summary of the biodiversity status based upon the other essential criteria is provided in the following table.

Table 12: Summary of biodiversity significance based upon other essential criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I)	1.3	0.1
State	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I) & Remnant forms part of a bioregional corridor (J)	245.6	19.5
Regional	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I)	124.4	9.9

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.

This criterion can be used to identify essential and general habitat for EVNT and other priority taxa additional to that derived under Diagnostic Criterion A. Information sources include expert and local knowledge, technical reports and papers, and modelled maps of essential and general habitat.

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								

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
Ib: Wildlife Refugia	246.9	19.6	124.4	9.9				
Ic: Disjunct Populations								
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								
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	103.0	8.2%
Regional	142.6	11.3%
Local or Other Values	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_l_18	Riparian Corridors	State Regional	J (Riparian Corridor): STATE J (Riparian Corridor): REGIONAL
brbn_l_69	Core areas in fragmented subregions: Dawson River Downs Callide Creek Downs Isaac - Comet Downs Upper Belyando Floodout	State	Ib (wildlife refugia): VERY HIGH

Decision Number	Description	Panel Recommended Significance	Criteria Values
brbn_l_73	Representation in fragmented subregions: Dawson River Downs Callide Creek Downs Isaac - Comet Downs Upper Belyando Floodout	State Regional	Ib (wildlife refugia): VERY HIGH Ib (wildlife refugia): HIGH
brbs_l_18	Riparian Bioregional Corridors	State or Regional	J (Riparian Corridor): STATE or J (Riparian Corridor): REGIONAL

Expert panel decision descriptions:

brbn_l_18

Riparian corridors are mapped in 2 parts using buffers of 200 metres and 1000 metres from the streamline as shown on the 1:100000 topographic map series. Remnant ecosystem polygons containing 30% or more of their area within the 200m buffer are assigned State significance. Remnant ecosystem polygons containing 30% or more of their area within the 1000m buffer are assigned Regional significance.

brbn_l_69

Tracts are patches of continuous remnant vegetation. 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. The northern Brigalow Belt has some very large tracts of vegetation. Based on the Tract Size analysis (Criterion C), the following core areas are identified for the northern Brigalow Belt. They are the fragmented subregions:

More information for this decision exists in the BRB BPA North Landscape Report.

brbn_l_73

The largest example of each regional ecosystem remaining should be rated as State significance because these act as significant wildlife refuges in an extensively cleared landscape. All other remnants are Regionally significant because these act as wildlife refuges in an extensively cleared landscape.

brbs_l_18

Riparian corridors are mapped in 2 parts using buffers of 200 metres and 1000 metres from the streamline as shown on the 1:100000 topographic map series. Remnant ecosystem polygons containing 30% or more of their area within the 200m buffer are assigned state significance. Remnant ecosystem polygons containing 30% or more of their area within the 1000m buffer are assigned regional significance.

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 prcesses

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.ehp.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%
High	0.0	0.0%
Medium	1256.6	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							1256.5	100.0
2. Naturalness catchment			1256.5	100.0				
3. Diversity and richness			14.2	1.1	1242.3	98.9		
4. Threatened species and ecosystems			1256.5	100.0				
5. Priority species and ecosystems			8.9	0.7				
6. Special features								
7. Connectivity							1256.5	100.0

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

(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
(No Records)		

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
(No Records)								

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.

(No Records)

4 is the highest rating/value

Expert panel decision descriptions:

(No Records)

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
Denisonia maculata	Ornamental Snake	V	V	Medium			FA

NB. Please note that the threatened species listed in this section are based upon the most recently compiled DEHP 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

(no results)

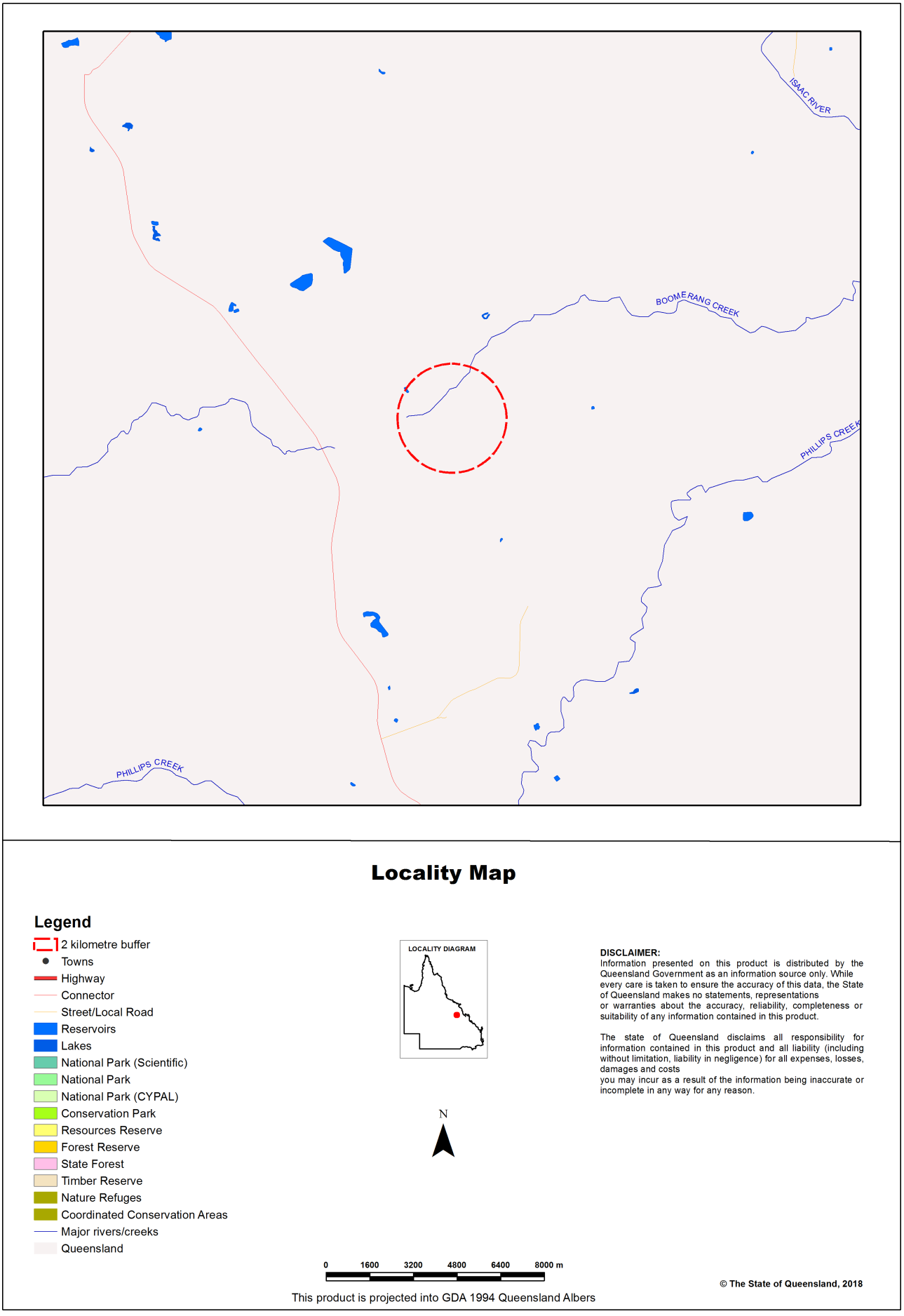
Table 25: Priority species recorded on, or within 4 km of the AOI - non-riverine

(no results)

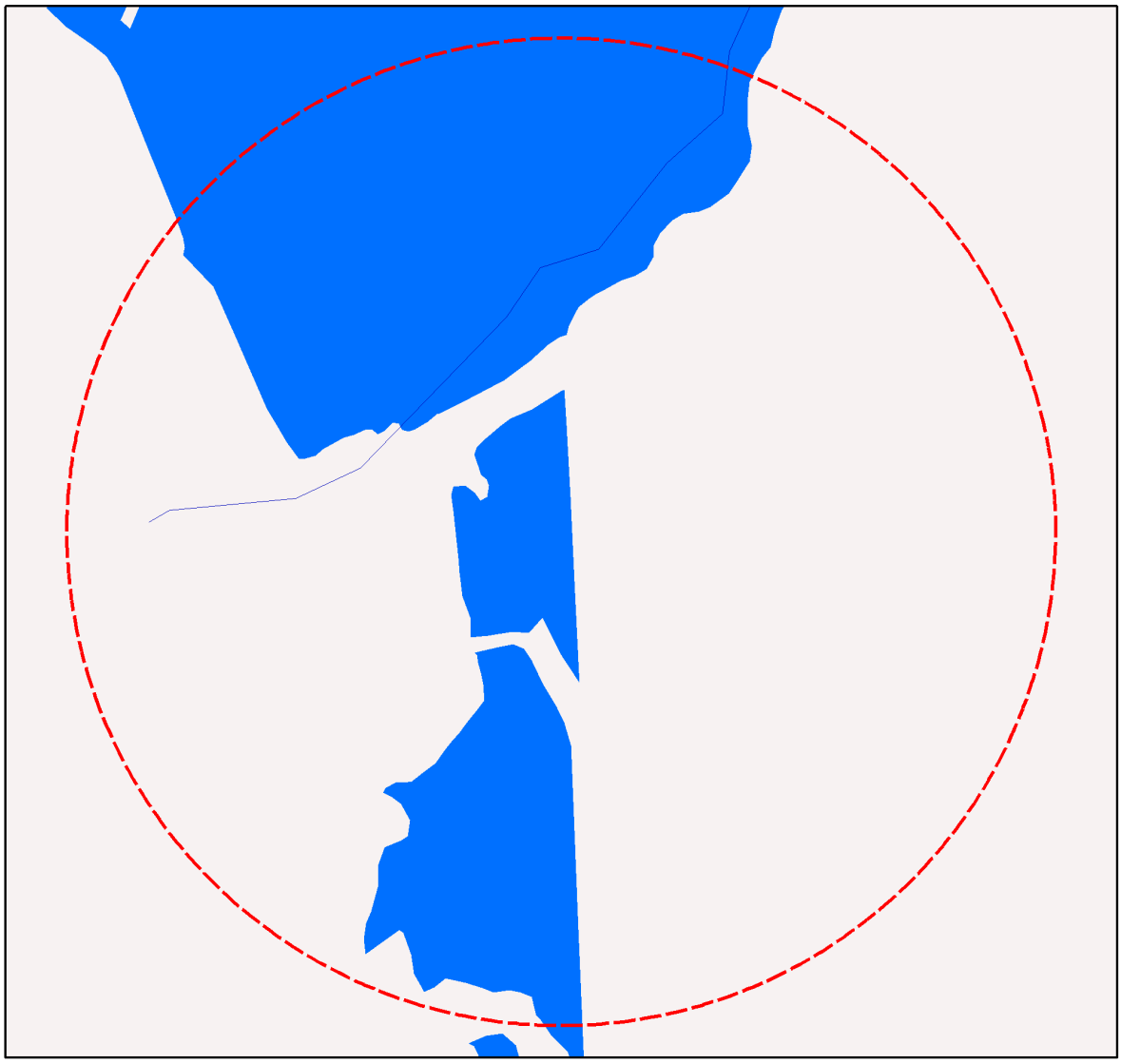
NB. Please note that the priority species records used in the above two tables are comprised of those adopted for the released individual ACAs. The ACA riverine and non-riverine priority species databases are updated from time to time to reflect new release of ACAs. At each update, the taxonomic details for all ACAs records are amended as necessary to reflect current taxonomic name and/or status changes.

Maps

Map 1 - Locality Map



Map 2 - Biodiversity Planning Assessment (BPA)



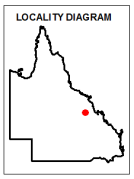
Biodiversity Planning Assessments

Legend

- 2 kilometre buffer
- Towns
- Roads
- Major rivers/creeks
- Queensland

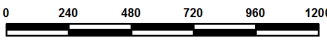
Biodiversity Planning Assessment

- State Habitat for EVNT taxa
- State
- Regional
- Local or Other Values
- Non Bioregion Ecosystem



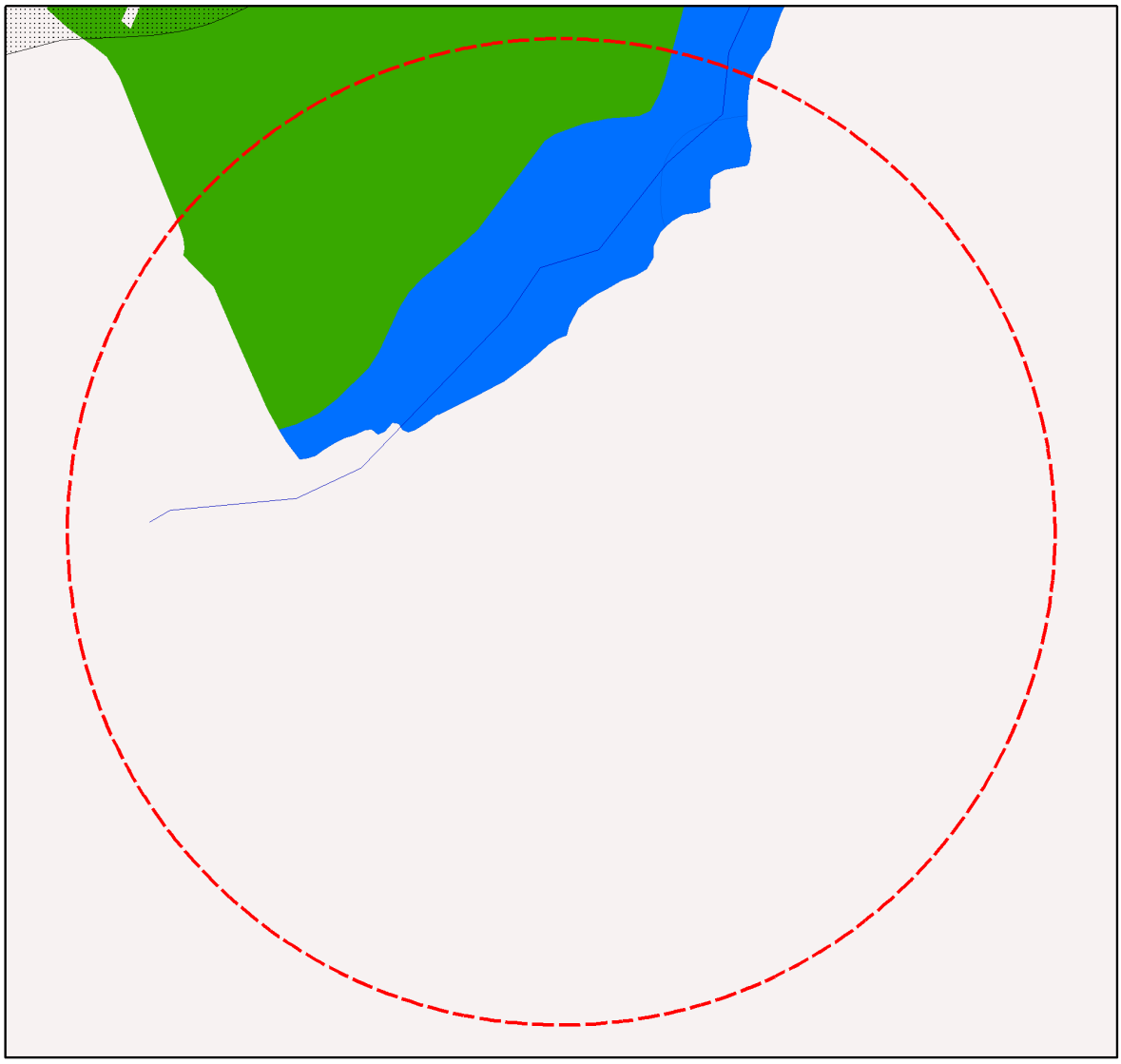
DISCLAIMER:
Information presented on this product is distributed by the Queensland Government as an information source only. While every care is taken to ensure the accuracy of this data, the State of Queensland makes no statements, representations or warranties about the accuracy, reliability, completeness or suitability of any
information contained in this product.

The state of Queensland disclaims all responsibility for information contained in this product and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs
you may incur as a result of the information being inaccurate or incomplete in any wayfor any reason.



This product is projected into GDA 1994 Queensland Albers

Map 3 - Corridors



Corridors

Legend

- 2 kilometre buffer
- Towns
- Roads
- Major rivers/creeks
- Queensland

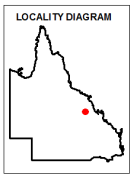
Corridors

- State
- Regional

Corridor Triggered Vegetation

- State
- Regional
- Local

LOCALITY DIAGRAM



DISCLAIMER:
Information presented on this product is distributed by the Queensland Government as an information source only. While every care is taken to ensure the accuracy of this data, the State of Queensland makes no statements, representations or warranties about the accuracy, reliability, completeness or suitability of any information contained in this product.

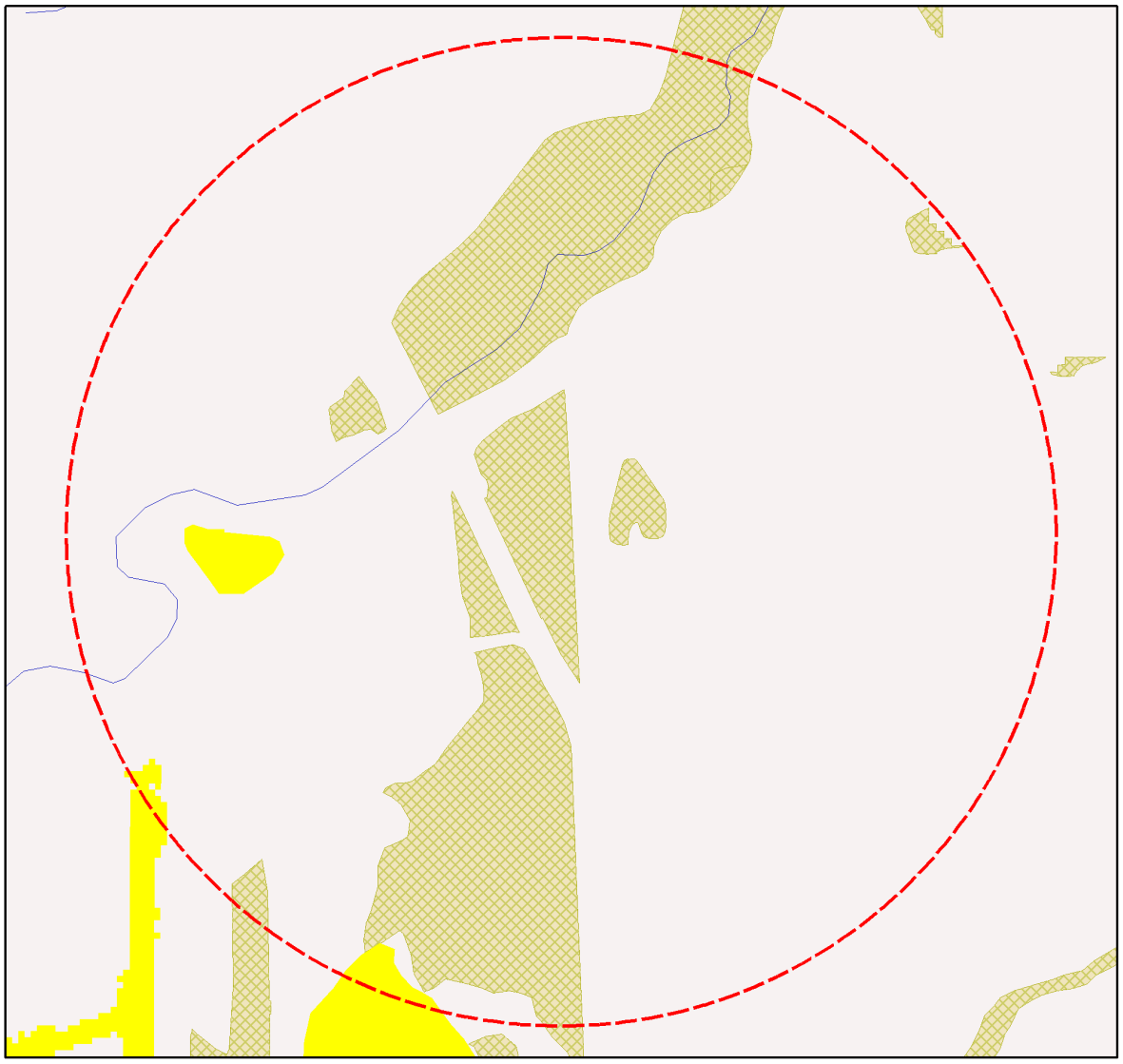
The state of Queensland disclaims allresponsibility for information contained in this product and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

N

0 240 480 720 960 1200 m

This product is projected into GDA 1994 Queensland Albers

Map 4 - Wetlands and waterways



Wetlands and Waterways

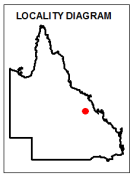
Legend

- 2 kilometre buffer
- 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)

LOCALITY DIAGRAM



N

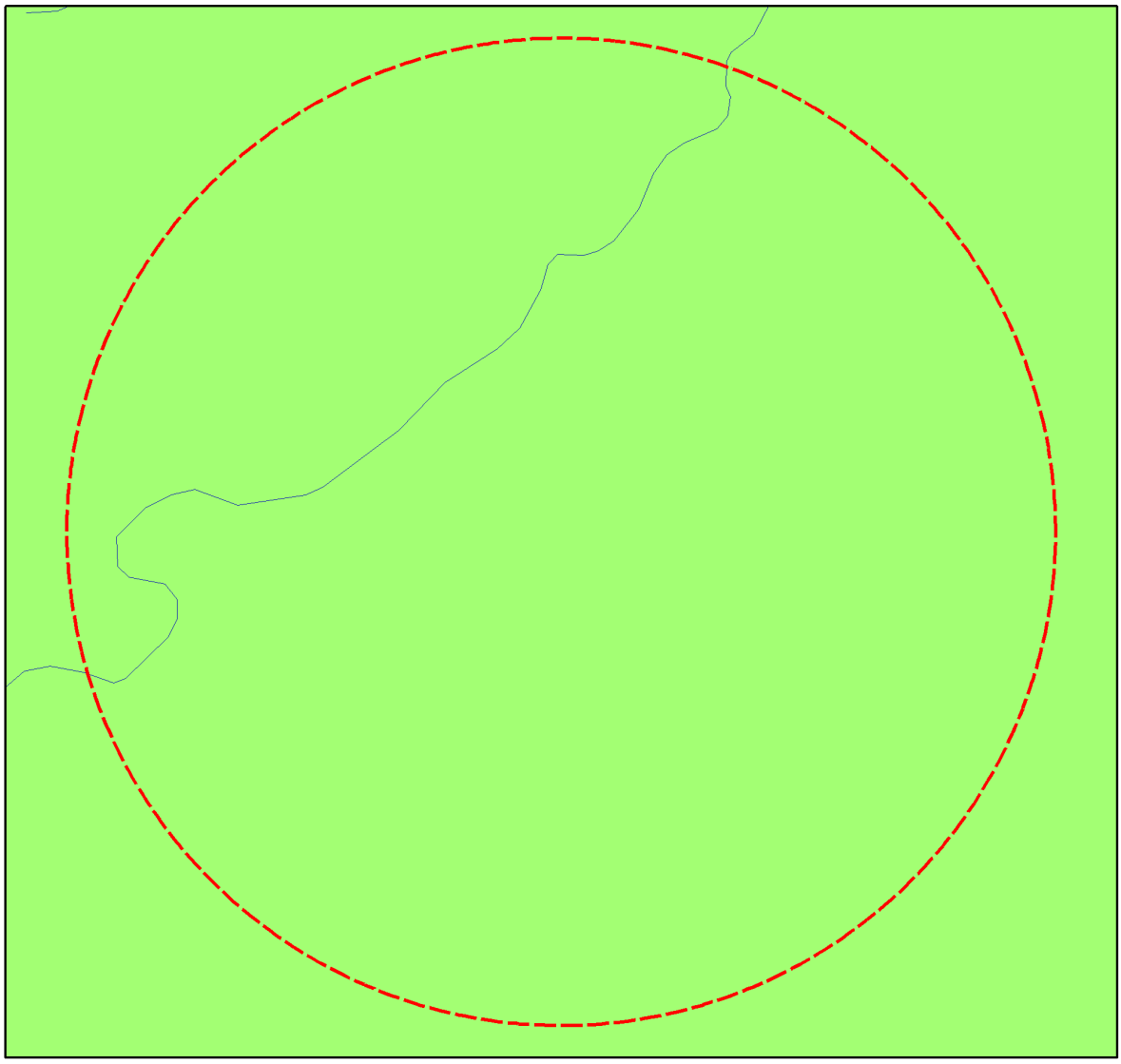
0 240 480 720 960 1200 m

This product is projected into GDA 1994 Queensland Albers

DISCLAIMER:
Information presented on this product is distributed by the Queensland Government as an information source only. While every care is taken to ensure the accuracy of this data, the State of Queensland makes no statements, representations or warranties about the accuracy, reliability, completeness or suitability of any
information contained in this product.

The state of Queensland disclaims all responsibility for information contained in this product and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs
you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

Map 5 - Aquatic Conservation Assessment (ACA) - riverine



Aquatic Conservation Assessment (ACA) - riverine

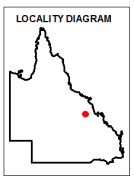
Legend

- 2 kilometre buffer
- Towns
- Roads
- Rivers/Creeks
- Queensland

ACA Riverine - Subcatchment Significance

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

LOCALITY DIAGRAM



N

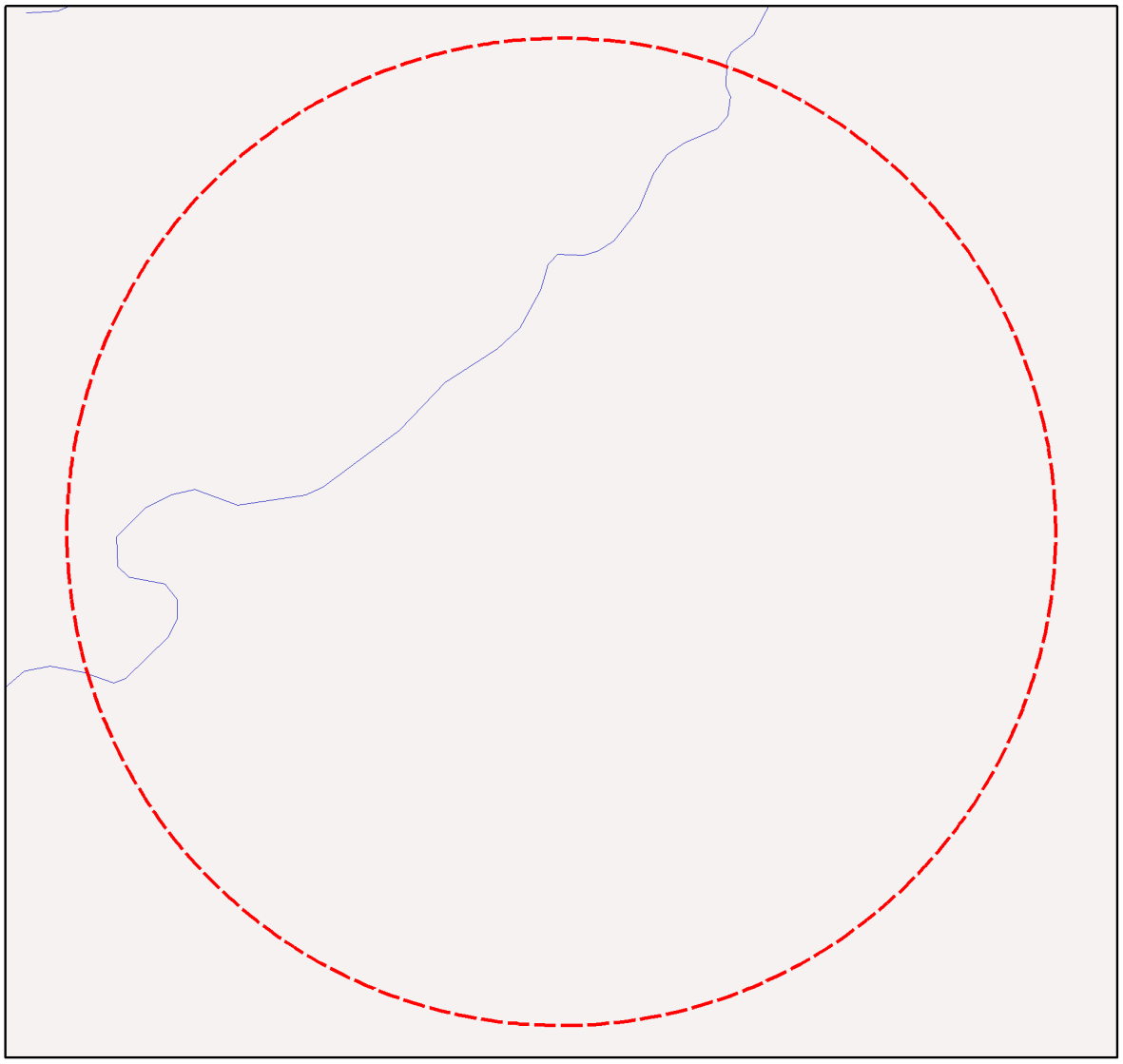
DISCLAIMER:
Information presented on this product is distributed by the Queensland Government as an information source only. While every care is taken to ensure the accuracy of this data, the State of Queensland makes no statements, representations or warranties about the accuracy, reliability, completeness or suitability of any information contained in this product.

The state of Queensland disclaims all responsibility for information contained in this product and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

0 240 480 720 960 1200 m

This product is projected into GDA 1994 Queensland Albers

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



Aquatic Conservation Assessment (ACA) - nonriverine

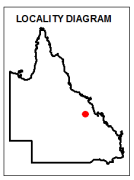
Legend

- 2 kilometre buffer
- Towns
- Roads
- Rivers/Creeks
- Queensland

ACA Non-riverine

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

LOCALITY DIAGRAM



N

DISCLAIMER:
Information presented on this product is distributed by the Queensland Government as an information source only. While every care is taken to ensure the accuracy of this data, the State of Queensland makes no statements, representations or warranties about the accuracy, reliability, completeness or suitability of any information contained in this product.

The state of Queensland disclaims all responsibility for information contained in this product and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

0 240 480 720 960 1200 m

This product is projected into GDA 1994 Queensland Albers

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.ehp.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 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 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 v1.3 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 v1.3
Threatened Species	An internal DEHP database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.
BPA Priority Species	An internal DEHP database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.
ACA Priority Species	An internal DEHP database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.

***These datasets are available at:**

http://dds.information.qld.gov.au/DDS

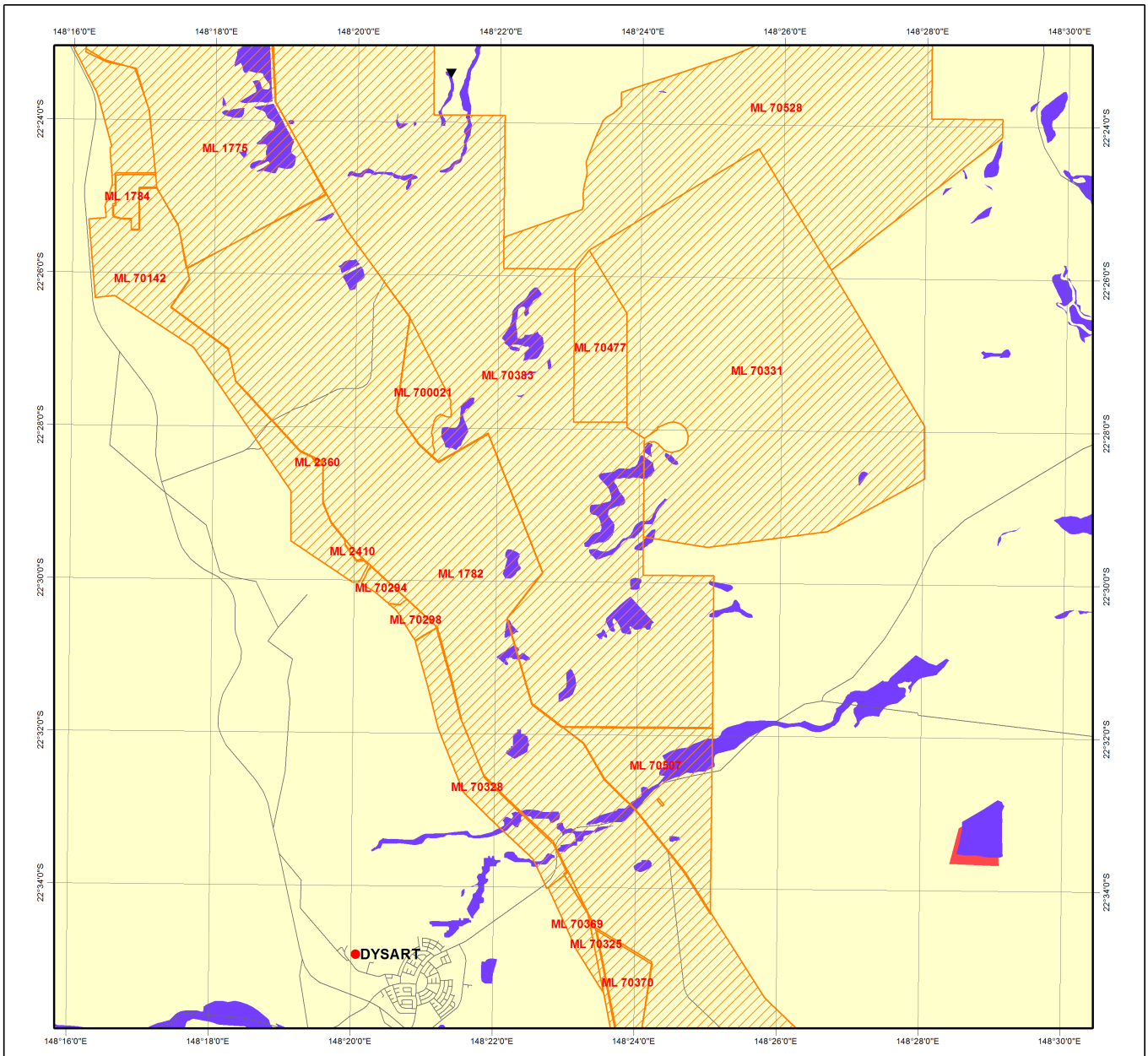
Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
ACA	- Aquatic Conservation Assessment
AQUABAMM	- Aquatic Biodiversity Assessment and Mapping Methodology
BAMM	- Biodiversity Assessment and Mapping Methodology
BoT	- Back on Track
BPA	- Biodiversity Planning Assessment
CAMBA	- China-Australia Migratory Bird Agreement
EHP	- Department of Environment and Heritage Protection
EPBC	- *Environment Protection and Biodiversity Conservation Act 1999*
EVNT	- Endangered, Vulnerable, Near Threatened
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
JAMBA	- Japan-Australia Migratory Bird Agreement
NCA	- *Nature Conservation Act 1992*
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
ROKAMBA	- Republic of Korea-Australia Migratory Bird Agreement

Tenure type: Mining Leases

Map requested: 15/01/2018 14:39:22

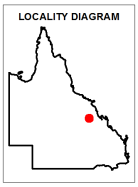
Centred on point position: Longitude: 148.3847 Latitude: -22.4902



ENVIRONMENTALLY SENSITIVE AREAS - Mining Activities

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

LOCALITY DIAGRAM



N

0 1,300 2,600 3,900 5,200 6,500 m

This product is projected into GDA 1994 MGA Zone 55

Information presented on this product is distributed by the Queensland Government as an information source only. While every care is taken to ensure the accuracy of this data, The State of Queensland makes no statements, representations or warranties about the accuracy, reliability, completeness or suitability of any information contained in this product.

The State of Queensland disclaims all responsibility for information contained in this product and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or ncomplete in any way for any reason.

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.

Australian Government

Department of the Environment

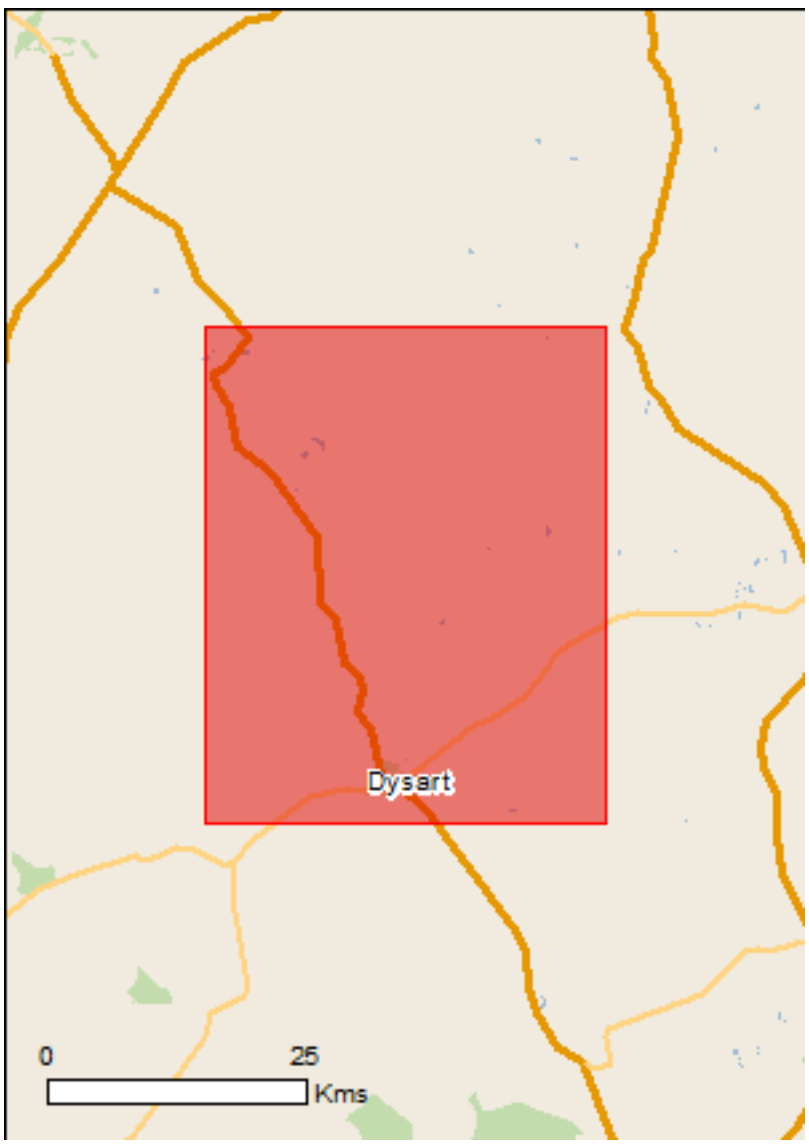
EPBC Act Protected Matters Report

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.

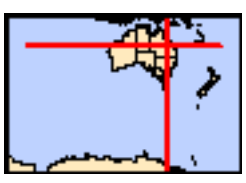
Report created: 14/09/16 14:58:26



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

Coordinates

Buffer: 0.0Km



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.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	22
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	15
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	20
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	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
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area
Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin	Endangered	Community likely to occur within area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat known to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Neochmia ruficauda ruficauda Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area
Poephila cincta cincta Southern Black-throated Finch [64447]	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus hallucatus Northern Quoll, Digul [331]	Endangered	Species or species habitat likely to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Nyctophilus corbeni		
Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
Petauroides volans		
Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Other		
Cycas ophiolitica		
[55797]	Endangered	Species or species habitat likely to occur within area
Plants		
Aristida annua		
[17906]	Vulnerable	Species or species habitat likely to occur within area
Dichanthium queenslandicum		
King Blue-grass [5481]	Endangered	Species or species habitat likely to occur within area
Reptiles		
Denisonia maculata		
Ornamental Snake [1193]	Vulnerable	Species or species habitat known to occur within area
Egernia rugosa		
Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
Elseya albagula		
Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat likely to occur within area
Furina dunmalli		
Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
Lerista allanae		
Allan's Lerista, Retro Slider [1378]	Endangered	Species or species habitat may occur within area
Rheodytes leukops		
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
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus		
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Species or species habitat known to occur

Name	Threatened	Type of Presence within area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat may occur within area
Migratory Wetlands Species		
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat likely to occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
[Anseranas semipalmata](#) Magpie Goose [978]		Species or species habitat may occur within area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardea alba](#) Great Egret, White Egret [59541]		Species or species habitat known to occur within area
[Ardea ibis](#) Cattle Egret [59542]		Species or species habitat may occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
[Cuculus saturatus](#) Oriental Cuckoo, Himalayan Cuckoo [710]		Species or species habitat may occur within area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Coolibah	QLD

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		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
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
Plants		
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
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
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.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

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

-22.2247 148.17096,-22.2247 148.518,-22.6227 148.518,-22.6227 148.17096,-22.2247 148.17096

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
-Parks and Wildlife Commission NT, Northern Territory Government
-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, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-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.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Department of Natural Resources, Mines and Energy

Vegetation management report

For Lot: 7 Plan: CNS144

Current as at 15/02/2018

Queensland Government

This publication has been compiled by Operations Support, Department of Natural Resources, Mines and Energy.

Overview

IMPORTANT INFORMATION- As a result of the new *Planning Act 2016*, which commenced on 3 July 2017, there are a number of changes to the Vegetation Management Framework. These changes include;

- Exemptions from the Vegetation Management Framework, commonly known as exemptions and detailed in the Sustainable Planning Regulations 2012, are now known as "exempt clearing works", and are detailed in the Planning Regulations Schedule 21; and
- Self-assessable vegetation clearing codes are now known as "accepted development vegetation clearing codes". However, as there are 15 self-assessable vegetation clearing codes available for use that will not be re-named as a result of the recent changes, the term self-assessable vegetation clearing code will be used throughout this report.

Vegetation clearing is predominantly regulated under the *Vegetation Management Act 1999* (VMA) and the *Planning Act 2016* (PA). A development permit is required to clear where the clearing is not exempt clearing work through the Planning Regulation 2017, or where it cannot be carried out under a self-assessable vegetation clearing code or an area management plan under the VMA.

Many routine vegetation management activities can be carried out as exempt clearing work listed in the Planning Regulation 2017, or through an self-assessable vegetation clearing code or an area management plan (AMP). Other activities may require you to apply for a development permit under the *Planning Act 2016*. The requirements for a development permit depend on the type of vegetation, the land tenure (e.g. freehold or leasehold land), the location, and the extent and purpose of the proposed clearing.

Please be aware that other requirements for clearing and managing vegetation may apply, even if the activity is not regulated by the Vegetation Management framework. Prior to commencing the clearing of vegetation, it is important to confirm that no other requirements apply under other legislation, including:

- Local laws in your local government area;
- Other State legislation, such as Protected Plants under the *Nature Conservation Act 1992* (NCA);
- The Commonwealth Government's *Environmental Protection and Biodiversity Act 1999* (EPBC).

Please see section 6 for contact details of other agencies you should confirm requirements with before commencing vegetation clearing.

Please note that the requirements for clearing Category C or Category R areas are located in the self-assessable vegetation clearing codes (SAVCC) for managing Category C and Category R vegetation respectively.

The information in this report will assist you to determine the options for managing vegetation on your property. Based on the lot on plan details you have supplied, this report provides the following detailed information:

- *Vegetation management framework* - an explanation of the options that may be available to manage vegetation on your property.
- *Property details* - information about the specified Lot on Plan, lot size, local government area, bioregion(s), subregion(s), catchment(s), coastal or non coastal status, and any applicable area management plans associated with your property.
- *Vegetation management details for the specified Lot on Plan* - specific information about your property including vegetation categories, regional ecosystems, watercourses, wetlands, essential habitat, land suitability and protected plants.
- *Contact information.*
- *Maps* - a series of colour maps to assist in identifying regulated vegetation on your property including:
  - regulated vegetation management map;
  - vegetation management supporting map;
  - land suitability map;
  - coastal/non coastal map;
  - protected plants map.
- *Other legislation contact information.*

Table of Contents

1. Vegetation management framework

The *Vegetation Management Act 1999* (VMA), the Vegetation Management Regulation 2012, the *Planning Act 2016* and the Planning Regulation 2017, in conjunction with associated policies and codes, form the Vegetation Management Framework. This framework regulates the management and clearing of assessable vegetation in Queensland.

The VMA does not apply to all land tenures or vegetation types. State forests, national parks, forest reserves and some tenure types as defined under the *Forestry Act 1959* and *Nature Conservation Act 1992* are not regulated by the VMA.

Managing or clearing vegetation may require permits under these laws.

The information provided in Sections 2 and 3 of this report, as well as the maps provided in Section 5, will assist you to determine whether your proposed clearing is:

- exempt clearing works;
- requires notification and compliance with a self-assessable vegetation clearing code or area management plan;
- requires a development permit; and/or
- in a high risk area and is therefore subject to the protected plants legislative framework (see section 3.7 of this report).

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

- grass or non-woody herbage;
- a plant within a grassland regional ecosystem prescribed under the VM Regulation 2012; and
- a mangrove.

Although vegetation management laws may allow clearing, there may be other state, local or Commonwealth laws that apply, such as the Queensland Government's *Nature Conservation Act 1992* (see Protected Plants) and the Commonwealth Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The EPBC Act regulates matters of national environmental significance, such as threatened species and ecological communities. You may need to obtain approval under the EPBC Act if your proposed clearing could have a significant impact on matters of national environmental significance. Further details are available at www.environment.gov.au.

1.1 Exempt Clearing Work

The vegetation management framework allows clearing for certain purposes without approval, known as an exempt clearing work. Exempt clearing work provisions under the *Planning Act 2016* were formerly called exemptions.

In areas that are mapped as Category X (white in colour) on the regulated vegetation management map (see section 5.1), and where the land tenure is freehold, indigenous land and leasehold land for agriculture and grazing purposes, the clearing of vegetation is considered exempt clearing work, or exempt from the VMA. For all other land tenures, contact DNRME before commencing clearing to ensure that the proposed activity is exempt clearing work. Please see Section 4 for DNRME's contact details.

A range of routine property management activities are considered exempt clearing work. A list of these is available at https://www.qld.gov.au/environment/land/vegetation/exemptions/.

Although vegetation management laws may allow clearing as exempt clearing work, there may be other state, local or Commonwealth laws that apply. For example, a clearing permit under the *Nature Conservation Act 1992* may be required for clearing protected plants. These requirements apply irrespective of the classification of the vegetation under the vegetation management framework. In addition, clearing that is exempt clearing work may not apply in an area subject to a development permit, a covenant, an environmental offset, an Exchange Area, a Restoration Notice, or an area mapped as Category A. Landholders considering clearing in any of these areas should contact DNRME prior to clearing to clarify if any conditions apply in the area that affect the use of the provisions for exempt clearing work.

1.2 Self-assessable vegetation clearing codes

Some clearing activities can be undertaken using a self-assessable vegetation clearing code and notification process. The codes can be downloaded at
https://www.qld.gov.au/environment/land/vegetation/codes/

If you intend to clear vegetation under a self-assessable vegetation clearing code, you must notify DNRME before commencing. The information in this report will assist you to complete the online notification form.

Please note that a self-assessable vegetation clearing code cannot be used in an area mapped as Category A.(see section 5.1)

You can complete the online form at
https://apps.dnrm.qld.gov.au/vegetation/

1.3 Area management plans

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

If an area management plan applies to your property, it will be listed in Section 2.2 of this report.

To clear under an existing AMP, you must notify the DNRME before clearing starts and follow the conditions listed in the AMP. You can download the area management plan notification form and obtain a copy of the relevant AMP at
https://www.qld.gov.au/environment/land/vegetation/area-plans/

1.4 Development permits

If your proposed clearing is not exempt clearing work, or is not permitted under a self-assessable vegetation clearing code, or an AMP, you may be able to apply for a development permit. Information on how to apply for a development permit is available at
https://www.qld.gov.au/environment/land/vegetation/applying/

2. Property details

2.1 Tenure

All of the lot, plan and tenure information associated with property Lot: 7 Plan: CNS144 (Calculated area in Hectares - 2550.91ha), including links to relevant Smart Maps, are listed in Table 1. The tenure of the property (whether it is freehold, leasehold, or other) may be viewed by clicking on the Smart Map link(s) provided.

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

Lot	Plan	Tenure	Link to property on SmartMap
7	CNS144	Lands Lease	http://globe.information.qld.gov.au/cgi-bin/SmartMapgen.py?q=7\CNS144
AE	SP215968	Easement	http://globe.information.qld.gov.au/cgi-bin/SmartMapgen.py?q=AE\SP215968
A	CNS122	Easement	http://globe.information.qld.gov.au/cgi-bin/SmartMapgen.py?q=A\CNS122
A	CNS65	Easement	http://globe.information.qld.gov.au/cgi-bin/SmartMapgen.py?q=A\CNS65
C	SP216045	Easement	http://globe.information.qld.gov.au/cgi-bin/SmartMapgen.py?q=C\SP216045

The tenure of the land may affect whether the clearing is considered exempt clearing work.

Some self-assessable vegetation clearing codes apply only to freehold and leasehold land granted for grazing and agricultural purposes.

2.2 Property location

Table 2 provides a summary of the locations for property Lot: 7 Plan: CNS144, in relation to natural and administrative boundaries.

Local Government(s)
Isaac Regional

Bioregion(s)	Subregion(s)
Brigalow Belt	Northern Bowen Basin
Brigalow Belt	Isaac - Comet Downs

Catchment(s)
Fitzroy

For the purposes of the Self-assessable vegetation clearing codes and the State Development Assessment Provisions (SDAP), this property is regarded as *
Non Coastal

*See also Map 5.4

Area Management Plan(s): Nil

3. Vegetation management details for Lot: 7 Plan: CNS144

3.1 Vegetation categories

Vegetation categories are shown on the regulated vegetation management map in section 5.1 of this report. A summary of vegetation categories on the subject lot are listed in Table 3. Descriptions for these categories are shown in Table 4.

Table 3: Vegetation categories for subject property. Total area: 2551.81ha

Vegetation category	Area (ha)
Category B	808.92
Category X	1742.89

Table 4

Category	Colour on Map	Description	Requirements
A	red	Compliance areas, environmental offset areas and voluntary declaration areas	There may be special conditions that apply in a Category A area. Before clearing, contact DNRME to confirm any requirements in a Category A area.
B	dark blue	Remnant vegetation areas	Clearing may be considered exempt clearing work, or can be undertaken after notifying under a self-assessable vegetation clearing code or an Area Management Plan, or may require a Development Permit.
C	light blue	High-value regrowth areas	Clearing may be considered exempt clearing work, or can be undertaken after notifying under the self-assessable vegetation clearing code for Managing Category C Regrowth vegetation.
R	yellow	Regrowth within 50m of a watercourse or drainage feature in the priority reef catchment areas	Clearing may be considered exempt clearing work, or can be undertaken after notifying under the self-assessable vegetation clearing code for Managing Category R Regrowth vegetation.
X	white	Clearing is considered accepted development on freehold land, indigenous land and leasehold land for agriculture and grazing purposes. Contact DNRME to clarify whether a development permit is required for other State land tenures.	No permit or notification required on freehold land, indigenous land and leasehold land for agriculture and grazing. A Development Permit may be required for some State land tenures.

Property Map of Assessable Vegetation (PMAV)

This report does not confirm if a Property Map of Assessable Vegetation (PMAV) exists on a lot. To confirm whether or not a PMAV exists on a lot, please check the PMAV layer on the Queensland Globe2, or contact DNRME on 135 834.

3.2 Regional ecosystems

The endangered, of concern and least concern regional ecosystems on your property are shown on the vegetation management supporting map in section 5.2 and are listed in Table 5.

A description of regional ecosystems can be accessed online at
https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/descriptions/

Table 5: Regional ecosystems present on subject property

Regional Ecosystem	VMA Status	Category	Area (Ha)	Short Description	Structure Category
11.3.1	Endangered	B	5.83	Acacia harpophylla and/or Casuarina cristata open forest on alluvial plains	Mid-dense
11.3.2	Of concern	B	34.96	Eucalyptus populnea woodland on alluvial plains	Sparse
11.3.25	Least concern	B	17.48	Eucalyptus tereticornis or E. camaldulensis woodland fringing drainage lines	Mid-dense
11.4.8	Endangered	B	135.39	Eucalyptus cambageana woodland to open forest with Acacia harpophylla or A. argyrodendron on Cainozoic clay plains	Mid-dense
11.4.9	Endangered	B	154.89	Acacia harpophylla shrubby woodland with Terminalia oblongata on Cainozoic clay plains	Mid-dense
11.5.3	Least concern	B	460.41	Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana on Cainozoic sand plains and/or remnant surfaces	Sparse
non-rem	None	X	1,742.89	None	None

Please note:

1. All area and area derived figures included in this table have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.
2. If Table 5 contains a Category 'plant', please be aware that this refers to 'plantations' such as forestry, and these areas are considered non-remnant under the VMA.

The VMA status of the regional ecosystem (whether it is endangered, of concern or least concern) also determines if any of the following are applicable:

- exempt clearing work
- self assessable vegetation clearing codes
- performance outcomes in State Development Assessment Provisions (SDAP).

Some clearing purposes are limited to a particular group of regional ecosystems (e.g. encroachment) and some self-assessable vegetation clearing codes allow clearing only in certain regional ecosystems.

3.3 Watercourses

Vegetation management watercourses and drainage features for this property are shown on the vegetation management supporting map in section 5.2.

3.4 Wetlands

There are no vegetation management wetlands present on this property.

3.5 Essential habitat

Protected wildlife is native wildlife prescribed under the *Nature Conservation Act 1992* (NCA), and includes endangered or vulnerable wildlife.

Essential habitat identifies areas in which species of wildlife that are Endangered or Vulnerable under the *Nature Conservation Act 1992* for which suitable habitat occurs on the lot, or where they have been known to occur up to 1.1 kilometres from a lot on which there is assessable vegetation. These important habitat areas are protected under the VMA.

Any essential habitat on this property will be shown as blue hatching on the vegetation supporting map in section 5.2.

If essential habitat is identified on the lot, information about the protected wildlife species is provided in Table 6 below. The numeric labels on the vegetation management supporting map can be cross referenced with Table 6 to outline the essential habitat factors for that particular species. There may be essential habitat for more than one species on each lot, and areas of Category A, Category B and Category C can be mapped as Essential Habitat.

Essential habitat is compiled from a combination of species habitat models and buffered species records. Regional ecosystem is a mandatory essential habitat factor, unless otherwise stated. Essential habitat, for protected wildlife, means an area of vegetation shown on the Regulated Vegetation Management Map as assessable vegetation -

1) that has at least 3 essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database. Essential habitat factors are comprised of - regional ecosystem (mandatory for most species), vegetation community, altitude, soils, position in landscape; or

2) in which the protected wildlife, at any stage of its life cycle, is located.

If there is no essential habitat mapping shown on the vegetation management supporting map for this lot, and there is no table in the sections below, it confirms that there is no essential habitat on the lot.

3.5.1 Category A and/or Category B

Table 6: Essential habitat in Category A and/or Category B

Label	Scientific Name	Common Name	NCA Status	Vegetation Community	Altitude	Soils	Position in Landscape
483	Denisonia maculata	Ornamental Snake	V	Under litter/fallen timber and in wide soil cracks, in riparian woodland/open forest and shrub/woodland including Brigalow Acacia harpophylla.	100-450m.	Deep cracking clay and sandy loam substrates.	Near freshwater waterholes/creeks.

Label	Regional Ecosystem (mandatory unless otherwise specified)
483	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, 9.3.10, 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, 9.3.24, 9.5.1, 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, 9.5.13, 9.5.14, 9.7.1, 9.7.2, 9.7.3, 9.7.4, 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, 9.8.12, 9.10.1, 9.10.3, 9.10.4, 9.10.5, 9.10.6, 9.10.7, 9.10.8, 9.10.9, 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, 9.11.14, 9.11.15, 9.11.16, 9.11.17, 9.11.18, 9.11.19, 9.11.21, 9.11.22, 9.11.23, 9.11.24, 9.11.25, 9.11.26, 9.11.27, 9.11.28, 9.11.29, 9.11.30, 9.11.31, 9.11.32, 9.12.1, 9.12.2, 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, 9.12.14, 9.12.15, 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, 9.12.25, 9.12.26, 9.12.27, 9.12.28, 9.12.29, 9.12.30, 9.12.31, 9.12.32, 9.12.33, 9.12.35, 9.12.36, 9.12.37, 9.12.38, 9.12.39, 9.12.40, 9.12.43, 10.3.6, 10.4.2, 10.4.5, 11.3.5, 11.3.25, 11.4.2, 11.4.3, 11.4.5, 11.4.6, 11.4.7, 11.4.8, 11.4.9, 11.9.1, 11.9.5, 11.11.19

3.5.2 Category C

Table 7: Essential habitat in Category C

No records

3.6 Land suitability

Land suitability mapping and information is required if you are applying to clear vegetation for high-value or irrigated high-value agriculture. Land suitability assessment addresses the capacity of land to sustain specific land uses such as cropping, irrigated agriculture and forestry.

A land suitability map for this property is provided in section 5.3. The map provides detailed land suitability, agricultural land classification, or soil and land resource mapping data where it is available.

The land suitability project that applies to this property is shown in Table 8 and Table 9.

Table 8: Land suitability project details for this property

Project name	Project code	Start date	Scale
Survey of the Isaac-Comet Area	ZDK3	2003-02-03 00:00:00	1000000

Table 9: Available land suitability project reports for this property

Project name	Availability of report
Survey of the Isaac-Comet Area	CSIRO report. Available at www.publications.qld.gov.au

3.7 Protected plants (administered by the Department of Environment and Science (DES))

In Queensland, all plants that are native to Australia are protected plants under the *Nature Conservation Act 1992* (NCA), with clearing of protected plants in the wild regulated by the Nature Conservation (Wildlife Management) Regulation 2006. These requirements apply irrespective of the classification of the vegetation under the *Vegetation Management Act 1999*.

Prior to clearing, if the plants proposed to be cleared are in the wild (see Operational policy: When a protected plant in Queensland is considered to be 'in the wild') and the exemptions under the Nature Conservation (Wildlife Management) Regulation 2006 are not applicable to the proposed clearing, you must check the flora survey trigger map to determine if any part of the area to be cleared is within a high risk area. The trigger map for this property is provided in section 5.5. The exemptions relate to:

- imminent risk of death or serious injury (refer s261A)
- imminent risk of serious damage to a building or other structure on land, or to personal property (refer s261B)
- *Fire and Emergency Service Act 1990* (refer 261C)
- previously cleared areas (refer s261ZB)
- maintenance activities (refer s261ZC)
- firebreak or fire management line (refer s261ZD)
- self-assessable vegetation clearing code (refer s261ZE)
- conservation purposes (refer s261ZG)
- authorised in particular circumstances (refer s385).

Some exemptions under the NCA are the same as exempt clearing work (formerly known as exemptions) from the *Vegetation Management Act 1999* (i.e. listed in the Planning Regulations 2017) while some are different.

If the proposed area to be cleared is shown as blue (i.e. high risk) on the flora survey trigger map, a flora survey of the clearing impact area must be undertaken in accordance with the flora survey guidelines. The main objective of a flora survey is to locate any endangered, vulnerable or near threatened plants (EVNT plants) that may be present in the clearing impact area.

If a flora survey identifies that EVNT plants are not present within the clearing impact area or clearing within 100m of EVNT plants can be avoided, the clearing activity is exempt from a permit. An exempt clearing notification form must be submitted to the Department of Environment and Science, with a copy of the flora survey report, at least one week prior to clearing. The clearing must be conducted within two years after the flora survey report was submitted.

If a flora survey identifies that EVNT plants are present in, or within 100m of, the ara to be cleared, a clearing permit is required before any clearing is undertaken. The flora survey report, as well as an impact management report, must be submitted with the application form clearing permit.

In an area other than a high risk area, a clearing permit is only required where a person is, or becomes aware that EVNT plants are present in, or within 100m of, the area to be cleared. You must keep a copy of the flora survey trigger map for the area subject to clearing for five years from the day the clearing starts. If you do not clear within the 12 month period that the flora survey trigger map was printed, you need to print and check a new flora survey trigger map.

Further information on protected plants is available at
http://www.ehp.qld.gov.au/licences-permits/plants-animals/protected-plants/

For assistance on the protected plants flora survey trigger map for this property, please contact the Department of Environment and Science at palm@ehp.qld.gov.au.

3.8 Emissions Reduction Fund (ERF)

The ERF is an Australian Government scheme which offers incentives for businesses and communities across the economy to reduce emissions.

Under the ERF, farmers can earn money from activities such as planting (and keeping) trees, managing regrowth vegetation and adopting more sustainable agricultural practices.

The purpose of a project is to remove greenhouse gases from the atmosphere. Each project will provide new economic opportunities for farmers, forest growers and land managers.

Further information on ERF is available at https://www.qld.gov.au/environment/land/state/use/carbon-rights/.

4. Contact information for DNRME

For further information on vegetation management:
Phone 135VEG (135 834)
Email vegetation@dnrme.qld.gov.au
Visit www.dnrme.qld.gov.au/our-department/contact-us/vegetation-contacts to submit an online enquiry.

For contact details for other State and Commonwealth agencies, please see the "Other relevant legislation contacts list" in Section 6.

5. Maps

The maps included in this report may also be requested individually at:

https://www.dnrme.qld.gov.au/qld/environment/land/vegetation/vegetation-map-request-form
and
http://www.ehp.qld.gov.au/licences-permits/plants-animals/protected-plants/map-request.php

Regulated vegetation management map

The regulated vegetation management map shows vegetation categories to determine clearing requirements. These maps are updated monthly to show new property maps of assessable vegetation (PMAV).

Vegetation management supporting map

The vegetation management supporting map provides information on regional ecosystems, wetlands, watercourses and essential habitat.

Land suitability map

The land suitability map assists with identifying the land suitability category under the high value and irrigated high value agriculture vegetation clearing purpose.

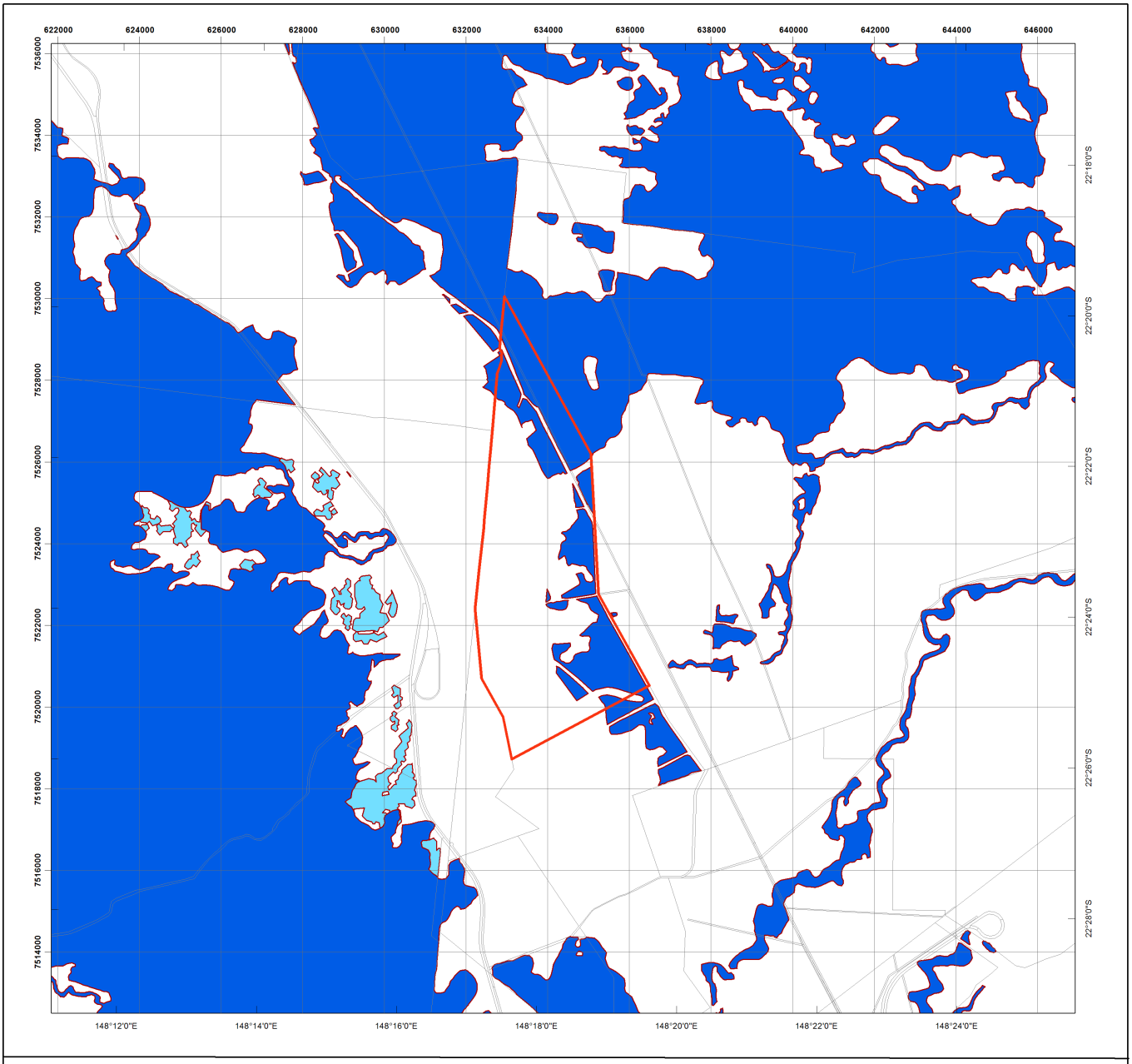
Coastal/non coastal map

The coastal/non-coastal map confirms whether the lot, or which parts of the lot, are considered coastal or non-coastal for the purposes of the self-assessable vegetation clearing codes and the State Development Assessment Provisions (SDAP).

Protected plants map

The protected plants map shows areas where particular provisions of the *Nature Conservation Act 1992* apply to the clearing of protected plants.

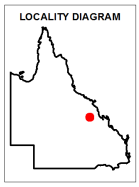
5.1 Regulated vegetation management map



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



N

0 1,300 2,600 3,900 5,200 6,500 m

This product is projected into:
GDA 1994 MGA Zone 55

Disclaimer:
While every care is taken to ensure the accuracy of this product, the Department of 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 incurr as a result of the product being inaccurate or incomplete in any way and for any reason.

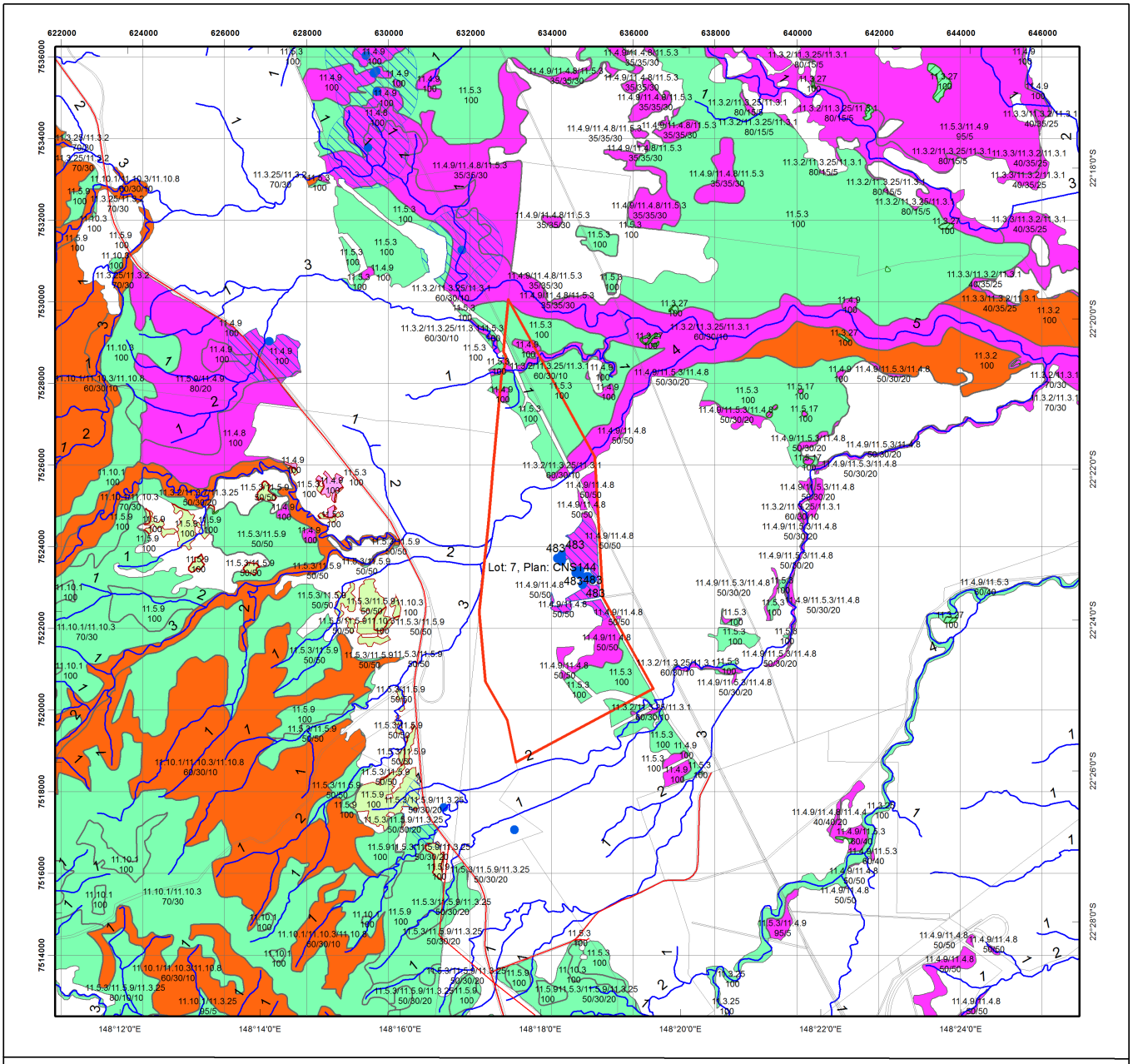
Additional information required for the assessment of vegetation values is provided in the accompanying "Vegetation Management Supporting map". For further information go to the web site: www.dnrme.qld.gov.au or contact the Department of Natural Resources, Mines and Energy.

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.

Queensland Government

5.2 Vegetation management supporting map



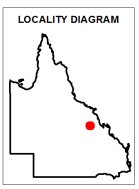
Vegetation Management Supporting Map

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 containing remnant vegetation
- 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 containing high value regrowth vegetation
- 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 are provided as a locational aid only

Queensland Government

LOCALITY DIAGRAM



N

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.

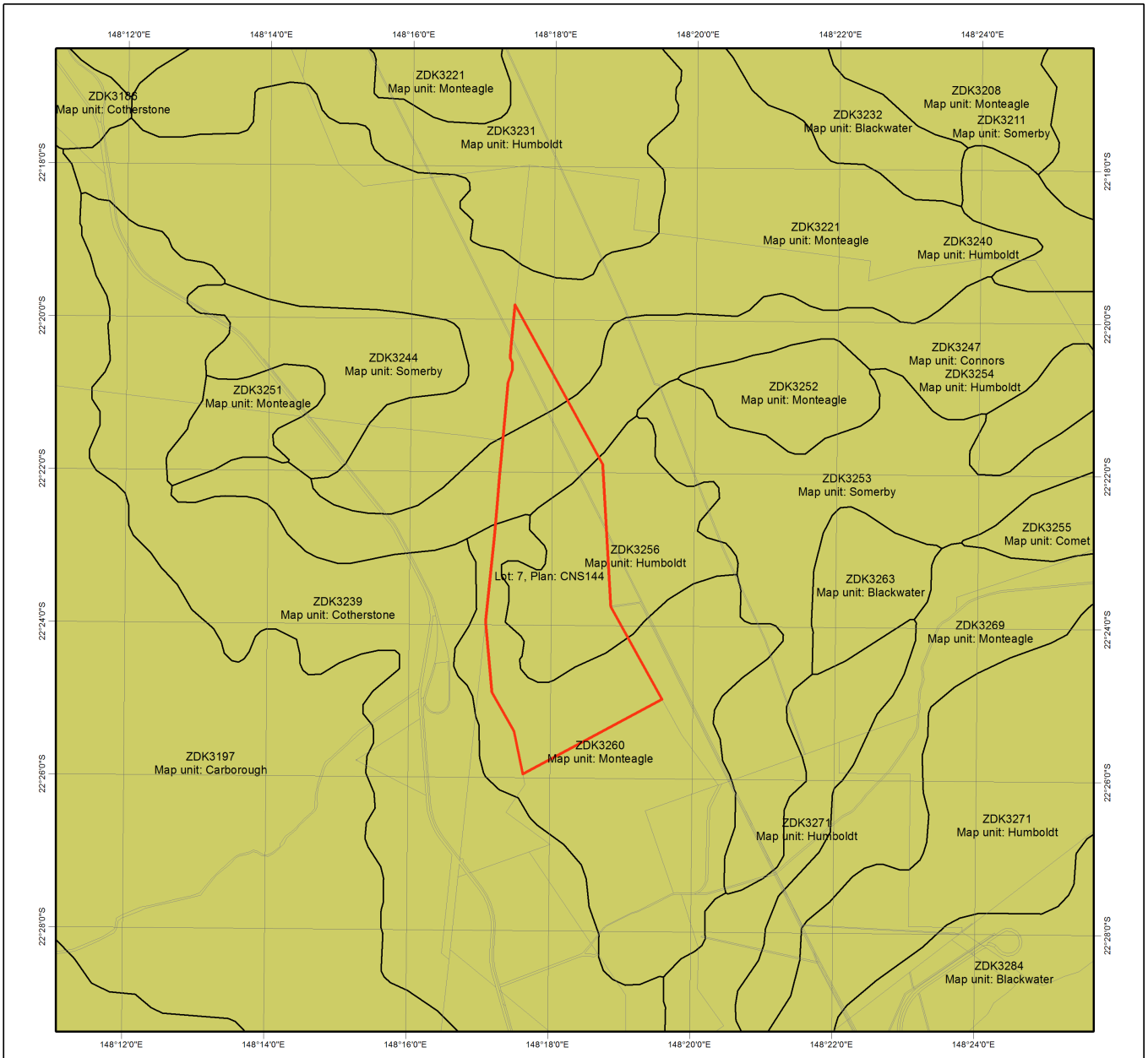
Regional ecosystem linework has been compiled at a scale of 1:100 000, except in designated areas where a compilation scale of 1:50 000 is available. Linework should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100 000 is +/- 100 metres.

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 incurr 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 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/

5.3 Land suitability map

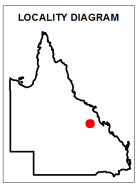


Land Suitability Overview Map

Legend

- Lot and Plan
- Cadastral Boundaries
- Land suitability mapping 1:100,000 scale or better (Category 2 or 3*)
- Land suitability mapping greater than 1:100,000 scale (Category 4)
- No mapping available (Category 4)

* Category 3 applies to applications where there is some land resource mapping or information available however it either does not cover the entire area, or the land suitability mapping and information does not identify the land as suitable for the proposed crop and management systems.



Important information

The Land Suitability Overview Map assists with identifying the Land Suitability category under the high value and irrigated high value agriculture vegetation clearing purpose. This map provides detailed land suitability, agricultural land classification, or soil and land resource mapping data where it is available on the selected lots. Where no data is available, the maps will be blank, with no mapping visible.

Further information on these categories is available in the Guideline for applying to clear for high-value or irrigated high-value agriculture (www.dnrme.qld.gov.au).

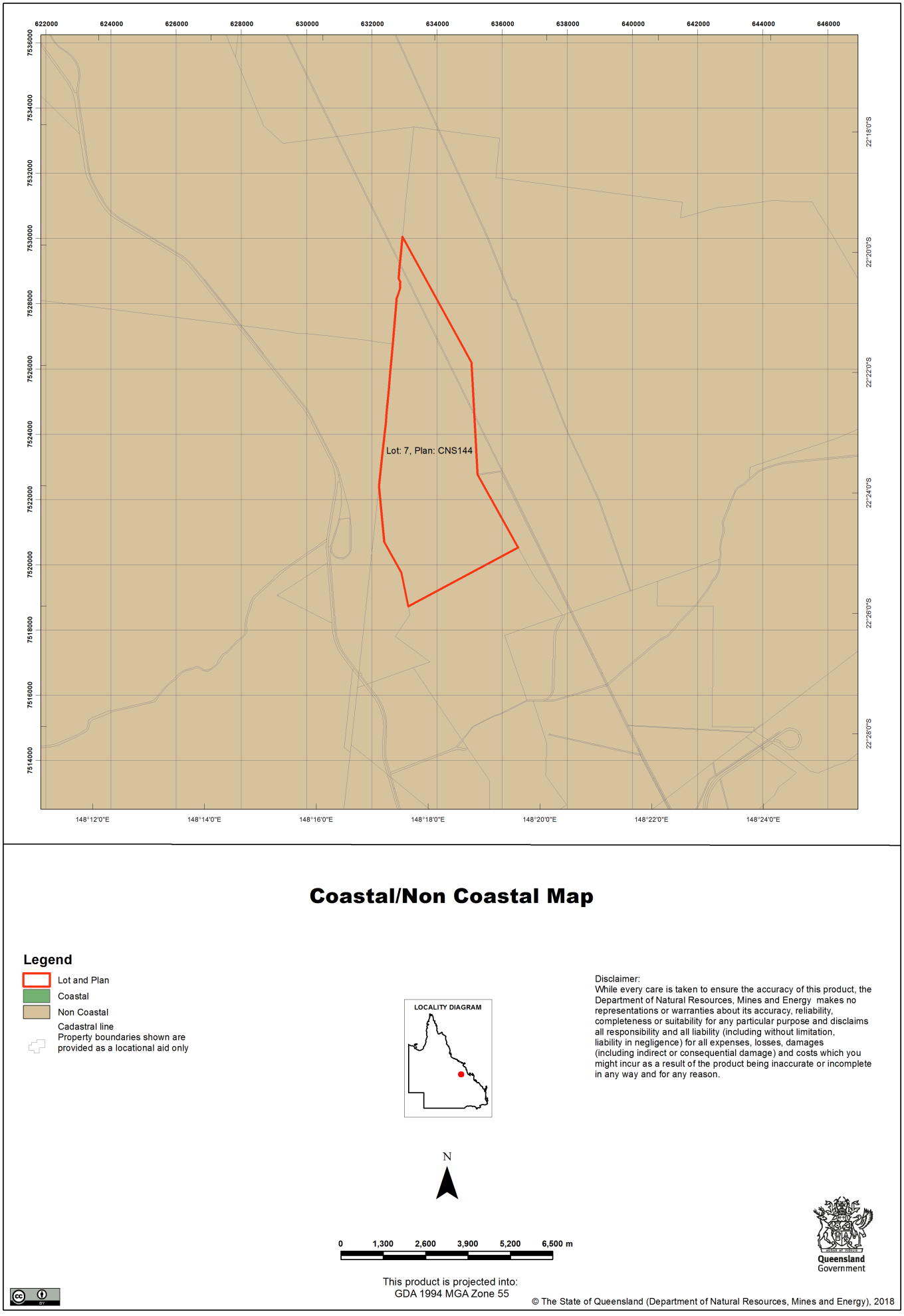
Disclaimer
All persons and organisations by using this map take all responsibility for assessing the relevance and accuracy of the map contents for their purpose and accept all risks associated with its use. The State of Queensland (as represented by the Department of Natural Resources, Mines and Energy) makes no representations or warranties in relation to the map contents, and, to the extent permitted by law, excludes or limits all warranties relating to correctness, accuracy, reliability, completeness or currency and all disclaims all liability for any direct, indirect and consequential costs, losses, damages and expenses incurred in any way (including but not limited to that arising from negligence) in connection with any use of or reliance on the map contents.

N

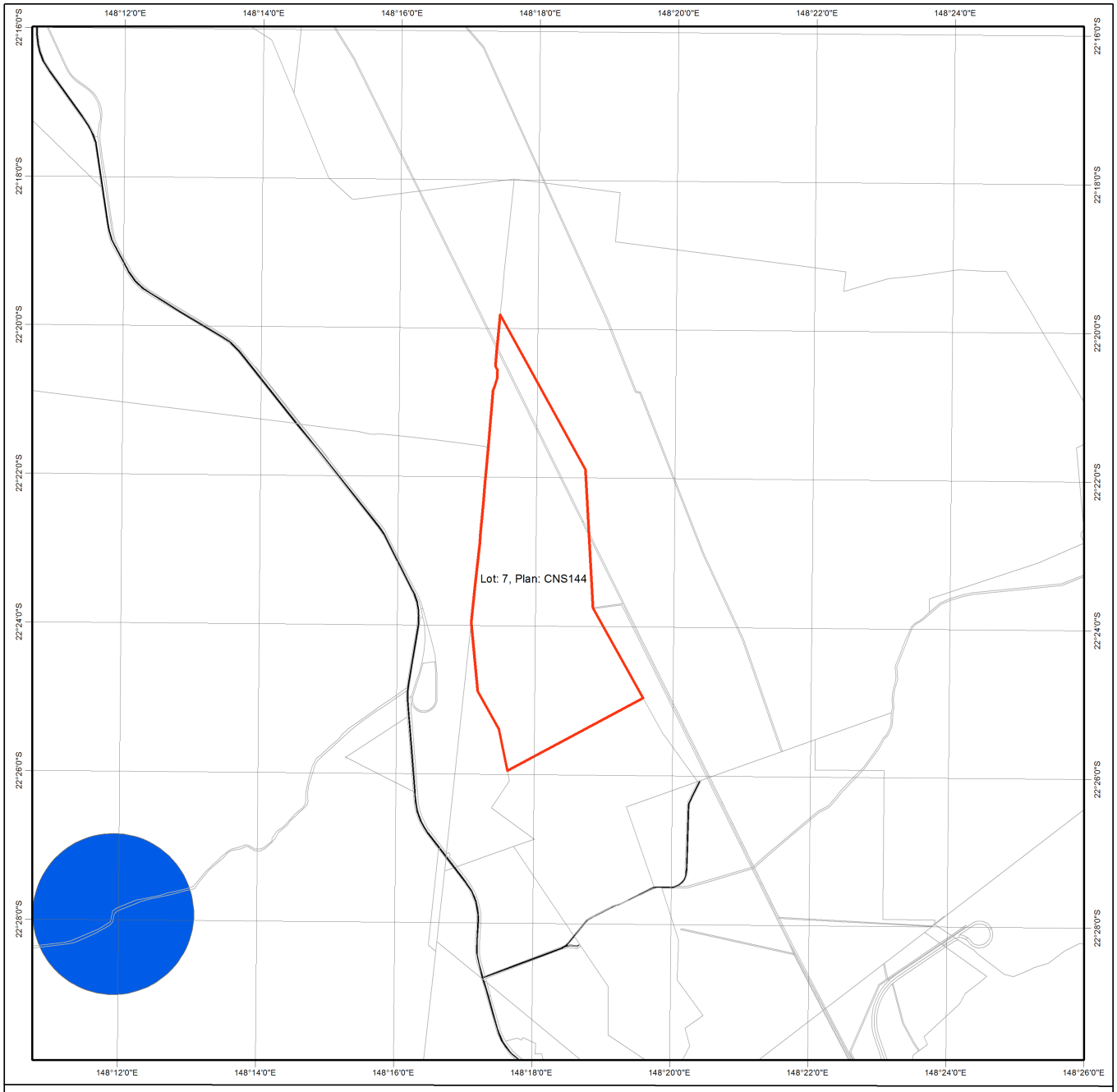
0 975 1,950 2,925 3,900 4,875 m

This product is projected into:
GDA 1994 MGA Zone 55

5.4 Coastal/non coastal map



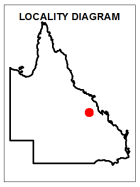
5.5 Protected plants map administered by DES



Protected Plants Flora Survey Trigger Map

Legend

- Lot and Plan
- High risk area
- Cadastral line
  Property boundaries shown are provided as a locational aid only
- Freeways / motorways / highways
- Secondary roads / streets



This map shows areas where particular provisions of the Nature Conservation Act 1992 apply to the clearing of protected plants.

This map is produced at a scale relevant to the size of the area selected and should be printed as A4 size in portrait orientation.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Science at palm@ehp.qld.gov.au

N

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

This product is projected into:
GDA 1994 MGA Zone 55

Disclaimer:
While every care is taken to ensure the accuracy of the data used to generate this product, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaim all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damages) and costs which might be incurred as a consequence of reliance on the data, or as a result of the data being inaccurate or incomplete in any way and for any reason.

6. Other relevant legislation contacts list

Activity	Legislation	Agency	Contact details
Interference with overland flow Earthworks, significant disturbance	*Water Act 2000* *Soil Conservation Act 1986*	Department of Natural Resources, Mines and Energy (Queensland Government)	Ph: 13 QGOV (13 74 68) www.dnrme.qld.gov.au
Indigenous Cultural Heritage	*Aboriginal Cultural Heritage Act 2003* *Torres Strait Islander Cultural Heritage Act 2003*	Department of Aboriginal and Torres Strait Islander Partnerships (Queensland Government)	Ph: 13 QGOV (13 74 68) www.datsip.qld.gov.au
Mining and environmentally relevant activities Infrastructure development (coastal) Heritage issues Protected plants and protected areas [1]	*Environmental Protection Act 1994* *Coastal Protection and Management Act 1995* *Queensland Heritage Act 1992* *Nature Conservation Act 1992*	Department of Environment and Science (Queensland Government)	Ph: 13 QGOV (13 74 68) www.ehp.qld.gov.au
Interference with fish passage in a watercourse, mangroves Forestry activities	*Fisheries Act 1994* *Forestry Act 1959* [2]	Department of Agriculture and Fisheries (Queensland Government)	Ph: 13 QGOV (13 74 68) www.daf.qld.gov.au
Matters of National Environmental Significance including listed threatened species and ecological communities	*Environment Protection and Biodiversity Conservation Act 1999*	Department of the Environment (Australian Government)	Ph: 1800 803 772 www.environment.gov.au
Development and planning processes	*Planning Act 2016*	Department of State Development, Manufacturing, Infrastructure and Planning (Queensland Government)	Ph: 13 QGOV (13 74 68) www.statedevelopment.qld.gov.au
State Development	*State Development and Public Works Organisation Act 1971*	Department of State Development, Manufacturing, Infrastructure and Planning (Queensland Government)	Ph: 13 QGOV (13 74 68) www.statedevelopment.qld.gov.au
Local government requirements	*Local Government Act 2009*	Local government	Contact your relevant local government office

1. In Queensland, all plants that are native to Australia are protected plants under the *Nature Conservation Act 1992*, which endeavours to ensure that protected plants (whether whole plants or protected plants parts) are not illegally removed from the wild, or illegally traded. Prior to clearing, you should check the flora survey trigger map to determine if the clearing is within a high-risk area by visiting www.ehp.qld.gov.au. For further information or assistance on the protected plants flora survey trigger map for your property, please contact the Department of Environment and Science on 13QGOV (13 74 68) or email palm@ehp.qld.gov.au.

2. Contact the Department of Agriculture and Fisheries before clearing:

- Any sandalwood on state-owned land (including leasehold land)
- On freehold land in a 'forest consent area'
- More than five hectares on state-owned land (including leasehold land) containing commercial timber species listed in parts 2 or 3 of Schedule 6 of the Vegetation Management Regulation 2012 and located within any of the following local government management areas-Banana, Bundaberg Regional, Fraser Coast Regional, Gladstone Regional, Isaac Regional, North Burnett Regional, Somerset Regional, South Burnett Regional, Southern Downs Regional, Tablelands Regional, Toowoomba Regional, Western Downs Regional.

Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Defined Area
Species: All
Type: All
Status: All
Records: All
Date: Since 1980
Latitude: 22.6227 to 22.2247
Longitude: 148.1710 to 148.5180
Email: sebastian.knight@aecom.com
Date submitted: Wednesday 14 Sep 2016 14:53:09
Date extracted: Wednesday 14 Sep 2016 15:00:06

The number of records retrieved = 412

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	*Rhinella marina*	cane toad	Y			2
animals	amphibians	Hylidae	*Litoria caerulea*	common green treefrog		C		3
animals	birds	Acanthizidae	*Smicrornis brevirostris*	weebill		C		5
animals	birds	Acanthizidae	*Acanthiza reguloides*	buff-rumped thornbill		C		1
animals	birds	Acanthizidae	*Gerygone olivacea*	white-throated gerygone		C		7
animals	birds	Accipitridae	*Circus assimilis*	spotted harrier		C		1
animals	birds	Accipitridae	*Haliaeetus leucogaster*	white-bellied sea-eagle		C		5
animals	birds	Accipitridae	*Aquila audax*	wedge-tailed eagle		C		5
animals	birds	Accipitridae	*Milvus migrans*	black kite		C		8
animals	birds	Accipitridae	*Accipiter cirrocephalus*	collared sparrowhawk		C		2
animals	birds	Accipitridae	*Elanus axillaris*	black-shouldered kite		C		2
animals	birds	Accipitridae	*Circus approximans*	swamp harrier		C		1
animals	birds	Accipitridae	*Lophoictinia isura*	square-tailed kite		C		1
animals	birds	Accipitridae	*Aviceda subcristata*	Pacific baza		C		3
animals	birds	Accipitridae	*Haliastur sphenurus*	whistling kite		C		13
animals	birds	Acrocephalidae	*Acrocephalus australis*	Australian reed-warbler		SL		7
animals	birds	Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar		C		3
animals	birds	Anatidae	*Dendrocygna eytoni*	plumed whistling-duck		C		4
animals	birds	Anatidae	*Nettapus coromandelianus*	cotton pygmy-goose		C		6
animals	birds	Anatidae	*Dendrocygna arcuata*	wandering whistling-duck		C		3
animals	birds	Anatidae	*Chenonetta jubata*	Australian wood duck		C		12
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		13
animals	birds	Anatidae	*Oxyura australis*	blue-billed duck		C		1
animals	birds	Anatidae	*Aythya australis*	hardhead		C		12
animals	birds	Anatidae	*Cygnus atratus*	black swan		C		8
animals	birds	Anatidae	*Anas gracilis*	grey teal		C		11
animals	birds	Anhingidae	*Anhinga novaehollandiae*	Australasian darter		C		11
animals	birds	Ardeidae	*Ardea pacifica*	white-necked heron		C		4
animals	birds	Ardeidae	*Ardea ibis*	cattle egret		SL		1
animals	birds	Ardeidae	*Ardea alba modesta*	eastern great egret		SL		11
animals	birds	Ardeidae	*Nycticorax caledonicus*	nankeen night-heron		C		2
animals	birds	Ardeidae	*Ardea intermedia*	intermediate egret		C		7
animals	birds	Ardeidae	*Egretta garzetta*	little egret		C		4
animals	birds	Ardeidae	*Egretta novaehollandiae*	white-faced heron		C		5
animals	birds	Artamidae	*Strepera graculina*	pied currawong		C		3
animals	birds	Artamidae	*Cracticus torquatus*	grey butcherbird		C		9
animals	birds	Artamidae	*Artamus leucorynchus*	white-breasted woodswallow		C		9
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		18
animals	birds	Artamidae	*Cracticus tibicen*	Australian magpie		C		21
animals	birds	Burhinidae	*Burhinus grallarius*	bush stone-curlew		C		2
animals	birds	Cacatuidae	*Eolophus roseicapillus*	galah		C		9
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		18
animals	birds	Campephagidae	*Lalage tricolor*	white-winged triller		C		1
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		14
animals	birds	Campephagidae	*Coracina tenuirostris*	cicadabird		C		1
animals	birds	Campephagidae	*Coracina papuensis*	white-bellied cuckoo-shrike		C		3

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Casuariidae	*Dromaius novaehollandiae*	emu		C		5
animals	birds	Charadriidae	*Vanellus miles miles*	masked lapwing (northern subspecies)		C		5
animals	birds	Charadriidae	*Vanellus miles*	masked lapwing		C		4
animals	birds	Charadriidae	*Elseyornis melanops*	black-fronted dotterel		C		5
animals	birds	Ciconiidae	*Ephippiorhynchus asiaticus*	black-necked stork		C		1
animals	birds	Cisticolidae	*Cisticola exilis*	golden-headed cisticola		C		8
animals	birds	Columbidae	*Geopelia cuneata*	diamond dove		C		1
animals	birds	Columbidae	*Geopelia striata*	peaceful dove		C		5
animals	birds	Columbidae	*Ocyphaps lophotes*	crested pigeon		C		12
animals	birds	Columbidae	*Phaps chalcoptera*	common bronzewing		C		5
animals	birds	Columbidae	*Geopelia humeralis*	bar-shouldered dove		C		6
animals	birds	Columbidae	*Geophaps scripta scripta*	squatter pigeon (southern subspecies)		V	V	3
animals	birds	Coraciidae	*Eurystomus orientalis*	dollarbird		C		9
animals	birds	Corcoracidae	*Struthidea cinerea*	apostlebird		C		12
animals	birds	Corvidae	*Corvus orru*	Torresian crow		C		30
animals	birds	Cuculidae	*Cacomantis pallidus*	pallid cuckoo		C		1
animals	birds	Cuculidae	*Chalcites basalis*	Horsfield's bronze-cuckoo		C		1
animals	birds	Cuculidae	*Eudynamys orientalis*	eastern koel		C		1
animals	birds	Cuculidae	*Scythrops novaehollandiae*	channel-billed cuckoo		C		2
animals	birds	Dicruridae	*Dicrurus bracteatus*	spangled drongo		C		3
animals	birds	Estrildidae	*Neochmia temporalis*	red-browed finch		C		1
animals	birds	Estrildidae	*Lonchura castaneothorax*	chestnut-breasted mannikin		C		3
animals	birds	Estrildidae	*Taeniopygia bichenovii*	double-barred finch		C		6
animals	birds	Falconidae	*Falco longipennis*	Australian hobby		C		3
animals	birds	Falconidae	*Falco cenchroides*	nankeen kestrel		C		9
animals	birds	Falconidae	*Falco berigora*	brown falcon		C		4
animals	birds	Gruidae	*Grus rubicunda*	brolga		C		2
animals	birds	Halcyonidae	*Todiramphus sanctus*	sacred kingfisher		C		3
animals	birds	Halcyonidae	*Todiramphus macleayii*	forest kingfisher		C		4
animals	birds	Halcyonidae	*Todiramphus pyrrhopygius*	red-backed kingfisher		C		1
animals	birds	Halcyonidae	*Dacelo leachii*	blue-winged kookaburra		C		5
animals	birds	Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra		C		11
animals	birds	Hirundinidae	*Petrochelidon ariel*	fairy martin		C		4
animals	birds	Hirundinidae	*Hirundo neoxena*	welcome swallow		C		5
animals	birds	Hirundinidae	*Petrochelidon nigricans*	tree martin		C		9
animals	birds	Jacanidae	*Irediparra gallinacea*	comb-crested jacana		C		1
animals	birds	Laridae	*Chroicocephalus novaehollandiae*	silver gull		C		2
animals	birds	Laridae	*Gelochelidon nilotica*	gull-billed tern		SL		1
animals	birds	Laridae	*Chlidonias hybrida*	whiskered tern		C		1
animals	birds	Maluridae	*Malurus lamberti*	variegated fairy-wren		C		3
animals	birds	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren		C		17
animals	birds	Megaluridae	*Megalurus timoriensis*	tawny grassbird		C		1
animals	birds	Megapodiidae	*Alectura lathami*	Australian brush-turkey		C		1
animals	birds	Meliphagidae	*Lichmera indistincta*	brown honeyeater		C		9
animals	birds	Meliphagidae	*Gavicalis virescens*	singing honeyeater		C		9
animals	birds	Meliphagidae	*Philemon corniculatus*	noisy friarbird		C		12

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Meliphagidae	*Melithreptus lunatus*	white-naped honeyeater		C		1
animals	birds	Meliphagidae	*Manorina flavigula*	yellow-throated miner		C		3
animals	birds	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater		C		16
animals	birds	Meliphagidae	*Caligavis chrysops*	yellow-faced honeyeater		C		1
animals	birds	Meliphagidae	*Myzomela obscura*	dusky honeyeater		C		1
animals	birds	Meliphagidae	*Manorina melanocephala*	noisy miner		C		9
animals	birds	Meliphagidae	*Philemon citreogularis*	little friarbird		C		8
animals	birds	Meliphagidae	*Acanthagenys rufogularis*	spiny-cheeked honeyeater		C		1
animals	birds	Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater		C		14
animals	birds	Meliphagidae	*Plectorhyncha lanceolata*	striped honeyeater		C		6
animals	birds	Meropidae	*Merops ornatus*	rainbow bee-eater		SL		8
animals	birds	Monarchidae	*Monarcha melanopsis*	black-faced monarch		SL		1
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		22
animals	birds	Monarchidae	*Myiagra rubecula*	leaden flycatcher		C		5
animals	birds	Monarchidae	*Myiagra inquieta*	restless flycatcher		C		2
animals	birds	Motacillidae	*Anthus novaeseelandiae*	Australasian pipit		C		4
animals	birds	Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird		C		3
animals	birds	Neosittidae	*Daphoenositta chrysoptera*	varied sittella		C		2
animals	birds	Oriolidae	*Oriolus sagittatus*	olive-backed oriole		C		1
animals	birds	Otididae	*Ardeotis australis*	Australian bustard		C		3
animals	birds	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush		C		4
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		6
animals	birds	Pachycephalidae	*Colluricincla megarhyncha*	little shrike-thrush		C		1
animals	birds	Pardalotidae	*Pardalotus striatus*	striated pardalote		C		17
animals	birds	Pelecanidae	*Pelecanus conspicillatus*	Australian pelican		C		8
animals	birds	Petroicidae	*Microeca fascinans*	jacky winter		C		2
animals	birds	Phalacrocoracidae	*Phalacrocorax varius*	pied cormorant		C		4
animals	birds	Phalacrocoracidae	*Phalacrocorax carbo*	great cormorant		C		1
animals	birds	Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant		C		11
animals	birds	Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant		C		10
animals	birds	Phasianidae	*Coturnix ypsilophora*	brown quail		C		3
animals	birds	Podargidae	*Podargus strigoides*	tawny frogmouth		C		3
animals	birds	Podicipedidae	*Podiceps cristatus*	great crested grebe		C		6
animals	birds	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe		C		11
animals	birds	Pomatostomidae	*Pomatostomus temporalis*	grey-crowned babbler		C		9
animals	birds	Psittacidae	*Trichoglossus haematodus moluccanus*	rainbow lorikeet		C		15
animals	birds	Psittacidae	*Trichoglossus chlorolepidotus*	scaly-breasted lorikeet		C		3
animals	birds	Psittacidae	*Aprosmictus erythropterus*	red-winged parrot		C		11
animals	birds	Psittacidae	*Platycercus adscitus*	pale-headed rosella		C		17
animals	birds	Ptilonorhynchidae	*Ptilonorhynchus maculatus*	spotted bowerbird		C		2
animals	birds	Rallidae	*Gallinula tenebrosa*	dusky moorhen		C		10
animals	birds	Rallidae	*Porzana fluminea*	Australian spotted crake		C		1
animals	birds	Rallidae	*Fulica atra*	Eurasian coot		C		8
animals	birds	Rallidae	*Porphyrio melanotus*	purple swamphen		C		10
animals	birds	Recurvirostridae	*Himantopus himantopus*	black-winged stilt		C		7
animals	birds	Rhipiduridae	*Rhipidura albiscapa*	grey fantail		C		4

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		14
animals	birds	Scolopacidae	*Tringa nebularia*	common greenshank		SL		1
animals	birds	Scolopacidae	*Tringa stagnatilis*	marsh sandpiper		SL		3
animals	birds	Scolopacidae	*Calidris acuminata*	sharp-tailed sandpiper		SL		1
animals	birds	Strigidae	*Ninox boobook*	southern boobook		C		8
animals	birds	Threskiornithidae	*Platalea flavipes*	yellow-billed spoonbill		C		4
animals	birds	Threskiornithidae	*Plegadis falcinellus*	glossy ibis		SL		1
animals	birds	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis		C		5
animals	birds	Threskiornithidae	*Threskiornis molucca*	Australian white ibis		C		5
animals	birds	Threskiornithidae	*Platalea regia*	royal spoonbill		C		8
animals	mammals	Emballonuridae	*Saccolaimus flaviventris*	yellow-bellied sheathtail bat		C		2
animals	mammals	Macropodidae	*Macropus dorsalis*	black-striped wallaby		C		1
animals	mammals	Muridae	*Hydromys chrysogaster*	water rat		C		1
animals	mammals	Petauridae	*Petaurus breviceps*	sugar glider		C		1
animals	mammals	Petauridae	*Petaurus sp.*					1
animals	mammals	Phascolarctidae	*Phascolarctos cinereus*	koala		V	V	6
animals	mammals	Pseudocheiridae	*Petauroides volans*	greater glider		C	V	3
animals	reptiles	Agamidae	*Diporiphora nobbi*	nobbi		C		1/1
animals	reptiles	Agamidae	*Diporiphora australis*	tommy roundhead		C		1/1
animals	reptiles	Boidae	*Antaresia maculosa*	spotted python		C		1
animals	reptiles	Diplodactylidae	*Oedura monilis*	ocellated velvet gecko		C		2/1
animals	reptiles	Elapidae	*Denisonia maculata*	ornamental snake		V	V	14
animals	reptiles	Gekkonidae	*Heteronotia binoei*	Bynoe's gecko		C		14/1
animals	reptiles	Gekkonidae	*Gehyra versicolor*			C		1
animals	reptiles	Gekkonidae	*Gehyra dubia*	dubious dtella		C		7/1
animals	reptiles	Pygopodidae	*Lialis burtonis*	Burton's legless lizard		C		1
animals	reptiles	Scincidae	*Morethia boulengeri*	south-eastern morethia skink		C		2
animals	reptiles	Scincidae	*Ctenotus taeniolatus*	copper-tailed skink		C		1
animals	reptiles	Scincidae	*Glaphyromorphus punctulatus*	fine-spotted mulch-skink		C		1/1
animals	reptiles	Scincidae	*Carlia pectoralis sensu lato*			C		8/1
animals	reptiles	Scincidae	*Lygisaurus foliorum*	tree-base litter-skink		C		4/1
animals	reptiles	Scincidae	*Carlia schmeltzii*	robust rainbow-skink		C		5/1
animals	reptiles	Scincidae	*Lerista fragilis*	eastern mulch slider		C		6/1
animals	reptiles	Scincidae	*Eulamprus sp.*					1
animals	reptiles	Scincidae	*Ctenotus spaldingi*	straight-browed ctenotus		C		2
fungi	sac fungi	Parmeliaceae	*Xanthoparmelia exuviata*			C		1/1
plants	ferns	Adiantaceae	*Cheilanthes sieberi subsp. sieberi*			C		3
plants	ferns	Marsileaceae	*Marsilea mutica*	shiny nardoo		C		1
plants	ferns	Marsileaceae	*Marsilea drummondii*	common nardoo		C		1
plants	higher dicots	Acanthaceae	*Brunoniella australis*	blue trumpet		C		2
plants	higher dicots	Acanthaceae	*Rostellularia adscendens*			C		1
plants	higher dicots	Acanthaceae	*Rostellularia adscendens var. clementii*			C		1/1
plants	higher dicots	Amaranthaceae	*Deeringia amaranthoides*	redberry		C		1/1
plants	higher dicots	Amaranthaceae	*Alternanthera denticulata var. micrantha*			C		3
plants	higher dicots	Amaranthaceae	*Achyranthes aspera*			C		1
plants	higher dicots	Amaranthaceae	*Alternanthera*			C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Apocynaceae	*Parsonsia eucalyptophylla*	gargaloo		C		1
plants	higher dicots	Apocynaceae	*Marsdenia viridiflora subsp. viridiflora*			C		1/1
plants	higher dicots	Apocynaceae	*Marsdenia viridiflora*			C		1
plants	higher dicots	Apocynaceae	*Alstonia constricta*	bitterbark		C		1
plants	higher dicots	Apocynaceae	*Cerbera dumicola*			NT		1/1
plants	higher dicots	Apocynaceae	*Carissa ovata*	currantbush		C		2
plants	higher dicots	Asteraceae	*Bidens pilosa*		Y			1
plants	higher dicots	Asteraceae	*Blumea mollis*			C		2/2
plants	higher dicots	Asteraceae	*Eclipta prostrata*	white eclipta	Y			1/1
plants	higher dicots	Asteraceae	*Olearia xerophila*			C		1
plants	higher dicots	Asteraceae	*Tridax procumbens*	tridax daisy	Y			2/1
plants	higher dicots	Asteraceae	*Emilia sonchifolia*		Y			2
plants	higher dicots	Asteraceae	*Praxelis clematidea*		Y			1/1
plants	higher dicots	Asteraceae	*Rutidosis leucantha*			C		1/1
plants	higher dicots	Asteraceae	*Peripleura hispidula*			C		1
plants	higher dicots	Asteraceae	*Pterocaulon redolens*			C		2
plants	higher dicots	Asteraceae	*Cyanthillium cinereum*			C		1
plants	higher dicots	Asteraceae	*Euchiton involucratus*			C		1
plants	higher dicots	Asteraceae	*Parthenium hysterophorus*	parthenium weed	Y			4/1
plants	higher dicots	Asteraceae	*Apowollastonia spilanthoides*			C		3/1
plants	higher dicots	Bignoniaceae	*Pandorea pandorana*	wonga vine		C		1
plants	higher dicots	Boraginaceae	*Ehretia membranifolia*	weeping koda		C		1
plants	higher dicots	Cactaceae	*Opuntia tomentosa*	velvety tree pear	Y			6
plants	higher dicots	Cactaceae	*Opuntia stricta*		Y			1
plants	higher dicots	Cactaceae	*Harrisia martinii*		Y			4
plants	higher dicots	Cactaceae	*Opuntia*			C		1
plants	higher dicots	Caesalpiniaceae	*Chamaecrista absus var. absus*			C		1/1
plants	higher dicots	Caesalpiniaceae	*Cassia brewsteri*			C		4
plants	higher dicots	Caesalpiniaceae	*Lysiphyllum*			C		1
plants	higher dicots	Caesalpiniaceae	*Senna*			C		1
plants	higher dicots	Campanulaceae	*Wahlenbergia gracilis*	sprawling bluebell		C		3
plants	higher dicots	Capparaceae	*Apophyllum anomalum*	broom bush		C		2
plants	higher dicots	Capparaceae	*Capparis lasiantha*	nipan		C		3
plants	higher dicots	Capparaceae	*Capparis canescens*			C		3
plants	higher dicots	Capparaceae	*Capparis*			C		1
plants	higher dicots	Capparaceae	*Capparis umbonata*			C		1/1
plants	higher dicots	Caryophyllaceae	*Polycarpaea corymbosa*			C		1/1
plants	higher dicots	Casuarinaceae	*Allocasuarina luehmannii*	bull oak		C		1
plants	higher dicots	Celastraceae	*Denhamia disperma*			C		3
plants	higher dicots	Chenopodiaceae	*Einadia nutans subsp. linifolia*			C		1/1
plants	higher dicots	Chenopodiaceae	*Sclerolaena*			C		1
plants	higher dicots	Chenopodiaceae	*Enchylaena tomentosa*			C		2
plants	higher dicots	Chenopodiaceae	*Maireana microphylla*			C		1
plants	higher dicots	Chenopodiaceae	*Maireana*			C		1
plants	higher dicots	Clusiaceae	*Hypericum gramineum*			C		1/1
plants	higher dicots	Convolvulaceae	*Evolvulus alsinoides*			C		3

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Convolvulaceae	*Ipomoea brownii*			C		1/1
plants	higher dicots	Cucurbitaceae	*Cucumis argenteus*			C		1/1
plants	higher dicots	Erythroxylaceae	*Erythroxylum australe*	cocaine tree		C		6
plants	higher dicots	Euphorbiaceae	*Euphorbia*			C		1
plants	higher dicots	Euphorbiaceae	*Euphorbia tannensis subsp. eremophila*			C		1
plants	higher dicots	Fabaceae	*Zornia*			C		1
plants	higher dicots	Fabaceae	*Crotalaria mitchellii subsp. mitchellii*			C		1
plants	higher dicots	Fabaceae	*Glycine tabacina*	glycine pea		C		3
plants	higher dicots	Fabaceae	*Lablab purpureus*	lablab	Y			1/1
plants	higher dicots	Fabaceae	*Canavalia papuana*	wild jack bean		C		1/1
plants	higher dicots	Fabaceae	*Rhynchosia minima*			C		4
plants	higher dicots	Fabaceae	*Indigofera hirsuta*	hairy indigo		C		1/1
plants	higher dicots	Fabaceae	*Sesbania cannabina*			C		1
plants	higher dicots	Fabaceae	*Zornia muelleriana*			C		1
plants	higher dicots	Fabaceae	*Aeschynomene indica*	budda pea		C		1
plants	higher dicots	Fabaceae	*Galactia tenuiflora*			C		1
plants	higher dicots	Fabaceae	*Stylosanthes hamata*		Y			4
plants	higher dicots	Fabaceae	*Alysicarpus muelleri*			C		1/1
plants	higher dicots	Fabaceae	*Indigofera linifolia*			C		3
plants	higher dicots	Fabaceae	*Tephrosia flagellaris*			C		1/1
plants	higher dicots	Fabaceae	*Crotalaria dissitiflora*			C		1
plants	higher dicots	Fabaceae	*Galactia tenuiflora var. lucida*			C		1/1
plants	higher dicots	Fabaceae	*Desmodium*			C		1
plants	higher dicots	Goodeniaceae	*Goodenia*			C		1
plants	higher dicots	Goodeniaceae	*Goodenia sp. (Mt Castletower M.D.Crisp 2753)*			C		1/1
plants	higher dicots	Goodeniaceae	*Goodenia rotundifolia*			C		1
plants	higher dicots	Lamiaceae	*Plectranthus*			C		1
plants	higher dicots	Lamiaceae	*Clerodendrum*			C		1
plants	higher dicots	Lamiaceae	*Clerodendrum floribundum*			C		1
plants	higher dicots	Lamiaceae	*Ocimum caryophyllinum*			C		1/1
plants	higher dicots	Lamiaceae	*Basilicum polystachyon*			C		2
plants	higher dicots	Loganiaceae	*Mitrasacme pygmaea*			C		1/1
plants	higher dicots	Malvaceae	*Sida*			C		6
plants	higher dicots	Malvaceae	*Sida spinosa*	spiny sida	Y			1/1
plants	higher dicots	Malvaceae	*Sida corrugata*			C		1/1
plants	higher dicots	Malvaceae	*Sida cordifolia*		Y			1
plants	higher dicots	Malvaceae	*Sida hackettiana*			C		2
plants	higher dicots	Malvaceae	*Gossypium australe*			C		1/1
plants	higher dicots	Malvaceae	*Hibiscus vitifolius*			C		1/1
plants	higher dicots	Malvaceae	*Hibiscus meraukensis*	Merauke hibiscus		C		1
plants	higher dicots	Malvaceae	*Malvastrum americanum*		Y			2
plants	higher dicots	Meliaceae	*Owenia acidula*	emu apple		C		1
plants	higher dicots	Mimosaceae	*Acacia leiocalyx*			C		1
plants	higher dicots	Mimosaceae	*Acacia flavescens*	toothed wattle		C		4
plants	higher dicots	Mimosaceae	*Acacia rhodoxylon*	ringy rosewood		C		18
plants	higher dicots	Mimosaceae	*Albizia canescens*			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Mimosaceae	*Acacia burdekensis*			C		6/1
plants	higher dicots	Mimosaceae	*Acacia harpophylla*	brigalow		C		3
plants	higher dicots	Mimosaceae	*Acacia dietrichiana*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia bancroftiorum*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia julifera subsp. curvinervia*			C		2/2
plants	higher dicots	Mimosaceae	*Acacia cowleana*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia salicina*	doolan		C		3
plants	higher dicots	Mimosaceae	*Acacia shirleyi*	lancewood		C		42/1
plants	higher dicots	Myrtaceae	*Eucalyptus orgadophila*	mountain coolibah		C		1
plants	higher dicots	Myrtaceae	*Eucalyptus populnea*	poplar box		C		3
plants	higher dicots	Myrtaceae	*Eucalyptus*			C		2
plants	higher dicots	Myrtaceae	*Myrtaceae*			C		2
plants	higher dicots	Myrtaceae	*Melaleuca*			C		1
plants	higher dicots	Myrtaceae	*Corymbia*			C		1
plants	higher dicots	Myrtaceae	*Eucalyptus tereticornis subsp. tereticornis*			C		11
plants	higher dicots	Myrtaceae	*Eucalyptus crebra*	narrow-leaved red ironbark		C		8
plants	higher dicots	Myrtaceae	*Corymbia dallachiana*			C		2
plants	higher dicots	Myrtaceae	*Melaleuca viridiflora var. viridiflora*			C		1/1
plants	higher dicots	Myrtaceae	*Corymbia citriodora subsp. citriodora*			C		34
plants	higher dicots	Myrtaceae	*Corymbia tessellaris*	Moreton Bay ash		C		4
plants	higher dicots	Myrtaceae	*Corymbia clarksoniana*			C		25/1
plants	higher dicots	Myrtaceae	*Eucalyptus apothalassica*			C		4
plants	higher dicots	Nyctaginaceae	*Boerhavia*			C		1
plants	higher dicots	Oxalidaceae	*Oxalis*			C		2
plants	higher dicots	Phyllanthaceae	*Notoleptopus decaisnei*			C		1/1
plants	higher dicots	Phyllanthaceae	*Phyllanthus virgatus*			C		2
plants	higher dicots	Phyllanthaceae	*Breynia oblongifolia*			C		1
plants	higher dicots	Picrodendraceae	*Petalostigma pubescens*	quinine tree		C		6
plants	higher dicots	Pittosporaceae	*Bursaria spinosa subsp. spinosa*			C		1
plants	higher dicots	Portulacaceae	*Portulaca pilosa*		Y			2
plants	higher dicots	Portulacaceae	*Portulaca*			C		1/1
plants	higher dicots	Proteaceae	*Grevillea parallela*			C		2/1
plants	higher dicots	Proteaceae	*Grevillea*			C		1
plants	higher dicots	Proteaceae	*Persoonia falcata*			C		5
plants	higher dicots	Proteaceae	*Persoonia amaliae*			C		2/1
plants	higher dicots	Proteaceae	*Hakea lorea*			C		1
plants	higher dicots	Putranjivaceae	*Drypetes deplanchei*	grey boxwood		C		1
plants	higher dicots	Rhamnaceae	*Alphitonia excelsa*	soap tree		C		4
plants	higher dicots	Rubiaceae	*Pavetta australiensis var. australiensis*			C		1/1
plants	higher dicots	Rubiaceae	*Coelospermum reticulatum*			C		1/1
plants	higher dicots	Rubiaceae	*Spermacoce multicaulis*			C		1
plants	higher dicots	Rubiaceae	*Spermacoce brachystema*			C		1
plants	higher dicots	Rubiaceae	*Larsenaikia ochreata*			C		2
plants	higher dicots	Rubiaceae	*Psydrax oleifolia*			C		1
plants	higher dicots	Rubiaceae	*Pavetta granitica*			C		1/1
plants	higher dicots	Sapindaceae	*Alectryon diversifolius*	scrub boonaree		C		2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Scrophulariaceae	*Eremophila maculata*			C		2
plants	higher dicots	Solanaceae	*Solanum seaforthianum*	Brazilian nightshade	Y			1/1
plants	higher dicots	Sparrmanniaceae	*Grewia retusifolia*			C		3/1
plants	higher dicots	Stylidiaceae	*Stylidium eglandulosum*			C		1/1
plants	higher dicots	Thymelaeaceae	*Wikstroemia indica*	tie bush		C		1
plants	higher dicots	Violaceae	*Hybanthus enneaspermus*			C		2
plants	higher dicots	Vitaceae	*Cissus cardiophylla*			C		1/1
plants	lower dicots	Lauraceae	*Cassytha pubescens*	downy devil's twine		C		1
plants	lower dicots	Menispermaceae	*Tinospora smilacina*	snakevine		C		2
plants	monocots	Commelinaceae	*Murdannia graminea*	murdannia		C		1/1
plants	monocots	Cyperaceae	*Cyperus gilesii*			C		1
plants	monocots	Cyperaceae	*Cyperus concinnus*			C		1
plants	monocots	Cyperaceae	*Cyperus exaltatus*	tall flatsedge		C		2
plants	monocots	Cyperaceae	*Scleria sphacelata*			C		1
plants	monocots	Cyperaceae	*Cyperus isabellinus*			C		1/1
plants	monocots	Cyperaceae	*Cyperus alopecuroides*			C		1/1
plants	monocots	Cyperaceae	*Eleocharis philippinensis*			C		1/1
plants	monocots	Cyperaceae	*Schoenoplectiella dissachantha*			C		2
plants	monocots	Cyperaceae	*Cyperus*			C		1
plants	monocots	Cyperaceae	*Gahnia aspera*			C		1
plants	monocots	Hemerocallidaceae	*Dianella nervosa*			C		1
plants	monocots	Hemerocallidaceae	*Dianella*			C		1
plants	monocots	Laxmanniaceae	*Laxmannia gracilis*	slender wire lily		C		1
plants	monocots	Laxmanniaceae	*Lomandra filiformis*			C		1
plants	monocots	Laxmanniaceae	*Eustrephus latifolius*	wombat berry		C		1
plants	monocots	Laxmanniaceae	*Lomandra confertifolia subsp. pallida*			C		1
plants	monocots	Orchidaceae	*Cymbidium canaliculatum*			C		1
plants	monocots	Poaceae	*Aristida jerichoensis var. subspinulifera*			C		1/1
plants	monocots	Poaceae	*Poaceae*			C		2
plants	monocots	Poaceae	*Aristida*			C		3
plants	monocots	Poaceae	*Eragrostis*			C		2
plants	monocots	Poaceae	*Bothriochloa*			C		1
plants	monocots	Poaceae	*Perotis rara*	comet grass		C		1
plants	monocots	Poaceae	*Eriachne rara*			C		1/1
plants	monocots	Poaceae	*Eulalia aurea*	silky browntop		C		1
plants	monocots	Poaceae	*Melinis repens*	red natal grass	Y			2
plants	monocots	Poaceae	*Aristida ramosa*	purple wiregrass		C		3/1
plants	monocots	Poaceae	*Chloris inflata*	purpletop chloris	Y			1
plants	monocots	Poaceae	*Chloris virgata*	feathertop rhodes grass	Y			1
plants	monocots	Poaceae	*Panicum effusum*			C		2
plants	monocots	Poaceae	*Setaria surgens*			C		1
plants	monocots	Poaceae	*Aristida lignosa*			C		1/1
plants	monocots	Poaceae	*Chloris truncata*			C		2
plants	monocots	Poaceae	*Digitaria orbata*			C		1
plants	monocots	Poaceae	*Dinebra ligulata*			C		1/1
plants	monocots	Poaceae	*Themeda triandra*	kangaroo grass		C		6

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Poaceae	*Cenchrus ciliaris*		Y			6
plants	monocots	Poaceae	*Entolasia stricta*	wiry panic		C		2
plants	monocots	Poaceae	*Eriochloa procera*	slender cupgrass		C		2
plants	monocots	Poaceae	*Phalaris paradoxa*	paradoxa grass	Y			1/1
plants	monocots	Poaceae	*Sporobolus caroli*	fairy grass		C		1
plants	monocots	Poaceae	*Urochloa piligera*			C		1
plants	monocots	Poaceae	*Aristida benthamii*			C		1
plants	monocots	Poaceae	*Astrebla squarrosa*	bull mitchell grass		C		1
plants	monocots	Poaceae	*Chrysopogon fallax*			C		1
plants	monocots	Poaceae	*Digitaria bicornis*			C		1
plants	monocots	Poaceae	*Eragrostis brownii*	Brown's lovegrass		C		2
plants	monocots	Poaceae	*Eragrostis sororia*			C		2
plants	monocots	Poaceae	*Cymbopogon ambiguus*	lemon grass		C		2
plants	monocots	Poaceae	*Digitaria ammophila*	silky umbrella grass		C		5/1
plants	monocots	Poaceae	*Enteropogon ramosus*			C		1/1
plants	monocots	Poaceae	*Eragrostis speciosa*			C		1/1
plants	monocots	Poaceae	*Paspalidium gracile*	slender panic		C		2
plants	monocots	Poaceae	*Sporobolus sessilis*			C		1/1
plants	monocots	Poaceae	*Bothriochloa pertusa*		Y			3
plants	monocots	Poaceae	*Cymbopogon refractus*	barbed-wire grass		C		3/1
plants	monocots	Poaceae	*Dichanthium sericeum*			C		1
plants	monocots	Poaceae	*Enneapogon truncatus*			C		1/1
plants	monocots	Poaceae	*Eragrostis tenellula*	delicate lovegrass		C		2
plants	monocots	Poaceae	*Cymbopogon bombycinus*	silky oilgrass		C		1
plants	monocots	Poaceae	*Digitaria breviglumis*			C		1
plants	monocots	Poaceae	*Elytrophorus spicatus*			C		1
plants	monocots	Poaceae	*Eragrostis parviflora*	weeping lovegrass		C		2
plants	monocots	Poaceae	*Eremochloa bimaculata*	poverty grass		C		1
plants	monocots	Poaceae	*Heteropogon contortus*	black speargrass		C		4
plants	monocots	Poaceae	*Sporobolus natalensis*		Y			1/1
plants	monocots	Poaceae	*Alloteropsis semialata*	cockatoo grass		C		1
plants	monocots	Poaceae	*Aristida queenslandica*			C		1
plants	monocots	Poaceae	*Enneapogon polyphyllus*	leafy nineawn		C		1/1
plants	monocots	Poaceae	*Panicum queenslandicum*			C		1
plants	monocots	Poaceae	*Paspalidium criniforme*			C		1
plants	monocots	Poaceae	*Paspalidium globoideum*	sago grass		C		1/1
plants	monocots	Poaceae	*Eragrostis leptostachya*			C		1
plants	monocots	Poaceae	*Walwhalleya subxerophila*			C		1/1
plants	monocots	Poaceae	*Cymbopogon queenslandicus*			C		1
plants	monocots	Poaceae	*Hyparrhenia rufa subsp. rufa*		Y			2/2
plants	monocots	Poaceae	*Chloris divaricata var. divaricata*	slender chloris		C		1
plants	monocots	Poaceae	*Aristida queenslandica var. dissimilis*			C		1
plants	monocots	Poaceae	*Panicum queenslandicum var. acuminatum*			C		1/1
plants	monocots	Pontederiaceae	*Monochoria cyanea*			C		2

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

Department of Environment and Heritage Protection

Environmental Reports

Biodiversity and Conservation Values

Biodiversity Planning Assessments and Aquatic Conservation Assessments

Area of Interest: Longitude: 148.3118 Latitude: -22.3729

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@ehp.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.

Table of Contents

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

Area of Interest	148.3118,-22.3729 with 2 kilometre radius
Size (ha)	1256.6
Local Government(s)	ISAAC REGIONAL
Bioregion(s)	Brigalow Belt
Subregion(s)	Isaac - Comet Downs
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 v1.3
Aquatic Conservation Assessment(s) (riverine)	Great Barrier Reef Catchment v1.1
Aquatic Conservation Assessment(s) (non-riverine)	Great Barrier Reef Catchment 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	127.8	10.2%
Of Concern	84.0	6.7%
No concern at present	101.3	8.1%

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 Heritage Protection'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	371.3	29.5%
Regional	0.0	0.0%
Local or Other Values	0.0	0.0%

Table 5: Non-riverine wetlands intersecting the AOI

Non-riverine wetland types intersecting the area of interest	#
(No Records)	

NB. The figures presented in the table above are derived from the relevant non-riverine Aquatic Conservation Assessment(s). Later releases of wetland mapping produced via the Queensland Wetland Mapping Program may provide more recent information in regards to wetland extent.

Table 6: Named waterways intersecting the AOI

(no results)

Refer to **Map 1** for general locality information.

The following two tables identify the extent and proportion of the user specified AOI which is mapped as being of "Very High", "High", "Medium", "Low", or "Very Low" aquatic conservation value for riverine and non-riverine wetlands via application of the Queensland Department of Environment and Heritage Protection'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	1256.6	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
(No Records)		

Biodiversity Planning Assessments

Introduction

The department of Environment and Heritage Protection (EHP) 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 EHP.

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	371.3	29.5%
Regional	0.0	0.0%
Local or Other Values	0.0	0.0%

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

Diagnostic Criteria

Diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion. These criteria are diagnostic in that they are used to filter the available data and provide a "first-cut" or initial determination of biodiversity significance. This initial assessment is then combined through a second group of other essential criteria.

A description of the individual diagnostic criteria is provided in the following sections.

Criteria A. Habitat for EVNT taxa: Classifies areas according to their significance based on the presence of endangered, vulnerable and/or rare (EVNT) taxa. EVNT taxa are those scheduled under the *Nature Conservation Act 1992* and/or the *Environment Protection and Biodiversity Conservation Act 1999*. It excludes highly mobile fauna taxa which are instead considered in Criterion H and brings together information on EVNT taxa using buffering of recorded sites or habitat suitability models (HSM) where available.

Criteria B. Ecosystem value: Classifies on the basis of biodiversity status of regional ecosystems, their extent in protected areas (presence of poorly conserved regional ecosystems), the presence of significant wetlands and intertidal zones; and areas of national importance such as World Heritage areas and Ramsar sites. Ecosystem value is applied at a bioregional (**B1**) and regional (**B2**) scale.

Criteria C. Tract size: Measures the relative size of tracts of vegetation in the landscape. The size of any tract is a major indicator of ecological significance, and is also strongly correlated with the long-term viability of biodiversity values. Larger tracts are less susceptible to ecological edge effects and are more likely to sustain viable populations of native flora and fauna than smaller tracts.

Criteria D. Relative size of regional ecosystems: Classifies the relative size of each regional ecosystem unit within its bioregion (**D1**) and its subregion (**D2**). Remnant units are compared with all other occurrences with the same regional ecosystem. Large examples of a regional ecosystem are more significant than smaller examples of the same regional ecosystem because they are more representative of the biodiversity values particular to the regional ecosystem, are more resilient to the effects of disturbance, and constitute a significant proportion of the total area of the regional ecosystem.

Criteria F. Ecosystem diversity: Is an indicator of the number of regional ecosystems occurring within an area. An area with high ecosystem diversity will have many regional ecosystems and ecotones relative to other areas within the bioregion.

Criteria G. Context and connection: Represents the extent to which a remnant unit incorporates, borders or buffers areas such as significant wetlands, endangered ecosystems; and the degree to which it is connected to other vegetation.

A summary of the biodiversity status based upon the diagnostic criteria is provided in the following table.

Table 10: Summary of biodiversity significance based upon diagnostic criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains at least 1 Endangered RE (B1)	125.7	10.0
Regional	Remnant contains at least 1 RE with 10-30 percent extent remaining in the subregion (B2) & Remnant is part of a Tract that is one of the largest in the bioregion (C)	142.6	11.3
Regional	Remnant contains at least one Of Concern RE (B1)	103.0	8.2

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							371.3	29.5
B1: Ecosystem Value (Bioregion)	125.7	10.0	103.0	8.2	142.6	11.3		
B2: Ecosystem Value (Subregion)	125.7	10.0	142.6	11.3	103.0	8.2		
C: Tract Size	246.9	19.6			85.9	6.8	38.5	3.1
D1: Relative RE Size (Bioregion)							371.3	29.5
D2: Relative RE Size (Subregion)	103.0	8.2					268.3	21.4
F: Ecosystem Diversity	103.0	8.2	125.7	10.0	142.6	11.3		
G: Context and Connection	9.5	0.8	237.4	18.9			124.4	9.9

Other Essential Criteria

Other essential criteria (also known as expert panel criteria) are based on non-uniform information sources and which may rely more upon expert opinion than on quantitative data. These criteria are used to provide a "second-cut" determination of biodiversity significance, which is then combined with the diagnostic criteria for an overall assessment of relative biodiversity significance. A summary of the biodiversity status based upon the other essential criteria is provided in the following table.

Table 12: Summary of biodiversity significance based upon other essential criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I)	1.3	0.1
State	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I) & Remnant forms part of a bioregional corridor (J)	245.6	19.5
Regional	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I)	124.4	9.9

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.

This criterion can be used to identify essential and general habitat for EVNT and other priority taxa additional to that derived under Diagnostic Criterion A. Information sources include expert and local knowledge, technical reports and papers, and modelled maps of essential and general habitat.

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								

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
Ib: Wildlife Refugia	246.9	19.6	124.4	9.9				
Ic: Disjunct Populations								
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								
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	103.0	8.2%
Regional	142.6	11.3%
Local or Other Values	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_l_18	Riparian Corridors	State Regional	J (Riparian Corridor): STATE J (Riparian Corridor): REGIONAL
brbn_l_69	Core areas in fragmented subregions: Dawson River Downs Callide Creek Downs Isaac - Comet Downs Upper Belyando Floodout	State	Ib (wildlife refugia): VERY HIGH

Decision Number	Description	Panel Recommended Significance	Criteria Values
brbn_l_73	Representation in fragmented subregions: Dawson River Downs Callide Creek Downs Isaac - Comet Downs Upper Belyando Floodout	State Regional	Ib (wildlife refugia): VERY HIGH Ib (wildlife refugia): HIGH
brbs_l_18	Riparian Bioregional Corridors	State or Regional	J (Riparian Corridor): STATE or J (Riparian Corridor): REGIONAL

Expert panel decision descriptions:

brbn_l_18

Riparian corridors are mapped in 2 parts using buffers of 200 metres and 1000 metres from the streamline as shown on the 1:100000 topographic map series. Remnant ecosystem polygons containing 30% or more of their area within the 200m buffer are assigned State significance. Remnant ecosystem polygons containing 30% or more of their area within the 1000m buffer are assigned Regional significance.

brbn_l_69

Tracts are patches of continuous remnant vegetation. 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. The northern Brigalow Belt has some very large tracts of vegetation. Based on the Tract Size analysis (Criterion C), the following core areas are identified for the northern Brigalow Belt. They are the fragmented subregions:

More information for this decision exists in the BRB BPA North Landscape Report.

brbn_l_73

The largest example of each regional ecosystem remaining should be rated as State significance because these act as significant wildlife refuges in an extensively cleared landscape. All other remnants are Regionally significant because these act as wildlife refuges in an extensively cleared landscape.

brbs_l_18

Riparian corridors are mapped in 2 parts using buffers of 200 metres and 1000 metres from the streamline as shown on the 1:100000 topographic map series. Remnant ecosystem polygons containing 30% or more of their area within the 200m buffer are assigned state significance. Remnant ecosystem polygons containing 30% or more of their area within the 1000m buffer are assigned regional significance.

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 prcesses

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.ehp.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%
High	0.0	0.0%
Medium	1256.6	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							1256.5	100.0
2. Naturalness catchment			1256.5	100.0				
3. Diversity and richness			14.2	1.1	1242.3	98.9		
4. Threatened species and ecosystems			1256.5	100.0				
5. Priority species and ecosystems			8.9	0.7				
6. Special features								
7. Connectivity							1256.5	100.0

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

(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
(No Records)		

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
(No Records)								

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.

(No Records)

4 is the highest rating/value

Expert panel decision descriptions:

(No Records)

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
Denisonia maculata	Ornamental Snake	V	V	Medium			FA

NB. Please note that the threatened species listed in this section are based upon the most recently compiled DEHP 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

(no results)

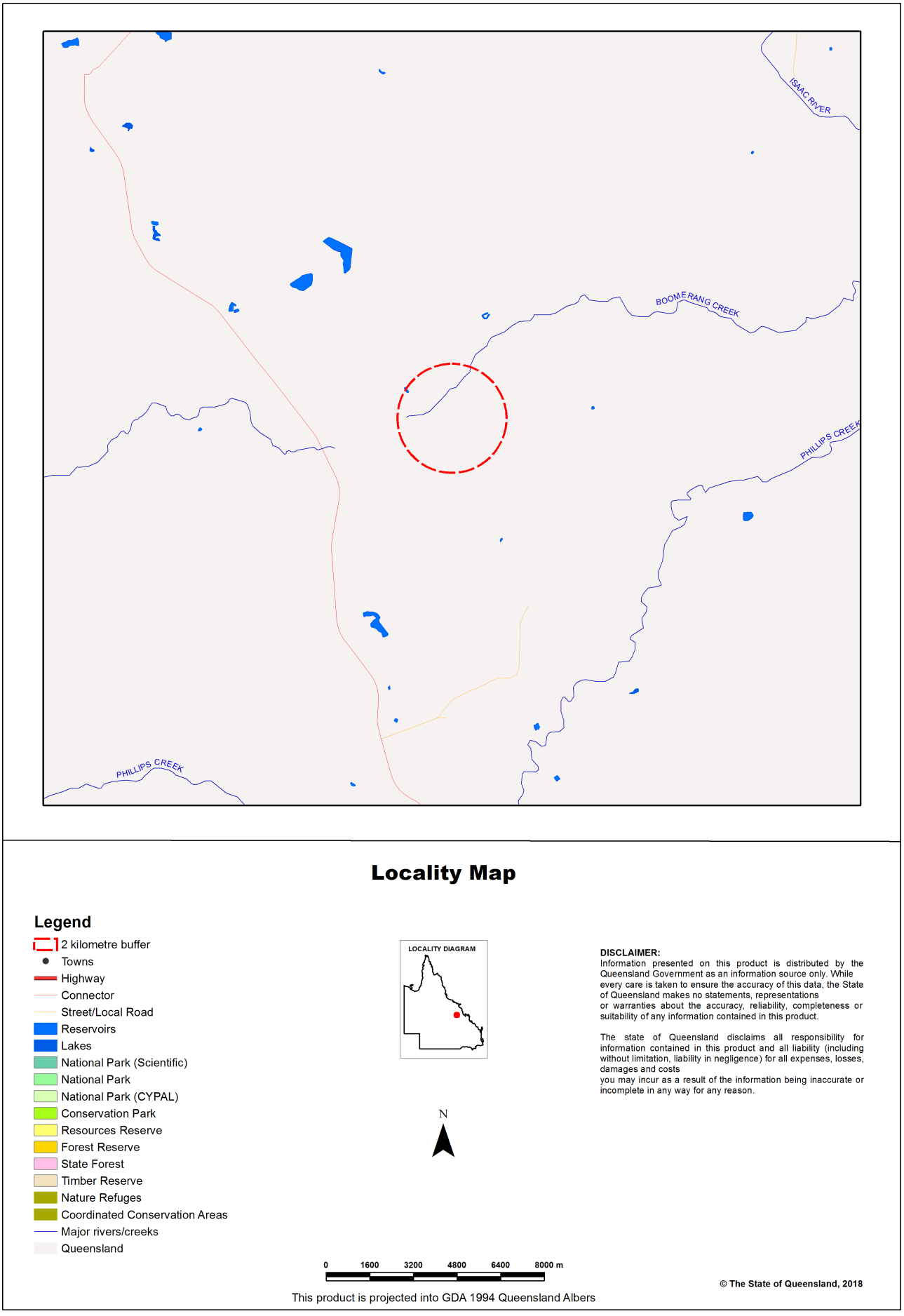
Table 25: Priority species recorded on, or within 4 km of the AOI - non-riverine

(no results)

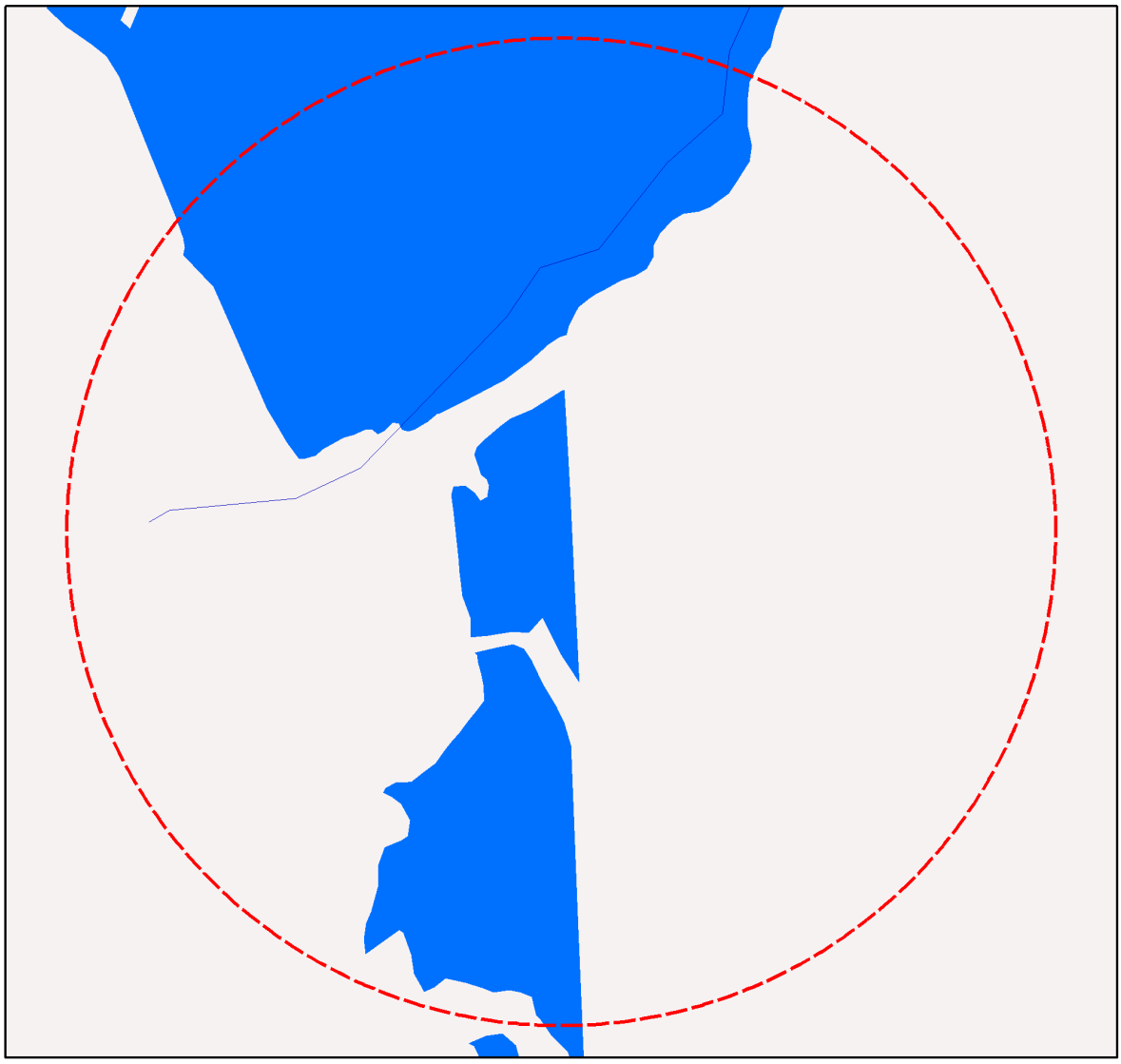
NB. Please note that the priority species records used in the above two tables are comprised of those adopted for the released individual ACAs. The ACA riverine and non-riverine priority species databases are updated from time to time to reflect new release of ACAs. At each update, the taxonomic details for all ACAs records are amended as necessary to reflect current taxonomic name and/or status changes.

Maps

Map 1 - Locality Map



Map 2 - Biodiversity Planning Assessment (BPA)



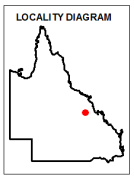
Biodiversity Planning Assessments

Legend

- 2 kilometre buffer
- Towns
- Roads
- Major rivers/creeks
- Queensland

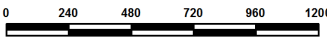
Biodiversity Planning Assessment

- State Habitat for EVNT taxa
- State
- Regional
- Local or Other Values
- Non Bioregion Ecosystem



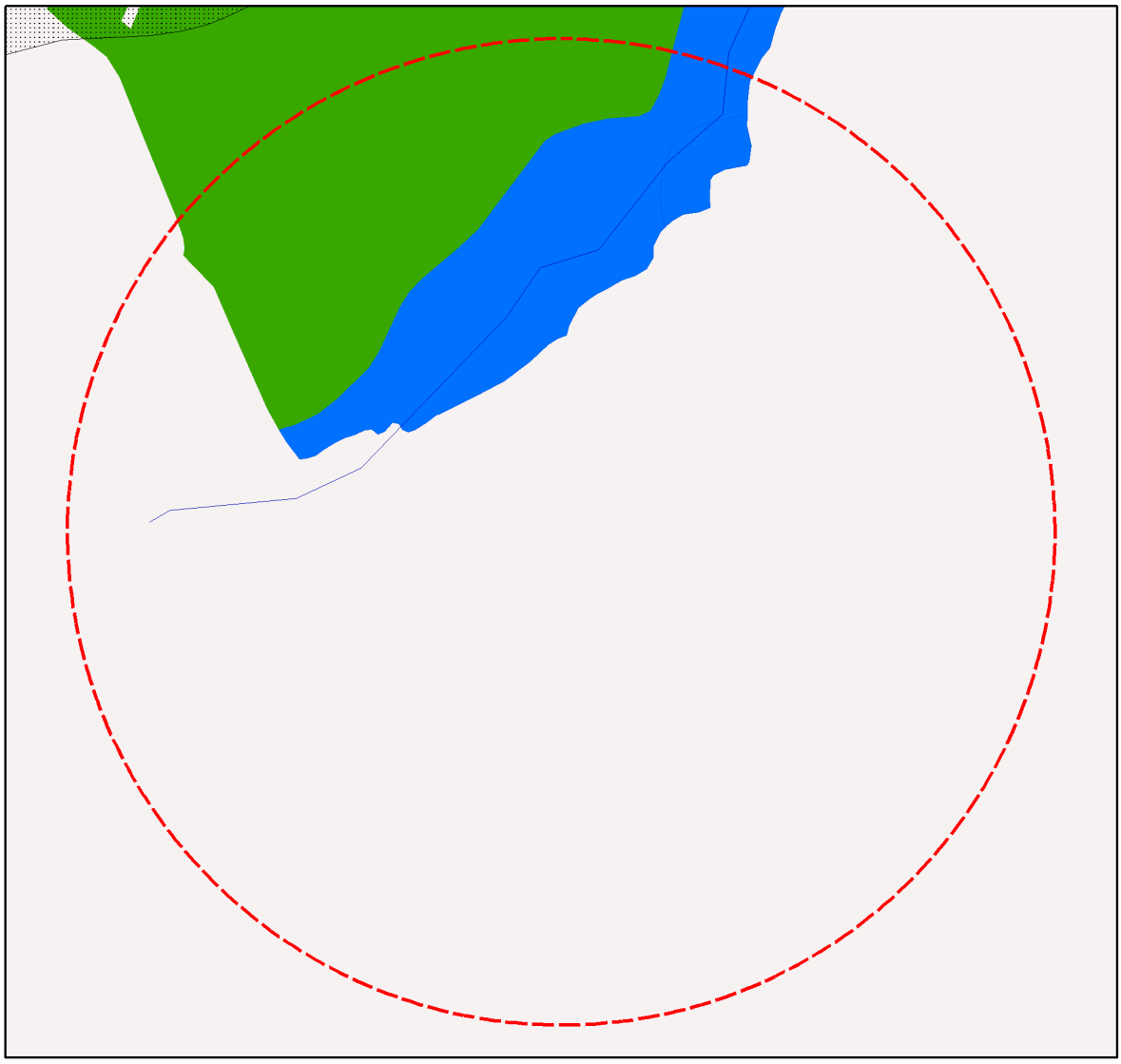
DISCLAIMER:
Information presented on this product is distributed by the Queensland Government as an information source only. While every care is taken to ensure the accuracy of this data, the State of Queensland makes no statements, representations or warranties about the accuracy, reliability, completeness or suitability of any
information contained in this product.

The state of Queensland disclaims all responsibility for information contained in this product and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs
you may incur as a result of the information being inaccurate or incomplete in any wayfor any reason.



This product is projected into GDA 1994 Queensland Albers

Map 3 - Corridors



Corridors

Legend

- 2 kilometre buffer
- Towns
- Roads
- Major rivers/creeks
- Queensland

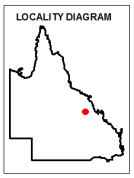
Corridors

- State
- Regional

Corridor Triggered Vegetation

- State
- Regional
- Local

LOCALITY DIAGRAM



DISCLAIMER:
Information presented on this product is distributed by the Queensland Government as an information source only. While every care is taken to ensure the accuracy of this data, the State of Queensland makes no statements, representations or warranties about the accuracy, reliability, completeness or suitability of any information contained in this product.

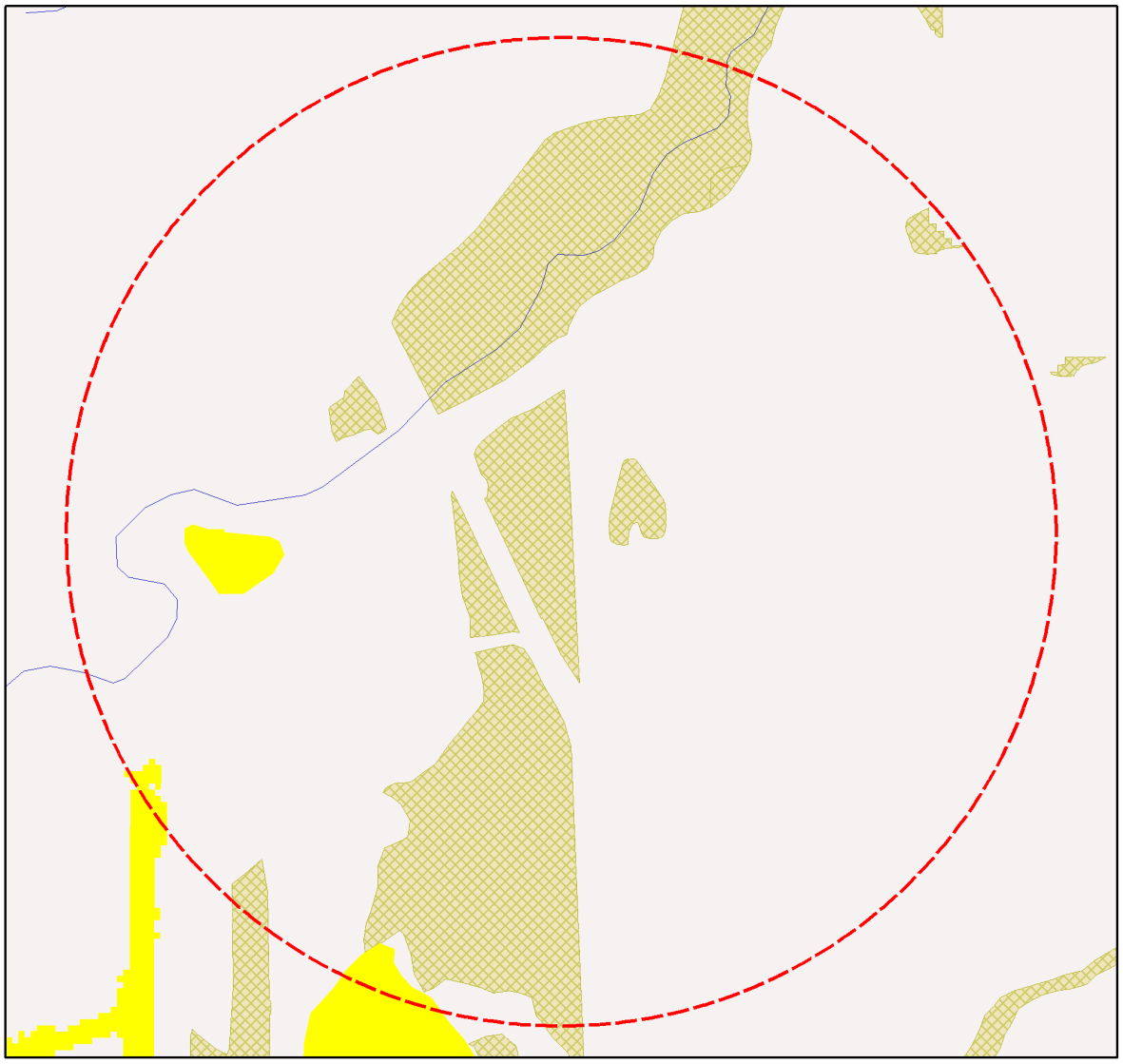
The state of Queensland disclaims allresponsibility for information contained in this product and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

N

0 240 480 720 960 1200 m

This product is projected into GDA 1994 Queensland Albers

Map 4 - Wetlands and waterways



Wetlands and Waterways

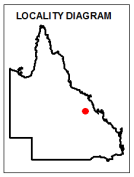
Legend

- 2 kilometre buffer
- 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)

LOCALITY DIAGRAM



N

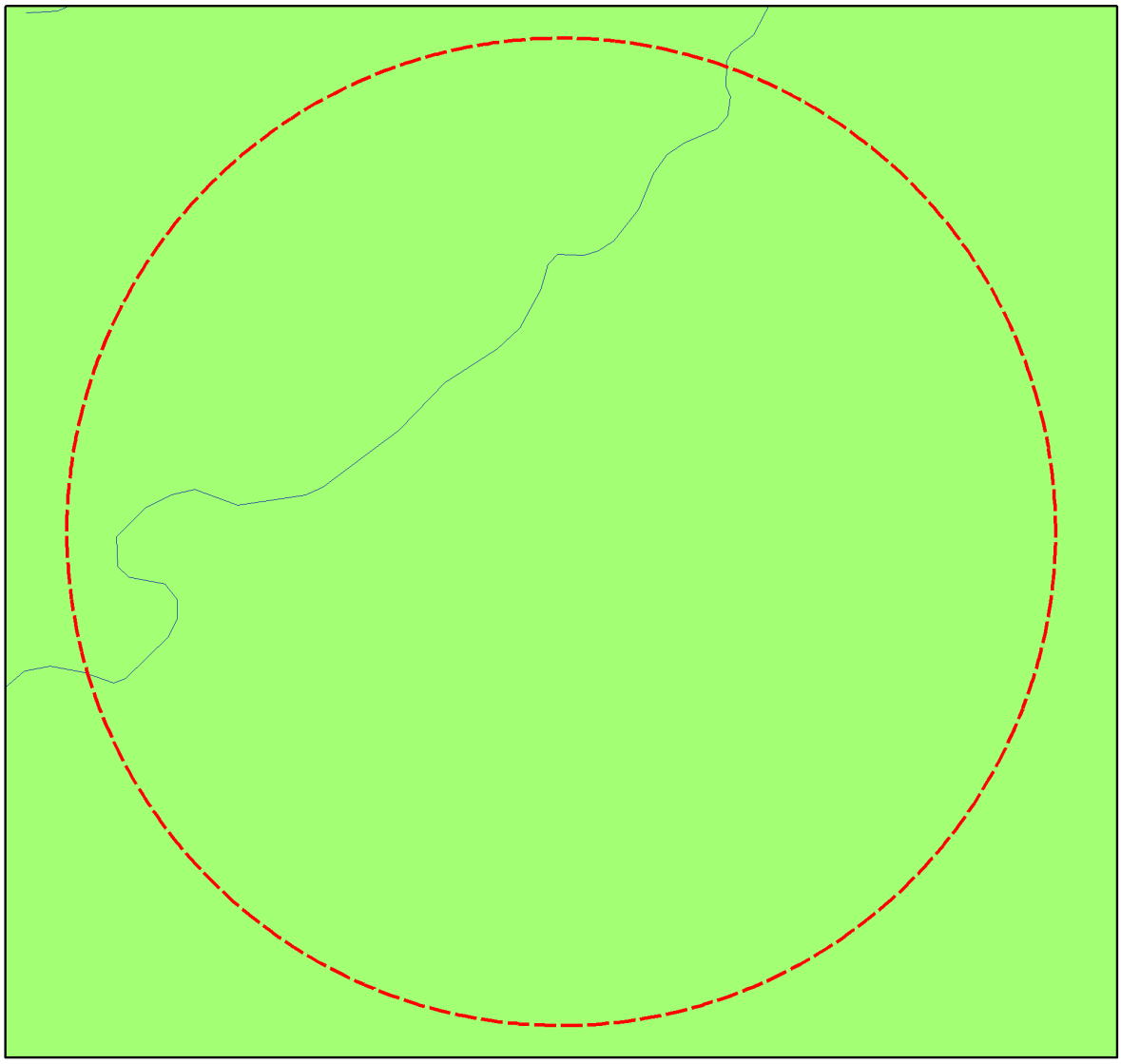
0 240 480 720 960 1200 m

This product is projected into GDA 1994 Queensland Albers

DISCLAIMER:
Information presented on this product is distributed by the Queensland Government as an information source only. While every care is taken to ensure the accuracy of this data, the State of Queensland makes no statements, representations or warranties about the accuracy, reliability, completeness or suitability of any
information contained in this product.

The state of Queensland disclaims all responsibility for information contained in this product and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs
you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

Map 5 - Aquatic Conservation Assessment (ACA) - riverine



Aquatic Conservation Assessment (ACA) - riverine

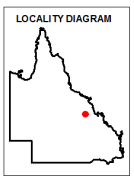
Legend

- 2 kilometre buffer
- Towns
- Roads
- Rivers/Creeks
- Queensland

ACA Riverine - Subcatchment Significance

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

LOCALITY DIAGRAM



N

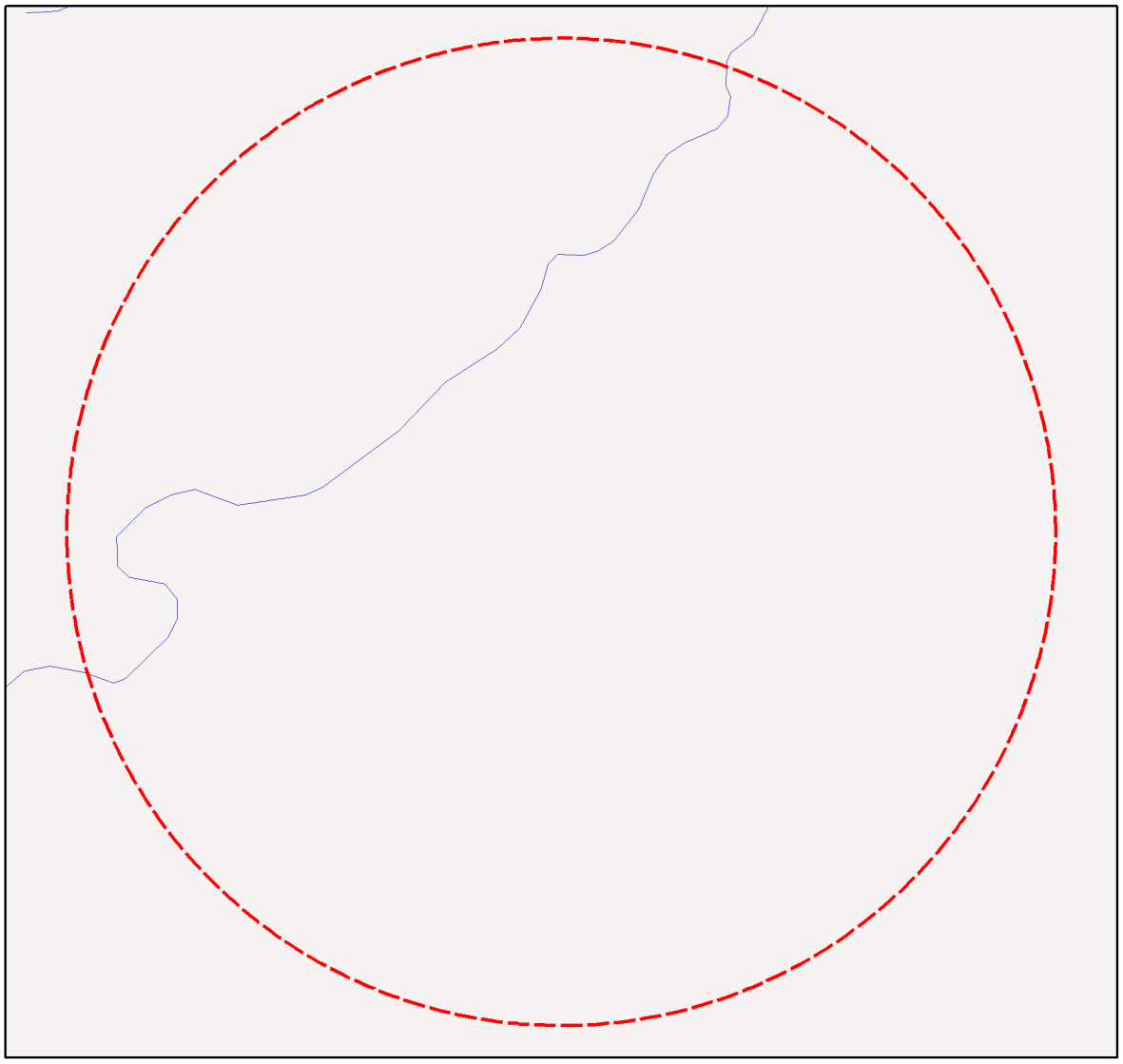
DISCLAIMER:
Information presented on this product is distributed by the Queensland Government as an information source only. While every care is taken to ensure the accuracy of this data, the State of Queensland makes no statements, representations or warranties about the accuracy, reliability, completeness or suitability of any information contained in this product.

The state of Queensland disclaims all responsibility for information contained in this product and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

0 240 480 720 960 1200 m

This product is projected into GDA 1994 Queensland Albers

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



Aquatic Conservation Assessment (ACA) - nonriverine

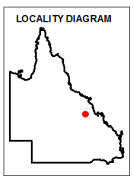
Legend

- 2 kilometre buffer
- Towns
- Roads
- Rivers/Creeks
- Queensland

ACA Non-riverine

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

LOCALITY DIAGRAM



N

DISCLAIMER:
Information presented on this product is distributed by the Queensland Government as an information source only. While every care is taken to ensure the accuracy of this data, the State of Queensland makes no statements, representations or warranties about the accuracy, reliability, completeness or suitability of any information contained in this product.

The state of Queensland disclaims all responsibility for information contained in this product and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

0 240 480 720 960 1200 m

This product is projected into GDA 1994 Queensland Albers

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.ehp.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 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 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 v1.3 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 v1.3
Threatened Species	An internal DEHP database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.
BPA Priority Species	An internal DEHP database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.
ACA Priority Species	An internal DEHP database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.

***These datasets are available at:**

http://dds.information.qld.gov.au/DDS

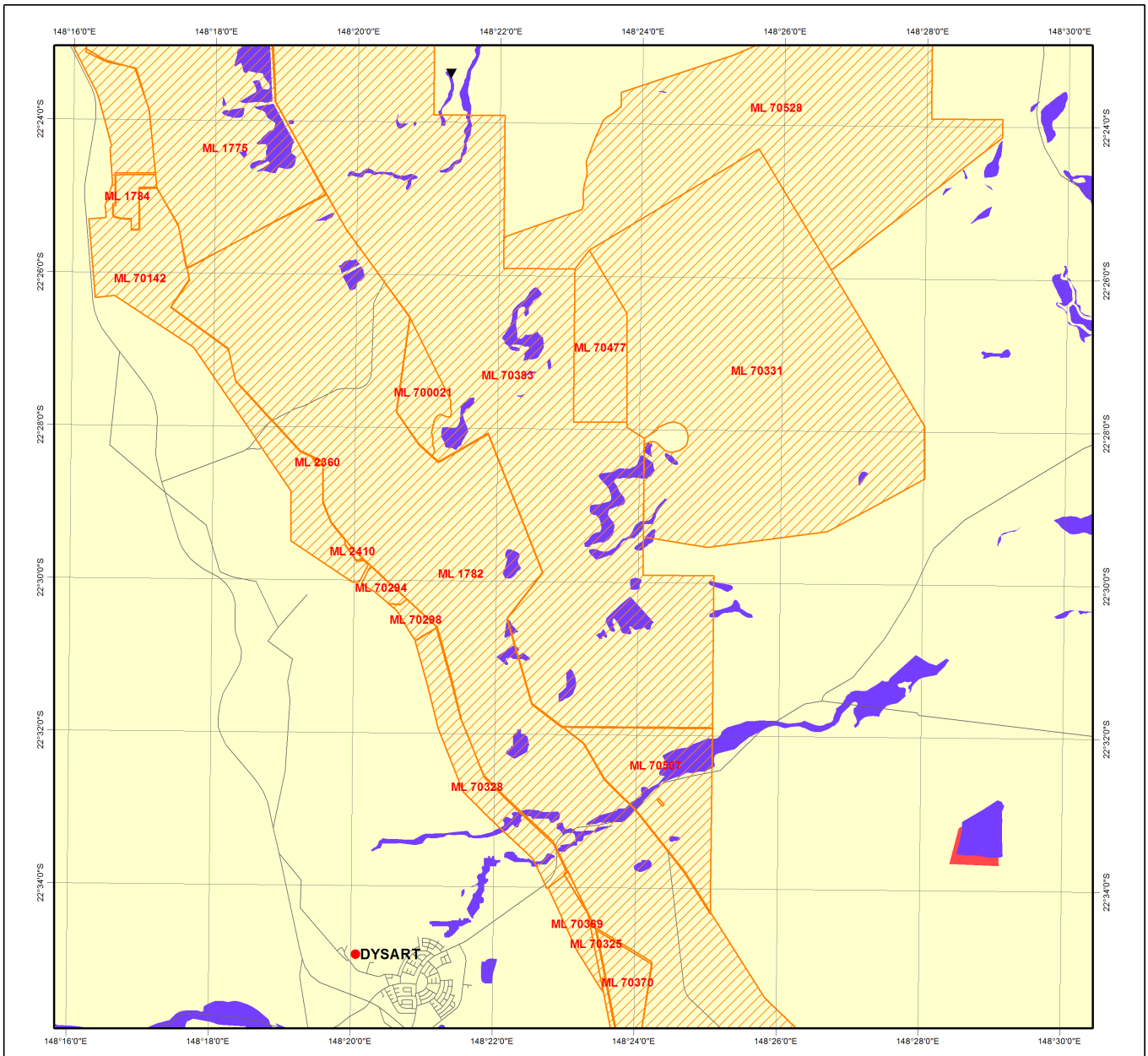
Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
ACA	- Aquatic Conservation Assessment
AQUABAMM	- Aquatic Biodiversity Assessment and Mapping Methodology
BAMM	- Biodiversity Assessment and Mapping Methodology
BoT	- Back on Track
BPA	- Biodiversity Planning Assessment
CAMBA	- China-Australia Migratory Bird Agreement
EHP	- Department of Environment and Heritage Protection
EPBC	- *Environment Protection and Biodiversity Conservation Act 1999*
EVNT	- Endangered, Vulnerable, Near Threatened
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
JAMBA	- Japan-Australia Migratory Bird Agreement
NCA	- *Nature Conservation Act 1992*
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
ROKAMBA	- Republic of Korea-Australia Migratory Bird Agreement

Tenure type: Mining Leases

Map requested: 15/01/2018 14:39:22

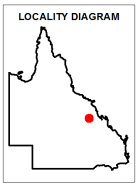
Centred on point position: Longitude: 148.3847 Latitude: -22.4902



ENVIRONMENTALLY SENSITIVE AREAS - Mining Activities

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

LOCALITY DIAGRAM



N

0 1,300 2,600 3,900 5,200 6,500 m

This product is projected into GDA 1994 MGA Zone 55

Information presented on this product is distributed by the Queensland Government as an information source only. While every care is taken to ensure the accuracy of this data, The State of Queensland makes no statements, representations or warranties about the accuracy, reliability, completeness or suitability of any information contained in this product.

The State of Queensland disclaims all responsibility for information contained in this product and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or ncomplete in any way for any reason.

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.

Australian Government
Department of the Environment and Energy

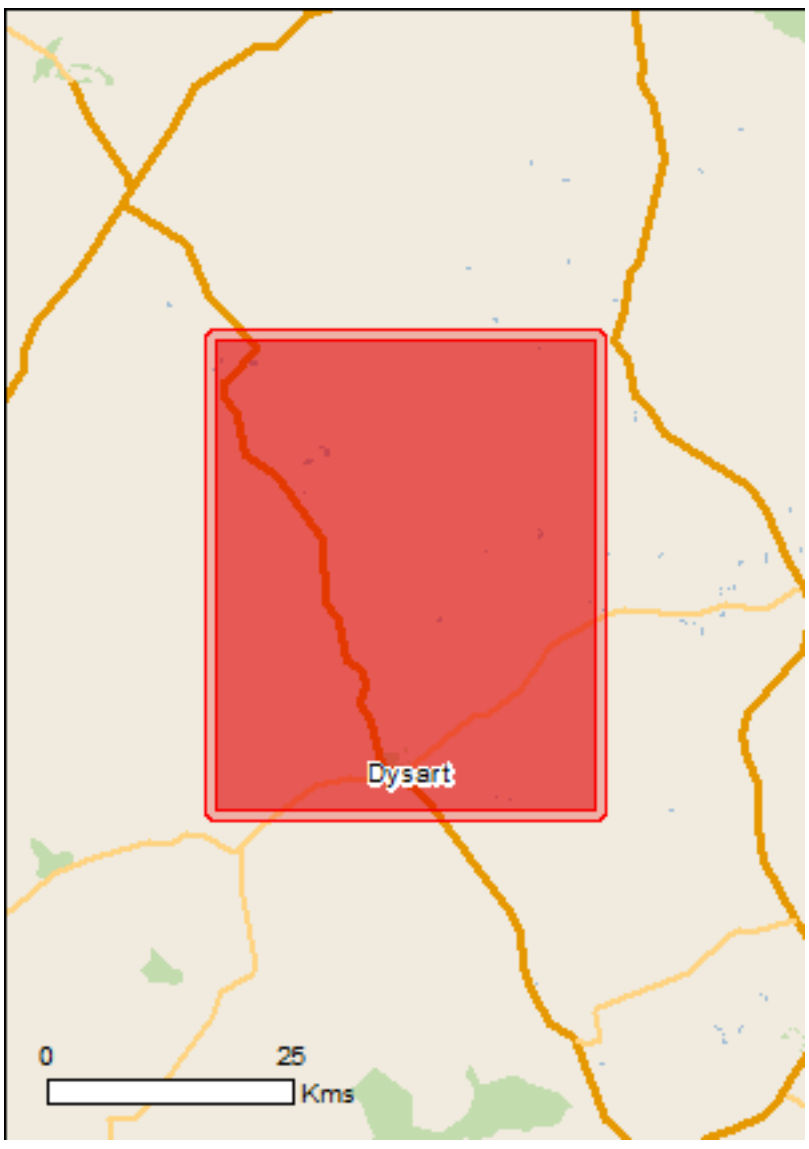
EPBC Act Protected Matters Report

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.

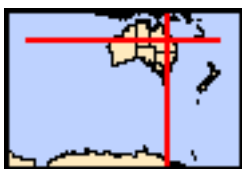
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 03/09/18 10:34:22



Coordinates
Buffer: 1.0Km



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.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	26
Listed Migratory Species:	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.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	20
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	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
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area
Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin	Endangered	Community likely to occur within area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat known to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Neochmia ruficauda ruficauda Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area
Poephila cincta cincta Southern Black-throated Finch [64447]	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Fish		
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
Mammals		
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur

Name	Status	Type of Presence within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Plants		
Aristida annua [17906]	Vulnerable	Species or species habitat likely to occur within area
Cadellia pentastylis Ooline [9828]	Vulnerable	Species or species habitat may occur within area
Cycas ophiolitica [55797]	Endangered	Species or species habitat likely to occur within area
Dichanthium queenslandicum King Blue-grass [5481]	Endangered	Species or species habitat likely to occur within area
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Samadera bidwillii Quassia [29708]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Denisonia maculata Ornamental Snake [1193]	Vulnerable	Species or species habitat known to occur within area
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
Elseya albagula Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat likely to occur within area
Furina dunmalli Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
Lerista allanae Allan's Lerista, Retro Slider [1378]	Endangered	Species or species habitat may occur within area
Rheodytes leukops 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
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Coolibah	QLD

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
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
Feral deer Feral deer species in Australia [85733]		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
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
Plants		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area

Name	Status	Type of Presence
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
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
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

-22.2247 148.17096,-22.2247 148.518,-22.6227 148.518,-22.6227 148.17096,-22.2247 148.17096

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.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Department of Natural Resources, Mines and Energy

Vegetation management report

For Lot: 7 Plan: CNS144

Current as at 15/02/2018

Queensland Government

This publication has been compiled by Operations Support, Department of Natural Resources, Mines and Energy.

Overview

IMPORTANT INFORMATION- As a result of the new *Planning Act 2016*, which commenced on 3 July 2017, there are a number of changes to the Vegetation Management Framework. These changes include;

- Exemptions from the Vegetation Management Framework, commonly known as exemptions and detailed in the Sustainable Planning Regulations 2012, are now known as "exempt clearing works", and are detailed in the Planning Regulations Schedule 21; and
- Self-assessable vegetation clearing codes are now known as "accepted development vegetation clearing codes". However, as there are 15 self-assessable vegetation clearing codes available for use that will not be re-named as a result of the recent changes, the term self-assessable vegetation clearing code will be used throughout this report.

Vegetation clearing is predominantly regulated under the *Vegetation Management Act 1999* (VMA) and the *Planning Act 2016* (PA). A development permit is required to clear where the clearing is not exempt clearing work through the Planning Regulation 2017, or where it cannot be carried out under a self-assessable vegetation clearing code or an area management plan under the VMA.

Many routine vegetation management activities can be carried out as exempt clearing work listed in the Planning Regulation 2017, or through an self-assessable vegetation clearing code or an area management plan (AMP). Other activities may require you to apply for a development permit under the *Planning Act 2016*. The requirements for a development permit depend on the type of vegetation, the land tenure (e.g. freehold or leasehold land), the location, and the extent and purpose of the proposed clearing.

Please be aware that other requirements for clearing and managing vegetation may apply, even if the activity is not regulated by the Vegetation Management framework. Prior to commencing the clearing of vegetation, it is important to confirm that no other requirements apply under other legislation, including:

- Local laws in your local government area;
- Other State legislation, such as Protected Plants under the *Nature Conservation Act 1992* (NCA);
- The Commonwealth Government's *Environmental Protection and Biodiversity Act 1999* (EPBC).

Please see section 6 for contact details of other agencies you should confirm requirements with before commencing vegetation clearing.

Please note that the requirements for clearing Category C or Category R areas are located in the self-assessable vegetation clearing codes (SAVCC) for managing Category C and Category R vegetation respectively.

The information in this report will assist you to determine the options for managing vegetation on your property. Based on the lot on plan details you have supplied, this report provides the following detailed information:

- *Vegetation management framework* - an explanation of the options that may be available to manage vegetation on your property.
- *Property details* - information about the specified Lot on Plan, lot size, local government area, bioregion(s), subregion(s), catchment(s), coastal or non coastal status, and any applicable area management plans associated with your property.
- *Vegetation management details for the specified Lot on Plan* - specific information about your property including vegetation categories, regional ecosystems, watercourses, wetlands, essential habitat, land suitability and protected plants.
- *Contact information.*
- *Maps* - a series of colour maps to assist in identifying regulated vegetation on your property including:
  - regulated vegetation management map;
  - vegetation management supporting map;
  - land suitability map;
  - coastal/non coastal map;
  - protected plants map.
- *Other legislation contact information.*

Table of Contents

1. Vegetation management framework

The *Vegetation Management Act 1999* (VMA), the Vegetation Management Regulation 2012, the *Planning Act 2016* and the Planning Regulation 2017, in conjunction with associated policies and codes, form the Vegetation Management Framework. This framework regulates the management and clearing of assessable vegetation in Queensland.

The VMA does not apply to all land tenures or vegetation types. State forests, national parks, forest reserves and some tenure types as defined under the *Forestry Act 1959* and *Nature Conservation Act 1992* are not regulated by the VMA.

Managing or clearing vegetation may require permits under these laws.

The information provided in Sections 2 and 3 of this report, as well as the maps provided in Section 5, will assist you to determine whether your proposed clearing is:

- exempt clearing works;
- requires notification and compliance with a self-assessable vegetation clearing code or area management plan;
- requires a development permit; and/or
- in a high risk area and is therefore subject to the protected plants legislative framework (see section 3.7 of this report).

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

- grass or non-woody herbage;
- a plant within a grassland regional ecosystem prescribed under the VM Regulation 2012; and
- a mangrove.

Although vegetation management laws may allow clearing, there may be other state, local or Commonwealth laws that apply, such as the Queensland Government's *Nature Conservation Act 1992* (see Protected Plants) and the Commonwealth Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The EPBC Act regulates matters of national environmental significance, such as threatened species and ecological communities. You may need to obtain approval under the EPBC Act if your proposed clearing could have a significant impact on matters of national environmental significance. Further details are available at www.environment.gov.au.

1.1 Exempt Clearing Work

The vegetation management framework allows clearing for certain purposes without approval, known as an exempt clearing work. Exempt clearing work provisions under the *Planning Act 2016* were formerly called exemptions.

In areas that are mapped as Category X (white in colour) on the regulated vegetation management map (see section 5.1), and where the land tenure is freehold, indigenous land and leasehold land for agriculture and grazing purposes, the clearing of vegetation is considered exempt clearing work, or exempt from the VMA. For all other land tenures, contact DNRME before commencing clearing to ensure that the proposed activity is exempt clearing work. Please see Section 4 for DNRME's contact details.

A range of routine property management activities are considered exempt clearing work. A list of these is available at https://www.qld.gov.au/environment/land/vegetation/exemptions/.

Although vegetation management laws may allow clearing as exempt clearing work, there may be other state, local or Commonwealth laws that apply. For example, a clearing permit under the *Nature Conservation Act 1992* may be required for clearing protected plants. These requirements apply irrespective of the classification of the vegetation under the vegetation management framework. In addition, clearing that is exempt clearing work may not apply in an area subject to a development permit, a covenant, an environmental offset, an Exchange Area, a Restoration Notice, or an area mapped as Category A. Landholders considering clearing in any of these areas should contact DNRME prior to clearing to clarify if any conditions apply in the area that affect the use of the provisions for exempt clearing work.

1.2 Self-assessable vegetation clearing codes

Some clearing activities can be undertaken using a self-assessable vegetation clearing code and notification process. The codes can be downloaded at
https://www.qld.gov.au/environment/land/vegetation/codes/

If you intend to clear vegetation under a self-assessable vegetation clearing code, you must notify DNRME before commencing. The information in this report will assist you to complete the online notification form.

Please note that a self-assessable vegetation clearing code cannot be used in an area mapped as Category A.(see section 5.1)

You can complete the online form at
https://apps.dnrm.qld.gov.au/vegetation/

1.3 Area management plans

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

If an area management plan applies to your property, it will be listed in Section 2.2 of this report.

To clear under an existing AMP, you must notify the DNRME before clearing starts and follow the conditions listed in the AMP. You can download the area management plan notification form and obtain a copy of the relevant AMP at
https://www.qld.gov.au/environment/land/vegetation/area-plans/

1.4 Development permits

If your proposed clearing is not exempt clearing work, or is not permitted under a self-assessable vegetation clearing code, or an AMP, you may be able to apply for a development permit. Information on how to apply for a development permit is available at
https://www.qld.gov.au/environment/land/vegetation/applying/

2. Property details

2.1 Tenure

All of the lot, plan and tenure information associated with property Lot: 7 Plan: CNS144 (Calculated area in Hectares - 2550.91ha), including links to relevant Smart Maps, are listed in Table 1. The tenure of the property (whether it is freehold, leasehold, or other) may be viewed by clicking on the Smart Map link(s) provided.

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

Lot	Plan	Tenure	Link to property on SmartMap
7	CNS144	Lands Lease	http://globe.information.qld.gov.au/cgi-bin/SmartMapgen.py?q=7\CNS144
AE	SP215968	Easement	http://globe.information.qld.gov.au/cgi-bin/SmartMapgen.py?q=AE\SP215968
A	CNS122	Easement	http://globe.information.qld.gov.au/cgi-bin/SmartMapgen.py?q=A\CNS122
A	CNS65	Easement	http://globe.information.qld.gov.au/cgi-bin/SmartMapgen.py?q=A\CNS65
C	SP216045	Easement	http://globe.information.qld.gov.au/cgi-bin/SmartMapgen.py?q=C\SP216045

The tenure of the land may affect whether the clearing is considered exempt clearing work.

Some self-assessable vegetation clearing codes apply only to freehold and leasehold land granted for grazing and agricultural purposes.

2.2 Property location

Table 2 provides a summary of the locations for property Lot: 7 Plan: CNS144, in relation to natural and administrative boundaries.

Local Government(s)
Isaac Regional

Bioregion(s)	Subregion(s)
Brigalow Belt	Northern Bowen Basin
Brigalow Belt	Isaac - Comet Downs

Catchment(s)
Fitzroy

For the purposes of the Self-assessable vegetation clearing codes and the State Development Assessment Provisions (SDAP), this property is regarded as *
Non Coastal

*See also Map 5.4

Area Management Plan(s): Nil

3. Vegetation management details for Lot: 7 Plan: CNS144

3.1 Vegetation categories

Vegetation categories are shown on the regulated vegetation management map in section 5.1 of this report. A summary of vegetation categories on the subject lot are listed in Table 3. Descriptions for these categories are shown in Table 4.

Table 3: Vegetation categories for subject property. Total area: 2551.81ha

Vegetation category	Area (ha)
Category B	808.92
Category X	1742.89

Table 4

Category	Colour on Map	Description	Requirements
A	red	Compliance areas, environmental offset areas and voluntary declaration areas	There may be special conditions that apply in a Category A area. Before clearing, contact DNRME to confirm any requirements in a Category A area.
B	dark blue	Remnant vegetation areas	Clearing may be considered exempt clearing work, or can be undertaken after notifying under a self-assessable vegetation clearing code or an Area Management Plan, or may require a Development Permit.
C	light blue	High-value regrowth areas	Clearing may be considered exempt clearing work, or can be undertaken after notifying under the self-assessable vegetation clearing code for Managing Category C Regrowth vegetation.
R	yellow	Regrowth within 50m of a watercourse or drainage feature in the priority reef catchment areas	Clearing may be considered exempt clearing work, or can be undertaken after notifying under the self-assessable vegetation clearing code for Managing Category R Regrowth vegetation.
X	white	Clearing is considered accepted development on freehold land, indigenous land and leasehold land for agriculture and grazing purposes. Contact DNRME to clarify whether a development permit is required for other State land tenures.	No permit or notification required on freehold land, indigenous land and leasehold land for agriculture and grazing. A Development Permit may be required for some State land tenures.

Property Map of Assessable Vegetation (PMAV)

This report does not confirm if a Property Map of Assessable Vegetation (PMAV) exists on a lot. To confirm whether or not a PMAV exists on a lot, please check the PMAV layer on the Queensland Globe2, or contact DNRME on 135 834.

3.2 Regional ecosystems

The endangered, of concern and least concern regional ecosystems on your property are shown on the vegetation management supporting map in section 5.2 and are listed in Table 5.

A description of regional ecosystems can be accessed online at
https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/descriptions/

Table 5: Regional ecosystems present on subject property

Regional Ecosystem	VMA Status	Category	Area (Ha)	Short Description	Structure Category
11.3.1	Endangered	B	5.83	Acacia harpophylla and/or Casuarina cristata open forest on alluvial plains	Mid-dense
11.3.2	Of concern	B	34.96	Eucalyptus populnea woodland on alluvial plains	Sparse
11.3.25	Least concern	B	17.48	Eucalyptus tereticornis or E. camaldulensis woodland fringing drainage lines	Mid-dense
11.4.8	Endangered	B	135.39	Eucalyptus cambageana woodland to open forest with Acacia harpophylla or A. argyrodendron on Cainozoic clay plains	Mid-dense
11.4.9	Endangered	B	154.89	Acacia harpophylla shrubby woodland with Terminalia oblongata on Cainozoic clay plains	Mid-dense
11.5.3	Least concern	B	460.41	Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana on Cainozoic sand plains and/or remnant surfaces	Sparse
non-rem	None	X	1,742.89	None	None

Please note:

1. All area and area derived figures included in this table have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.
2. If Table 5 contains a Category 'plant', please be aware that this refers to 'plantations' such as forestry, and these areas are considered non-remnant under the VMA.

The VMA status of the regional ecosystem (whether it is endangered, of concern or least concern) also determines if any of the following are applicable:

- exempt clearing work
- self assessable vegetation clearing codes
- performance outcomes in State Development Assessment Provisions (SDAP).

Some clearing purposes are limited to a particular group of regional ecosystems (e.g. encroachment) and some self-assessable vegetation clearing codes allow clearing only in certain regional ecosystems.

3.3 Watercourses

Vegetation management watercourses and drainage features for this property are shown on the vegetation management supporting map in section 5.2.

3.4 Wetlands

There are no vegetation management wetlands present on this property.

3.5 Essential habitat

Protected wildlife is native wildlife prescribed under the *Nature Conservation Act 1992* (NCA), and includes endangered or vulnerable wildlife.

Essential habitat identifies areas in which species of wildlife that are Endangered or Vulnerable under the *Nature Conservation Act 1992* for which suitable habitat occurs on the lot, or where they have been known to occur up to 1.1 kilometres from a lot on which there is assessable vegetation. These important habitat areas are protected under the VMA.

Any essential habitat on this property will be shown as blue hatching on the vegetation supporting map in section 5.2.

If essential habitat is identified on the lot, information about the protected wildlife species is provided in Table 6 below. The numeric labels on the vegetation management supporting map can be cross referenced with Table 6 to outline the essential habitat factors for that particular species. There may be essential habitat for more than one species on each lot, and areas of Category A, Category B and Category C can be mapped as Essential Habitat.

Essential habitat is compiled from a combination of species habitat models and buffered species records. Regional ecosystem is a mandatory essential habitat factor, unless otherwise stated. Essential habitat, for protected wildlife, means an area of vegetation shown on the Regulated Vegetation Management Map as assessable vegetation -

1) that has at least 3 essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database. Essential habitat factors are comprised of - regional ecosystem (mandatory for most species), vegetation community, altitude, soils, position in landscape; or

2) in which the protected wildlife, at any stage of its life cycle, is located.

If there is no essential habitat mapping shown on the vegetation management supporting map for this lot, and there is no table in the sections below, it confirms that there is no essential habitat on the lot.

3.5.1 Category A and/or Category B

Table 6: Essential habitat in Category A and/or Category B

Label	Scientific Name	Common Name	NCA Status	Vegetation Community	Altitude	Soils	Position in Landscape
483	Denisonia maculata	Ornamental Snake	V	Under litter/fallen timber and in wide soil cracks, in riparian woodland/open forest and shrub/woodland including Brigalow Acacia harpophylla.	100-450m.	Deep cracking clay and sandy loam substrates.	Near freshwater waterholes/creeks.

Label	Regional Ecosystem (mandatory unless otherwise specified)
483	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, 9.3.10, 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, 9.3.24, 9.5.1, 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, 9.5.13, 9.5.14, 9.7.1, 9.7.2, 9.7.3, 9.7.4, 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, 9.8.12, 9.10.1, 9.10.3, 9.10.4, 9.10.5, 9.10.6, 9.10.7, 9.10.8, 9.10.9, 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, 9.11.14, 9.11.15, 9.11.16, 9.11.17, 9.11.18, 9.11.19, 9.11.21, 9.11.22, 9.11.23, 9.11.24, 9.11.25, 9.11.26, 9.11.27, 9.11.28, 9.11.29, 9.11.30, 9.11.31, 9.11.32, 9.12.1, 9.12.2, 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, 9.12.14, 9.12.15, 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, 9.12.25, 9.12.26, 9.12.27, 9.12.28, 9.12.29, 9.12.30, 9.12.31, 9.12.32, 9.12.33, 9.12.35, 9.12.36, 9.12.37, 9.12.38, 9.12.39, 9.12.40, 9.12.43, 10.3.6, 10.4.2, 10.4.5, 11.3.5, 11.3.25, 11.4.2, 11.4.3, 11.4.5, 11.4.6, 11.4.7, 11.4.8, 11.4.9, 11.9.1, 11.9.5, 11.11.19

3.5.2 Category C

Table 7: Essential habitat in Category C

No records

3.6 Land suitability

Land suitability mapping and information is required if you are applying to clear vegetation for high-value or irrigated high-value agriculture. Land suitability assessment addresses the capacity of land to sustain specific land uses such as cropping, irrigated agriculture and forestry.

A land suitability map for this property is provided in section 5.3. The map provides detailed land suitability, agricultural land classification, or soil and land resource mapping data where it is available.

The land suitability project that applies to this property is shown in Table 8 and Table 9.

Table 8: Land suitability project details for this property

Project name	Project code	Start date	Scale
Survey of the Isaac-Comet Area	ZDK3	2003-02-03 00:00:00	1000000

Table 9: Available land suitability project reports for this property

Project name	Availability of report
Survey of the Isaac-Comet Area	CSIRO report. Available at www.publications.qld.gov.au

3.7 Protected plants (administered by the Department of Environment and Science (DES))

In Queensland, all plants that are native to Australia are protected plants under the *Nature Conservation Act 1992* (NCA), with clearing of protected plants in the wild regulated by the Nature Conservation (Wildlife Management) Regulation 2006. These requirements apply irrespective of the classification of the vegetation under the *Vegetation Management Act 1999*.

Prior to clearing, if the plants proposed to be cleared are in the wild (see Operational policy: When a protected plant in Queensland is considered to be 'in the wild') and the exemptions under the Nature Conservation (Wildlife Management) Regulation 2006 are not applicable to the proposed clearing, you must check the flora survey trigger map to determine if any part of the area to be cleared is within a high risk area. The trigger map for this property is provided in section 5.5. The exemptions relate to:

- imminent risk of death or serious injury (refer s261A)
- imminent risk of serious damage to a building or other structure on land, or to personal property (refer s261B)
- *Fire and Emergency Service Act 1990* (refer 261C)
- previously cleared areas (refer s261ZB)
- maintenance activities (refer s261ZC)
- firebreak or fire management line (refer s261ZD)
- self-assessable vegetation clearing code (refer s261ZE)
- conservation purposes (refer s261ZG)
- authorised in particular circumstances (refer s385).

Some exemptions under the NCA are the same as exempt clearing work (formerly known as exemptions) from the *Vegetation Management Act 1999* (i.e. listed in the Planning Regulations 2017) while some are different.

If the proposed area to be cleared is shown as blue (i.e. high risk) on the flora survey trigger map, a flora survey of the clearing impact area must be undertaken in accordance with the flora survey guidelines. The main objective of a flora survey is to locate any endangered, vulnerable or near threatened plants (EVNT plants) that may be present in the clearing impact area.

If a flora survey identifies that EVNT plants are not present within the clearing impact area or clearing within 100m of EVNT plants can be avoided, the clearing activity is exempt from a permit. An exempt clearing notification form must be submitted to the Department of Environment and Science, with a copy of the flora survey report, at least one week prior to clearing. The clearing must be conducted within two years after the flora survey report was submitted.

If a flora survey identifies that EVNT plants are present in, or within 100m of, the ara to be cleared, a clearing permit is required before any clearing is undertaken. The flora survey report, as well as an impact management report, must be submitted with the application form clearing permit.

In an area other than a high risk area, a clearing permit is only required where a person is, or becomes aware that EVNT plants are present in, or within 100m of, the area to be cleared. You must keep a copy of the flora survey trigger map for the area subject to clearing for five years from the day the clearing starts. If you do not clear within the 12 month period that the flora survey trigger map was printed, you need to print and check a new flora survey trigger map.

Further information on protected plants is available at
http://www.ehp.qld.gov.au/licences-permits/plants-animals/protected-plants/

For assistance on the protected plants flora survey trigger map for this property, please contact the Department of Environment and Science at palm@ehp.qld.gov.au.

3.8 Emissions Reduction Fund (ERF)

The ERF is an Australian Government scheme which offers incentives for businesses and communities across the economy to reduce emissions.

Under the ERF, farmers can earn money from activities such as planting (and keeping) trees, managing regrowth vegetation and adopting more sustainable agricultural practices.

The purpose of a project is to remove greenhouse gases from the atmosphere. Each project will provide new economic opportunities for farmers, forest growers and land managers.

Further information on ERF is available at https://www.qld.gov.au/environment/land/state/use/carbon-rights/.

4. Contact information for DNRME

For further information on vegetation management:
Phone 135VEG (135 834)
Email vegetation@dnrme.qld.gov.au
Visit www.dnrme.qld.gov.au/our-department/contact-us/vegetation-contacts to submit an online enquiry.

For contact details for other State and Commonwealth agencies, please see the "Other relevant legislation contacts list" in Section 6.

5. Maps

The maps included in this report may also be requested individually at:

https://www.dnrme.qld.gov.au/qld/environment/land/vegetation/vegetation-map-request-form
and
http://www.ehp.qld.gov.au/licences-permits/plants-animals/protected-plants/map-request.php

Regulated vegetation management map

The regulated vegetation management map shows vegetation categories to determine clearing requirements. These maps are updated monthly to show new property maps of assessable vegetation (PMAV).

Vegetation management supporting map

The vegetation management supporting map provides information on regional ecosystems, wetlands, watercourses and essential habitat.

Land suitability map

The land suitability map assists with identifying the land suitability category under the high value and irrigated high value agriculture vegetation clearing purpose.

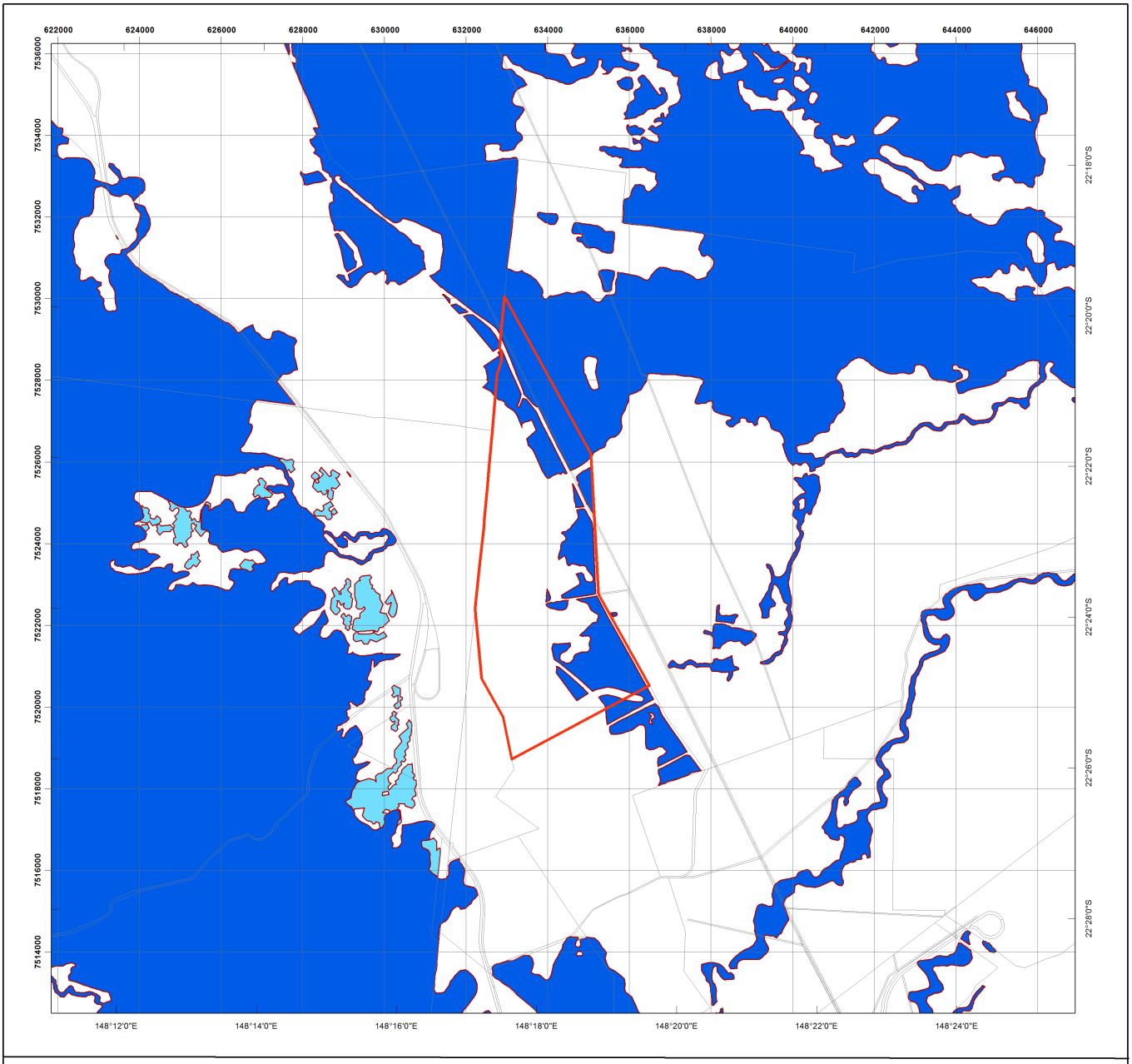
Coastal/non coastal map

The coastal/non-coastal map confirms whether the lot, or which parts of the lot, are considered coastal or non-coastal for the purposes of the self-assessable vegetation clearing codes and the State Development Assessment Provisions (SDAP).

Protected plants map

The protected plants map shows areas where particular provisions of the *Nature Conservation Act 1992* apply to the clearing of protected plants.

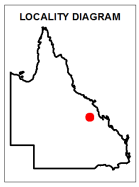
5.1 Regulated vegetation management map



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



N

0 1,300 2,600 3,900 5,200 6,500 m

This product is projected into:
GDA 1994 MGA Zone 55

Disclaimer:
While every care is taken to ensure the accuracy of this product, the Department of 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 incurr as a result of the product being inaccurate or incomplete in any way and for any reason.

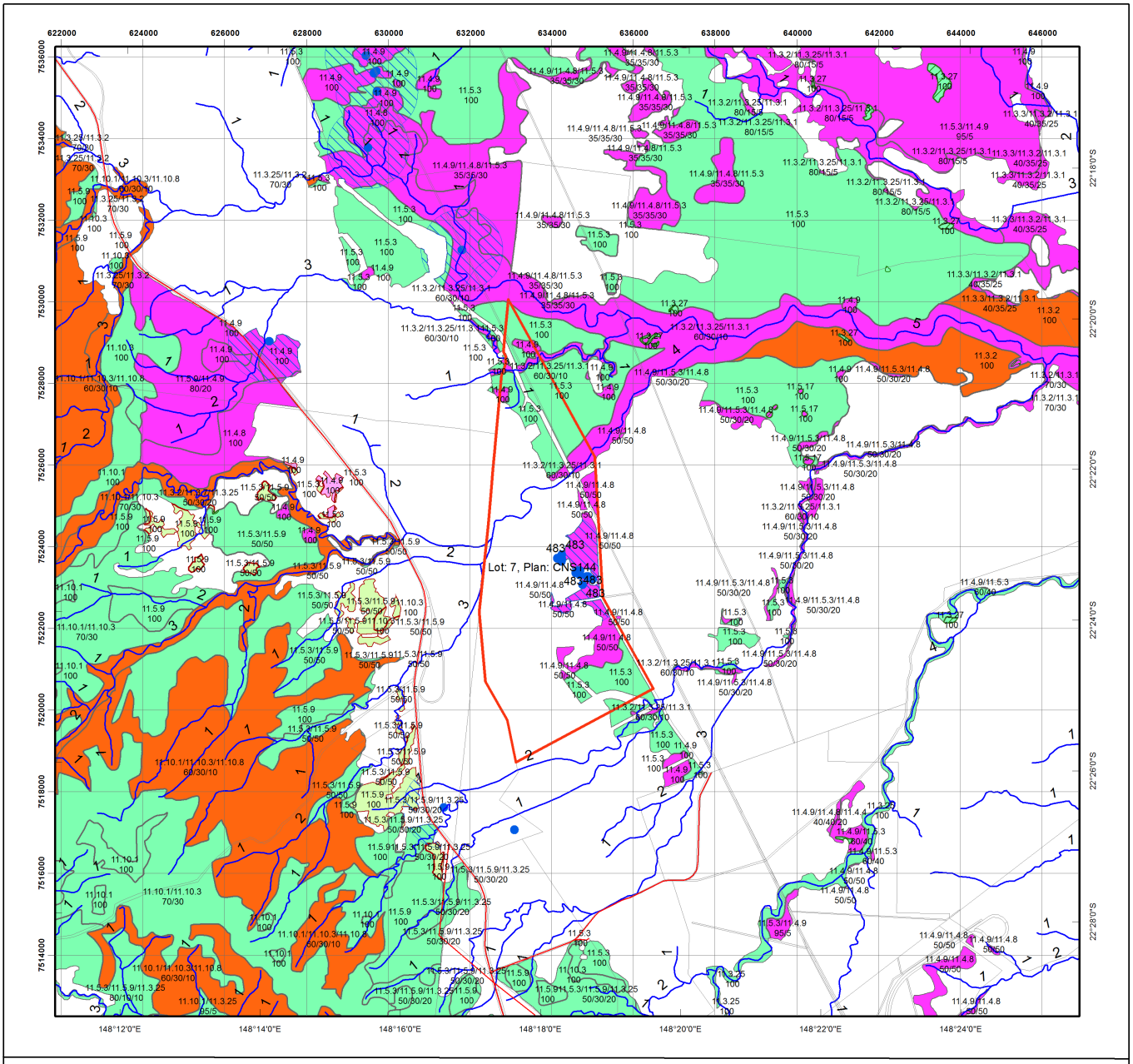
Additional information required for the assessment of vegetation values is provided in the accompanying "Vegetation Management Supporting map". For further information go to the web site: www.dnrme.qld.gov.au or contact the Department of Natural Resources, Mines and Energy.

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.

Queensland Government

5.2 Vegetation management supporting map



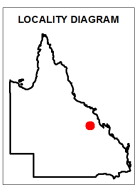
Vegetation Management Supporting Map

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 containing remnant vegetation
- 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 containing high value regrowth vegetation
- 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 are provided as a locational aid only

Queensland Government

LOCALITY DIAGRAM



N

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.

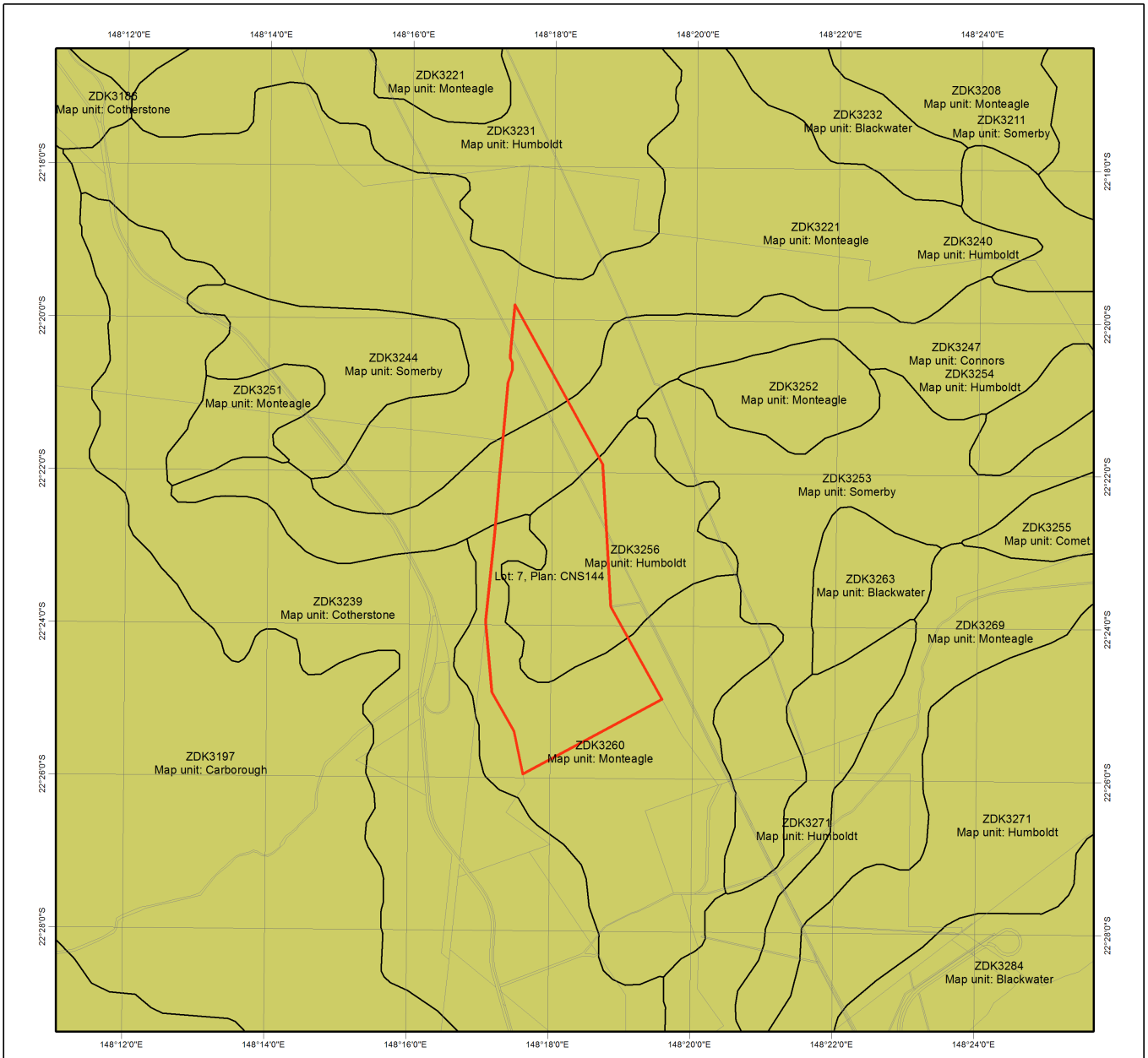
Regional ecosystem linework has been compiled at a scale of 1:100 000, except in designated areas where a compilation scale of 1:50 000 is available. Linework should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100 000 is +/- 100 metres.

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 incurr 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 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/

5.3 Land suitability map

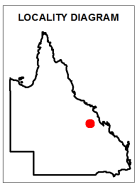


Land Suitability Overview Map

Legend

- Lot and Plan
- Cadastral Boundaries
- Land suitability mapping 1:100,000 scale or better (Category 2 or 3*)
- Land suitability mapping greater than 1:100,000 scale (Category 4)
- No mapping available (Category 4)

* Category 3 applies to applications where there is some land resource mapping or information available however it either does not cover the entire area, or the land suitability mapping and information does not identify the land as suitable for the proposed crop and management systems.



Important information

The Land Suitability Overview Map assists with identifying the Land Suitability category under the high value and irrigated high value agriculture vegetation clearing purpose. This map provides detailed land suitability, agricultural land classification, or soil and land resource mapping data where it is available on the selected lots. Where no data is available, the maps will be blank, with no mapping visible.

Further information on these categories is available in the Guideline for applying to clear for high-value or irrigated high-value agriculture (www.dnrme.qld.gov.au).

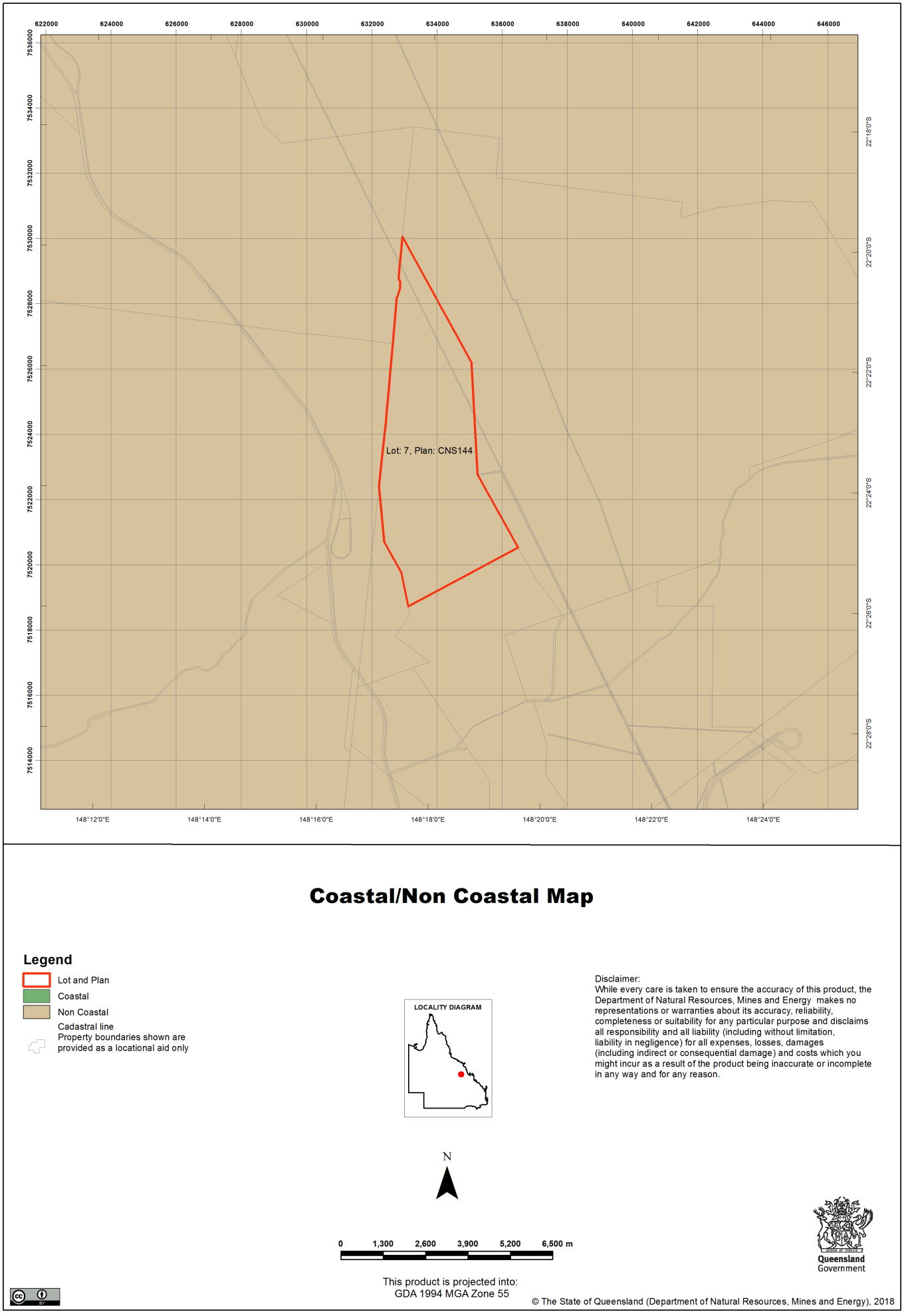
Disclaimer
All persons and organisations by using this map take all responsibility for assessing the relevance and accuracy of the map contents for their purpose and accept all risks associated with its use. The State of Queensland (as represented by the Department of Natural Resources, Mines and Energy) makes no representations or warranties in relation to the map contents, and, to the extent permitted by law, excludes or limits all warranties relating to correctness, accuracy, reliability, completeness or currency and all disclaims all liability for any direct, indirect and consequential costs, losses, damages and expenses incurred in any way (including but not limited to that arising from negligence) in connection with any use of or reliance on the map contents.

N

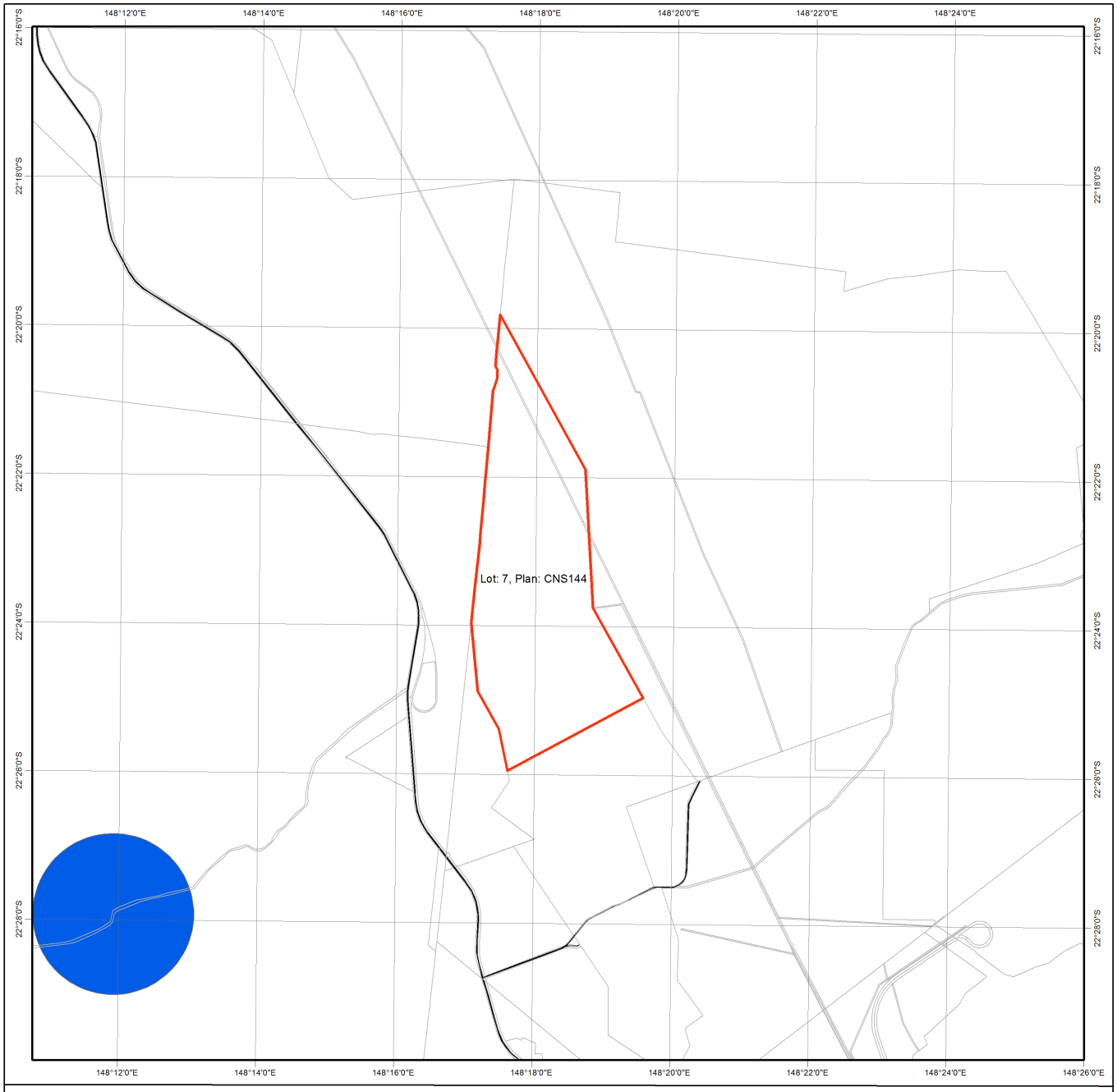
0 975 1,950 2,925 3,900 4,875 m

This product is projected into:
GDA 1994 MGA Zone 55

5.4 Coastal/non coastal map



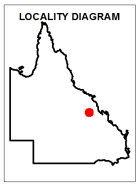
5.5 Protected plants map administered by DES



Protected Plants Flora Survey Trigger Map

Legend

- Lot and Plan
- High risk area
- Cadastral line
  Property boundaries shown are provided as a locational aid only
- Freeways / motorways / highways
- Secondary roads / streets



This map shows areas where particular provisions of the Nature Conservation Act 1992 apply to the clearing of protected plants.

This map is produced at a scale relevant to the size of the area selected and should be printed as A4 size in portrait orientation.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Science at palm@ehp.qld.gov.au

N

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

This product is projected into:
GDA 1994 MGA Zone 55

Disclaimer:
While every care is taken to ensure the accuracy of the data used to generate this product, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaim all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damages) and costs which might be incurred as a consequence of reliance on the data, or as a result of the data being inaccurate or incomplete in any way and for any reason.

6. Other relevant legislation contacts list

Activity	Legislation	Agency	Contact details
Interference with overland flow Earthworks, significant disturbance	*Water Act 2000* *Soil Conservation Act 1986*	Department of Natural Resources, Mines and Energy (Queensland Government)	Ph: 13 QGOV (13 74 68) www.dnrme.qld.gov.au
Indigenous Cultural Heritage	*Aboriginal Cultural Heritage Act 2003* *Torres Strait Islander Cultural Heritage Act 2003*	Department of Aboriginal and Torres Strait Islander Partnerships (Queensland Government)	Ph: 13 QGOV (13 74 68) www.datsip.qld.gov.au
Mining and environmentally relevant activities Infrastructure development (coastal) Heritage issues Protected plants and protected areas [1]	*Environmental Protection Act 1994* *Coastal Protection and Management Act 1995* *Queensland Heritage Act 1992* *Nature Conservation Act 1992*	Department of Environment and Science (Queensland Government)	Ph: 13 QGOV (13 74 68) www.ehp.qld.gov.au
Interference with fish passage in a watercourse, mangroves Forestry activities	*Fisheries Act 1994* *Forestry Act 1959* [2]	Department of Agriculture and Fisheries (Queensland Government)	Ph: 13 QGOV (13 74 68) www.daf.qld.gov.au
Matters of National Environmental Significance including listed threatened species and ecological communities	*Environment Protection and Biodiversity Conservation Act 1999*	Department of the Environment (Australian Government)	Ph: 1800 803 772 www.environment.gov.au
Development and planning processes	*Planning Act 2016*	Department of State Development, Manufacturing, Infrastructure and Planning (Queensland Government)	Ph: 13 QGOV (13 74 68) www.statedevelopment.qld.gov.au
State Development	*State Development and Public Works Organisation Act 1971*	Department of State Development, Manufacturing, Infrastructure and Planning (Queensland Government)	Ph: 13 QGOV (13 74 68) www.statedevelopment.qld.gov.au
Local government requirements	*Local Government Act 2009*	Local government	Contact your relevant local government office

1. In Queensland, all plants that are native to Australia are protected plants under the *Nature Conservation Act 1992*, which endeavours to ensure that protected plants (whether whole plants or protected plants parts) are not illegally removed from the wild, or illegally traded. Prior to clearing, you should check the flora survey trigger map to determine if the clearing is within a high-risk area by visiting www.ehp.qld.gov.au. For further information or assistance on the protected plants flora survey trigger map for your property, please contact the Department of Environment and Science on 13QGOV (13 74 68) or email palm@ehp.qld.gov.au.

2. Contact the Department of Agriculture and Fisheries before clearing:

- Any sandalwood on state-owned land (including leasehold land)
- On freehold land in a 'forest consent area'
- More than five hectares on state-owned land (including leasehold land) containing commercial timber species listed in parts 2 or 3 of Schedule 6 of the Vegetation Management Regulation 2012 and located within any of the following local government management areas-Banana, Bundaberg Regional, Fraser Coast Regional, Gladstone Regional, Isaac Regional, North Burnett Regional, Somerset Regional, South Burnett Regional, Southern Downs Regional, Tablelands Regional, Toowoomba Regional, Western Downs Regional.

Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Defined Area
Species: All
Type: All
Status: All
Records: All
Date: Since 1980
Latitude: 22.6227 to 22.2247
Longitude: 148.1710 to 148.5180
Email: sebastian.knight@aecom.com
Date submitted: Wednesday 14 Sep 2016 14:53:09
Date extracted: Wednesday 14 Sep 2016 15:00:06

The number of records retrieved = 412

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	*Rhinella marina*	cane toad	Y			2
animals	amphibians	Hylidae	*Litoria caerulea*	common green treefrog		C		3
animals	birds	Acanthizidae	*Smicrornis brevirostris*	weebill		C		5
animals	birds	Acanthizidae	*Acanthiza reguloides*	buff-rumped thornbill		C		1
animals	birds	Acanthizidae	*Gerygone olivacea*	white-throated gerygone		C		7
animals	birds	Accipitridae	*Circus assimilis*	spotted harrier		C		1
animals	birds	Accipitridae	*Haliaeetus leucogaster*	white-bellied sea-eagle		C		5
animals	birds	Accipitridae	*Aquila audax*	wedge-tailed eagle		C		5
animals	birds	Accipitridae	*Milvus migrans*	black kite		C		8
animals	birds	Accipitridae	*Accipiter cirrocephalus*	collared sparrowhawk		C		2
animals	birds	Accipitridae	*Elanus axillaris*	black-shouldered kite		C		2
animals	birds	Accipitridae	*Circus approximans*	swamp harrier		C		1
animals	birds	Accipitridae	*Lophoictinia isura*	square-tailed kite		C		1
animals	birds	Accipitridae	*Aviceda subcristata*	Pacific baza		C		3
animals	birds	Accipitridae	*Haliastur sphenurus*	whistling kite		C		13
animals	birds	Acrocephalidae	*Acrocephalus australis*	Australian reed-warbler		SL		7
animals	birds	Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar		C		3
animals	birds	Anatidae	*Dendrocygna eytoni*	plumed whistling-duck		C		4
animals	birds	Anatidae	*Nettapus coromandelianus*	cotton pygmy-goose		C		6
animals	birds	Anatidae	*Dendrocygna arcuata*	wandering whistling-duck		C		3
animals	birds	Anatidae	*Chenonetta jubata*	Australian wood duck		C		12
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		13
animals	birds	Anatidae	*Oxyura australis*	blue-billed duck		C		1
animals	birds	Anatidae	*Aythya australis*	hardhead		C		12
animals	birds	Anatidae	*Cygnus atratus*	black swan		C		8
animals	birds	Anatidae	*Anas gracilis*	grey teal		C		11
animals	birds	Anhingidae	*Anhinga novaehollandiae*	Australasian darter		C		11
animals	birds	Ardeidae	*Ardea pacifica*	white-necked heron		C		4
animals	birds	Ardeidae	*Ardea ibis*	cattle egret		SL		1
animals	birds	Ardeidae	*Ardea alba modesta*	eastern great egret		SL		11
animals	birds	Ardeidae	*Nycticorax caledonicus*	nankeen night-heron		C		2
animals	birds	Ardeidae	*Ardea intermedia*	intermediate egret		C		7
animals	birds	Ardeidae	*Egretta garzetta*	little egret		C		4
animals	birds	Ardeidae	*Egretta novaehollandiae*	white-faced heron		C		5
animals	birds	Artamidae	*Strepera graculina*	pied currawong		C		3
animals	birds	Artamidae	*Cracticus torquatus*	grey butcherbird		C		9
animals	birds	Artamidae	*Artamus leucorynchus*	white-breasted woodswallow		C		9
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		18
animals	birds	Artamidae	*Cracticus tibicen*	Australian magpie		C		21
animals	birds	Burhinidae	*Burhinus grallarius*	bush stone-curlew		C		2
animals	birds	Cacatuidae	*Eolophus roseicapillus*	galah		C		9
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		18
animals	birds	Campephagidae	*Lalage tricolor*	white-winged triller		C		1
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		14
animals	birds	Campephagidae	*Coracina tenuirostris*	cicadabird		C		1
animals	birds	Campephagidae	*Coracina papuensis*	white-bellied cuckoo-shrike		C		3

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Casuariidae	*Dromaius novaehollandiae*	emu		C		5
animals	birds	Charadriidae	*Vanellus miles miles*	masked lapwing (northern subspecies)		C		5
animals	birds	Charadriidae	*Vanellus miles*	masked lapwing		C		4
animals	birds	Charadriidae	*Elseyornis melanops*	black-fronted dotterel		C		5
animals	birds	Ciconiidae	*Ephippiorhynchus asiaticus*	black-necked stork		C		1
animals	birds	Cisticolidae	*Cisticola exilis*	golden-headed cisticola		C		8
animals	birds	Columbidae	*Geopelia cuneata*	diamond dove		C		1
animals	birds	Columbidae	*Geopelia striata*	peaceful dove		C		5
animals	birds	Columbidae	*Ocyphaps lophotes*	crested pigeon		C		12
animals	birds	Columbidae	*Phaps chalcoptera*	common bronzewing		C		5
animals	birds	Columbidae	*Geopelia humeralis*	bar-shouldered dove		C		6
animals	birds	Columbidae	*Geophaps scripta scripta*	squatter pigeon (southern subspecies)		V	V	3
animals	birds	Coraciidae	*Eurystomus orientalis*	dollarbird		C		9
animals	birds	Corcoracidae	*Struthidea cinerea*	apostlebird		C		12
animals	birds	Corvidae	*Corvus orru*	Torresian crow		C		30
animals	birds	Cuculidae	*Cacomantis pallidus*	pallid cuckoo		C		1
animals	birds	Cuculidae	*Chalcites basalis*	Horsfield's bronze-cuckoo		C		1
animals	birds	Cuculidae	*Eudynamys orientalis*	eastern koel		C		1
animals	birds	Cuculidae	*Scythrops novaehollandiae*	channel-billed cuckoo		C		2
animals	birds	Dicruridae	*Dicrurus bracteatus*	spangled drongo		C		3
animals	birds	Estrildidae	*Neochmia temporalis*	red-browed finch		C		1
animals	birds	Estrildidae	*Lonchura castaneothorax*	chestnut-breasted mannikin		C		3
animals	birds	Estrildidae	*Taeniopygia bichenovii*	double-barred finch		C		6
animals	birds	Falconidae	*Falco longipennis*	Australian hobby		C		3
animals	birds	Falconidae	*Falco cenchroides*	nankeen kestrel		C		9
animals	birds	Falconidae	*Falco berigora*	brown falcon		C		4
animals	birds	Gruidae	*Grus rubicunda*	brolga		C		2
animals	birds	Halcyonidae	*Todiramphus sanctus*	sacred kingfisher		C		3
animals	birds	Halcyonidae	*Todiramphus macleayii*	forest kingfisher		C		4
animals	birds	Halcyonidae	*Todiramphus pyrrhopygius*	red-backed kingfisher		C		1
animals	birds	Halcyonidae	*Dacelo leachii*	blue-winged kookaburra		C		5
animals	birds	Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra		C		11
animals	birds	Hirundinidae	*Petrochelidon ariel*	fairy martin		C		4
animals	birds	Hirundinidae	*Hirundo neoxena*	welcome swallow		C		5
animals	birds	Hirundinidae	*Petrochelidon nigricans*	tree martin		C		9
animals	birds	Jacanidae	*Irediparra gallinacea*	comb-crested jacana		C		1
animals	birds	Laridae	*Chroicocephalus novaehollandiae*	silver gull		C		2
animals	birds	Laridae	*Gelochelidon nilotica*	gull-billed tern		SL		1
animals	birds	Laridae	*Chlidonias hybrida*	whiskered tern		C		1
animals	birds	Maluridae	*Malurus lamberti*	variegated fairy-wren		C		3
animals	birds	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren		C		17
animals	birds	Megaluridae	*Megalurus timoriensis*	tawny grassbird		C		1
animals	birds	Megapodiidae	*Alectura lathami*	Australian brush-turkey		C		1
animals	birds	Meliphagidae	*Lichmera indistincta*	brown honeyeater		C		9
animals	birds	Meliphagidae	*Gavicalis virescens*	singing honeyeater		C		9
animals	birds	Meliphagidae	*Philemon corniculatus*	noisy friarbird		C		12

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Meliphagidae	*Melithreptus lunatus*	white-naped honeyeater		C		1
animals	birds	Meliphagidae	*Manorina flavigula*	yellow-throated miner		C		3
animals	birds	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater		C		16
animals	birds	Meliphagidae	*Caligavis chrysops*	yellow-faced honeyeater		C		1
animals	birds	Meliphagidae	*Myzomela obscura*	dusky honeyeater		C		1
animals	birds	Meliphagidae	*Manorina melanocephala*	noisy miner		C		9
animals	birds	Meliphagidae	*Philemon citreogularis*	little friarbird		C		8
animals	birds	Meliphagidae	*Acanthagenys rufogularis*	spiny-cheeked honeyeater		C		1
animals	birds	Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater		C		14
animals	birds	Meliphagidae	*Plectorhyncha lanceolata*	striped honeyeater		C		6
animals	birds	Meropidae	*Merops ornatus*	rainbow bee-eater		SL		8
animals	birds	Monarchidae	*Monarcha melanopsis*	black-faced monarch		SL		1
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		22
animals	birds	Monarchidae	*Myiagra rubecula*	leaden flycatcher		C		5
animals	birds	Monarchidae	*Myiagra inquieta*	restless flycatcher		C		2
animals	birds	Motacillidae	*Anthus novaeseelandiae*	Australasian pipit		C		4
animals	birds	Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird		C		3
animals	birds	Neosittidae	*Daphoenositta chrysoptera*	varied sittella		C		2
animals	birds	Oriolidae	*Oriolus sagittatus*	olive-backed oriole		C		1
animals	birds	Otididae	*Ardeotis australis*	Australian bustard		C		3
animals	birds	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush		C		4
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		6
animals	birds	Pachycephalidae	*Colluricincla megarhyncha*	little shrike-thrush		C		1
animals	birds	Pardalotidae	*Pardalotus striatus*	striated pardalote		C		17
animals	birds	Pelecanidae	*Pelecanus conspicillatus*	Australian pelican		C		8
animals	birds	Petroicidae	*Microeca fascinans*	jacky winter		C		2
animals	birds	Phalacrocoracidae	*Phalacrocorax varius*	pied cormorant		C		4
animals	birds	Phalacrocoracidae	*Phalacrocorax carbo*	great cormorant		C		1
animals	birds	Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant		C		11
animals	birds	Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant		C		10
animals	birds	Phasianidae	*Coturnix ypsilophora*	brown quail		C		3
animals	birds	Podargidae	*Podargus strigoides*	tawny frogmouth		C		3
animals	birds	Podicipedidae	*Podiceps cristatus*	great crested grebe		C		6
animals	birds	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe		C		11
animals	birds	Pomatostomidae	*Pomatostomus temporalis*	grey-crowned babbler		C		9
animals	birds	Psittacidae	*Trichoglossus haematodus moluccanus*	rainbow lorikeet		C		15
animals	birds	Psittacidae	*Trichoglossus chlorolepidotus*	scaly-breasted lorikeet		C		3
animals	birds	Psittacidae	*Aprosmictus erythropterus*	red-winged parrot		C		11
animals	birds	Psittacidae	*Platycercus adscitus*	pale-headed rosella		C		17
animals	birds	Ptilonorhynchidae	*Ptilonorhynchus maculatus*	spotted bowerbird		C		2
animals	birds	Rallidae	*Gallinula tenebrosa*	dusky moorhen		C		10
animals	birds	Rallidae	*Porzana fluminea*	Australian spotted crake		C		1
animals	birds	Rallidae	*Fulica atra*	Eurasian coot		C		8
animals	birds	Rallidae	*Porphyrio melanotus*	purple swamphen		C		10
animals	birds	Recurvirostridae	*Himantopus himantopus*	black-winged stilt		C		7
animals	birds	Rhipiduridae	*Rhipidura albiscapa*	grey fantail		C		4

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		14
animals	birds	Scolopacidae	*Tringa nebularia*	common greenshank		SL		1
animals	birds	Scolopacidae	*Tringa stagnatilis*	marsh sandpiper		SL		3
animals	birds	Scolopacidae	*Calidris acuminata*	sharp-tailed sandpiper		SL		1
animals	birds	Strigidae	*Ninox boobook*	southern boobook		C		8
animals	birds	Threskiornithidae	*Platalea flavipes*	yellow-billed spoonbill		C		4
animals	birds	Threskiornithidae	*Plegadis falcinellus*	glossy ibis		SL		1
animals	birds	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis		C		5
animals	birds	Threskiornithidae	*Threskiornis molucca*	Australian white ibis		C		5
animals	birds	Threskiornithidae	*Platalea regia*	royal spoonbill		C		8
animals	mammals	Emballonuridae	*Saccolaimus flaviventris*	yellow-bellied sheathtail bat		C		2
animals	mammals	Macropodidae	*Macropus dorsalis*	black-striped wallaby		C		1
animals	mammals	Muridae	*Hydromys chrysogaster*	water rat		C		1
animals	mammals	Petauridae	*Petaurus breviceps*	sugar glider		C		1
animals	mammals	Petauridae	*Petaurus sp.*					1
animals	mammals	Phascolarctidae	*Phascolarctos cinereus*	koala		V	V	6
animals	mammals	Pseudocheiridae	*Petauroides volans*	greater glider		C	V	3
animals	reptiles	Agamidae	*Diporiphora nobbi*	nobbi		C		1/1
animals	reptiles	Agamidae	*Diporiphora australis*	tommy roundhead		C		1/1
animals	reptiles	Boidae	*Antaresia maculosa*	spotted python		C		1
animals	reptiles	Diplodactylidae	*Oedura monilis*	ocellated velvet gecko		C		2/1
animals	reptiles	Elapidae	*Denisonia maculata*	ornamental snake		V	V	14
animals	reptiles	Gekkonidae	*Heteronotia binoei*	Bynoe's gecko		C		14/1
animals	reptiles	Gekkonidae	*Gehyra versicolor*			C		1
animals	reptiles	Gekkonidae	*Gehyra dubia*	dubious dtella		C		7/1
animals	reptiles	Pygopodidae	*Lialis burtonis*	Burton's legless lizard		C		1
animals	reptiles	Scincidae	*Morethia boulengeri*	south-eastern morethia skink		C		2
animals	reptiles	Scincidae	*Ctenotus taeniolatus*	copper-tailed skink		C		1
animals	reptiles	Scincidae	*Glaphyromorphus punctulatus*	fine-spotted mulch-skink		C		1/1
animals	reptiles	Scincidae	*Carlia pectoralis sensu lato*			C		8/1
animals	reptiles	Scincidae	*Lygisaurus foliorum*	tree-base litter-skink		C		4/1
animals	reptiles	Scincidae	*Carlia schmeltzii*	robust rainbow-skink		C		5/1
animals	reptiles	Scincidae	*Lerista fragilis*	eastern mulch slider		C		6/1
animals	reptiles	Scincidae	*Eulamprus sp.*					1
animals	reptiles	Scincidae	*Ctenotus spaldingi*	straight-browed ctenotus		C		2
fungi	sac fungi	Parmeliaceae	*Xanthoparmelia exuviata*			C		1/1
plants	ferns	Adiantaceae	*Cheilanthes sieberi subsp. sieberi*			C		3
plants	ferns	Marsileaceae	*Marsilea mutica*	shiny nardoo		C		1
plants	ferns	Marsileaceae	*Marsilea drummondii*	common nardoo		C		1
plants	higher dicots	Acanthaceae	*Brunoniella australis*	blue trumpet		C		2
plants	higher dicots	Acanthaceae	*Rostellularia adscendens*			C		1
plants	higher dicots	Acanthaceae	*Rostellularia adscendens var. clementii*			C		1/1
plants	higher dicots	Amaranthaceae	*Deeringia amaranthoides*	redberry		C		1/1
plants	higher dicots	Amaranthaceae	*Alternanthera denticulata var. micrantha*			C		3
plants	higher dicots	Amaranthaceae	*Achyranthes aspera*			C		1
plants	higher dicots	Amaranthaceae	*Alternanthera*			C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Apocynaceae	*Parsonsia eucalyptophylla*	gargaloo		C		1
plants	higher dicots	Apocynaceae	*Marsdenia viridiflora subsp. viridiflora*			C		1/1
plants	higher dicots	Apocynaceae	*Marsdenia viridiflora*			C		1
plants	higher dicots	Apocynaceae	*Alstonia constricta*	bitterbark		C		1
plants	higher dicots	Apocynaceae	*Cerbera dumicola*			NT		1/1
plants	higher dicots	Apocynaceae	*Carissa ovata*	currantbush		C		2
plants	higher dicots	Asteraceae	*Bidens pilosa*		Y			1
plants	higher dicots	Asteraceae	*Blumea mollis*			C		2/2
plants	higher dicots	Asteraceae	*Eclipta prostrata*	white eclipta	Y			1/1
plants	higher dicots	Asteraceae	*Olearia xerophila*			C		1
plants	higher dicots	Asteraceae	*Tridax procumbens*	tridax daisy	Y			2/1
plants	higher dicots	Asteraceae	*Emilia sonchifolia*		Y			2
plants	higher dicots	Asteraceae	*Praxelis clematidea*		Y			1/1
plants	higher dicots	Asteraceae	*Rutidosis leucantha*			C		1/1
plants	higher dicots	Asteraceae	*Peripleura hispidula*			C		1
plants	higher dicots	Asteraceae	*Pterocaulon redolens*			C		2
plants	higher dicots	Asteraceae	*Cyanthillium cinereum*			C		1
plants	higher dicots	Asteraceae	*Euchiton involucratus*			C		1
plants	higher dicots	Asteraceae	*Parthenium hysterophorus*	parthenium weed	Y			4/1
plants	higher dicots	Asteraceae	*Apowollastonia spilanthoides*			C		3/1
plants	higher dicots	Bignoniaceae	*Pandorea pandorana*	wonga vine		C		1
plants	higher dicots	Boraginaceae	*Ehretia membranifolia*	weeping koda		C		1
plants	higher dicots	Cactaceae	*Opuntia tomentosa*	velvety tree pear	Y			6
plants	higher dicots	Cactaceae	*Opuntia stricta*		Y			1
plants	higher dicots	Cactaceae	*Harrisia martinii*		Y			4
plants	higher dicots	Cactaceae	*Opuntia*			C		1
plants	higher dicots	Caesalpiniaceae	*Chamaecrista absus var. absus*			C		1/1
plants	higher dicots	Caesalpiniaceae	*Cassia brewsteri*			C		4
plants	higher dicots	Caesalpiniaceae	*Lysiphyllum*			C		1
plants	higher dicots	Caesalpiniaceae	*Senna*			C		1
plants	higher dicots	Campanulaceae	*Wahlenbergia gracilis*	sprawling bluebell		C		3
plants	higher dicots	Capparaceae	*Apophyllum anomalum*	broom bush		C		2
plants	higher dicots	Capparaceae	*Capparis lasiantha*	nipan		C		3
plants	higher dicots	Capparaceae	*Capparis canescens*			C		3
plants	higher dicots	Capparaceae	*Capparis*			C		1
plants	higher dicots	Capparaceae	*Capparis umbonata*			C		1/1
plants	higher dicots	Caryophyllaceae	*Polycarpaea corymbosa*			C		1/1
plants	higher dicots	Casuarinaceae	*Allocasuarina luehmannii*	bull oak		C		1
plants	higher dicots	Celastraceae	*Denhamia disperma*			C		3
plants	higher dicots	Chenopodiaceae	*Einadia nutans subsp. linifolia*			C		1/1
plants	higher dicots	Chenopodiaceae	*Sclerolaena*			C		1
plants	higher dicots	Chenopodiaceae	*Enchylaena tomentosa*			C		2
plants	higher dicots	Chenopodiaceae	*Maireana microphylla*			C		1
plants	higher dicots	Chenopodiaceae	*Maireana*			C		1
plants	higher dicots	Clusiaceae	*Hypericum gramineum*			C		1/1
plants	higher dicots	Convolvulaceae	*Evolvulus alsinoides*			C		3

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Convolvulaceae	*Ipomoea brownii*			C		1/1
plants	higher dicots	Cucurbitaceae	*Cucumis argenteus*			C		1/1
plants	higher dicots	Erythroxylaceae	*Erythroxylum australe*	cocaine tree		C		6
plants	higher dicots	Euphorbiaceae	*Euphorbia*			C		1
plants	higher dicots	Euphorbiaceae	*Euphorbia tannensis subsp. eremophila*			C		1
plants	higher dicots	Fabaceae	*Zornia*			C		1
plants	higher dicots	Fabaceae	*Crotalaria mitchellii subsp. mitchellii*			C		1
plants	higher dicots	Fabaceae	*Glycine tabacina*	glycine pea		C		3
plants	higher dicots	Fabaceae	*Lablab purpureus*	lablab	Y			1/1
plants	higher dicots	Fabaceae	*Canavalia papuana*	wild jack bean		C		1/1
plants	higher dicots	Fabaceae	*Rhynchosia minima*			C		4
plants	higher dicots	Fabaceae	*Indigofera hirsuta*	hairy indigo		C		1/1
plants	higher dicots	Fabaceae	*Sesbania cannabina*			C		1
plants	higher dicots	Fabaceae	*Zornia muelleriana*			C		1
plants	higher dicots	Fabaceae	*Aeschynomene indica*	budda pea		C		1
plants	higher dicots	Fabaceae	*Galactia tenuiflora*			C		1
plants	higher dicots	Fabaceae	*Stylosanthes hamata*		Y			4
plants	higher dicots	Fabaceae	*Alysicarpus muelleri*			C		1/1
plants	higher dicots	Fabaceae	*Indigofera linifolia*			C		3
plants	higher dicots	Fabaceae	*Tephrosia flagellaris*			C		1/1
plants	higher dicots	Fabaceae	*Crotalaria dissitiflora*			C		1
plants	higher dicots	Fabaceae	*Galactia tenuiflora var. lucida*			C		1/1
plants	higher dicots	Fabaceae	*Desmodium*			C		1
plants	higher dicots	Goodeniaceae	*Goodenia*			C		1
plants	higher dicots	Goodeniaceae	*Goodenia sp. (Mt Castletower M.D.Crisp 2753)*			C		1/1
plants	higher dicots	Goodeniaceae	*Goodenia rotundifolia*			C		1
plants	higher dicots	Lamiaceae	*Plectranthus*			C		1
plants	higher dicots	Lamiaceae	*Clerodendrum*			C		1
plants	higher dicots	Lamiaceae	*Clerodendrum floribundum*			C		1
plants	higher dicots	Lamiaceae	*Ocimum caryophyllinum*			C		1/1
plants	higher dicots	Lamiaceae	*Basilicum polystachyon*			C		2
plants	higher dicots	Loganiaceae	*Mitrasacme pygmaea*			C		1/1
plants	higher dicots	Malvaceae	*Sida*			C		6
plants	higher dicots	Malvaceae	*Sida spinosa*	spiny sida	Y			1/1
plants	higher dicots	Malvaceae	*Sida corrugata*			C		1/1
plants	higher dicots	Malvaceae	*Sida cordifolia*		Y			1
plants	higher dicots	Malvaceae	*Sida hackettiana*			C		2
plants	higher dicots	Malvaceae	*Gossypium australe*			C		1/1
plants	higher dicots	Malvaceae	*Hibiscus vitifolius*			C		1/1
plants	higher dicots	Malvaceae	*Hibiscus meraukensis*	Merauke hibiscus		C		1
plants	higher dicots	Malvaceae	*Malvastrum americanum*		Y			2
plants	higher dicots	Meliaceae	*Owenia acidula*	emu apple		C		1
plants	higher dicots	Mimosaceae	*Acacia leiocalyx*			C		1
plants	higher dicots	Mimosaceae	*Acacia flavescens*	toothed wattle		C		4
plants	higher dicots	Mimosaceae	*Acacia rhodoxylon*	ringy rosewood		C		18
plants	higher dicots	Mimosaceae	*Albizia canescens*			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Mimosaceae	*Acacia burdekensis*			C		6/1
plants	higher dicots	Mimosaceae	*Acacia harpophylla*	brigalow		C		3
plants	higher dicots	Mimosaceae	*Acacia dietrichiana*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia bancroftiorum*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia julifera subsp. curvinervia*			C		2/2
plants	higher dicots	Mimosaceae	*Acacia cowleana*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia salicina*	doolan		C		3
plants	higher dicots	Mimosaceae	*Acacia shirleyi*	lancewood		C		42/1
plants	higher dicots	Myrtaceae	*Eucalyptus orgadophila*	mountain coolibah		C		1
plants	higher dicots	Myrtaceae	*Eucalyptus populnea*	poplar box		C		3
plants	higher dicots	Myrtaceae	*Eucalyptus*			C		2
plants	higher dicots	Myrtaceae	*Myrtaceae*			C		2
plants	higher dicots	Myrtaceae	*Melaleuca*			C		1
plants	higher dicots	Myrtaceae	*Corymbia*			C		1
plants	higher dicots	Myrtaceae	*Eucalyptus tereticornis subsp. tereticornis*			C		11
plants	higher dicots	Myrtaceae	*Eucalyptus crebra*	narrow-leaved red ironbark		C		8
plants	higher dicots	Myrtaceae	*Corymbia dallachiana*			C		2
plants	higher dicots	Myrtaceae	*Melaleuca viridiflora var. viridiflora*			C		1/1
plants	higher dicots	Myrtaceae	*Corymbia citriodora subsp. citriodora*			C		34
plants	higher dicots	Myrtaceae	*Corymbia tessellaris*	Moreton Bay ash		C		4
plants	higher dicots	Myrtaceae	*Corymbia clarksoniana*			C		25/1
plants	higher dicots	Myrtaceae	*Eucalyptus apothalassica*			C		4
plants	higher dicots	Nyctaginaceae	*Boerhavia*			C		1
plants	higher dicots	Oxalidaceae	*Oxalis*			C		2
plants	higher dicots	Phyllanthaceae	*Notoleptopus decaisnei*			C		1/1
plants	higher dicots	Phyllanthaceae	*Phyllanthus virgatus*			C		2
plants	higher dicots	Phyllanthaceae	*Breynia oblongifolia*			C		1
plants	higher dicots	Picrodendraceae	*Petalostigma pubescens*	quinine tree		C		6
plants	higher dicots	Pittosporaceae	*Bursaria spinosa subsp. spinosa*			C		1
plants	higher dicots	Portulacaceae	*Portulaca pilosa*		Y			2
plants	higher dicots	Portulacaceae	*Portulaca*			C		1/1
plants	higher dicots	Proteaceae	*Grevillea parallela*			C		2/1
plants	higher dicots	Proteaceae	*Grevillea*			C		1
plants	higher dicots	Proteaceae	*Persoonia falcata*			C		5
plants	higher dicots	Proteaceae	*Persoonia amaliae*			C		2/1
plants	higher dicots	Proteaceae	*Hakea lorea*			C		1
plants	higher dicots	Putranjivaceae	*Drypetes deplanchei*	grey boxwood		C		1
plants	higher dicots	Rhamnaceae	*Alphitonia excelsa*	soap tree		C		4
plants	higher dicots	Rubiaceae	*Pavetta australiensis var. australiensis*			C		1/1
plants	higher dicots	Rubiaceae	*Coelospermum reticulatum*			C		1/1
plants	higher dicots	Rubiaceae	*Spermacoce multicaulis*			C		1
plants	higher dicots	Rubiaceae	*Spermacoce brachystema*			C		1
plants	higher dicots	Rubiaceae	*Larsenaikia ochreata*			C		2
plants	higher dicots	Rubiaceae	*Psydrax oleifolia*			C		1
plants	higher dicots	Rubiaceae	*Pavetta granitica*			C		1/1
plants	higher dicots	Sapindaceae	*Alectryon diversifolius*	scrub boonaree		C		2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Scrophulariaceae	*Eremophila maculata*			C		2
plants	higher dicots	Solanaceae	*Solanum seaforthianum*	Brazilian nightshade	Y			1/1
plants	higher dicots	Sparrmanniaceae	*Grewia retusifolia*			C		3/1
plants	higher dicots	Stylidiaceae	*Stylidium eglandulosum*			C		1/1
plants	higher dicots	Thymelaeaceae	*Wikstroemia indica*	tie bush		C		1
plants	higher dicots	Violaceae	*Hybanthus enneaspermus*			C		2
plants	higher dicots	Vitaceae	*Cissus cardiophylla*			C		1/1
plants	lower dicots	Lauraceae	*Cassytha pubescens*	downy devil's twine		C		1
plants	lower dicots	Menispermaceae	*Tinospora smilacina*	snakevine		C		2
plants	monocots	Commelinaceae	*Murdannia graminea*	murdannia		C		1/1
plants	monocots	Cyperaceae	*Cyperus gilesii*			C		1
plants	monocots	Cyperaceae	*Cyperus concinnus*			C		1
plants	monocots	Cyperaceae	*Cyperus exaltatus*	tall flatsedge		C		2
plants	monocots	Cyperaceae	*Scleria sphacelata*			C		1
plants	monocots	Cyperaceae	*Cyperus isabellinus*			C		1/1
plants	monocots	Cyperaceae	*Cyperus alopecuroides*			C		1/1
plants	monocots	Cyperaceae	*Eleocharis philippinensis*			C		1/1
plants	monocots	Cyperaceae	*Schoenoplectiella dissachantha*			C		2
plants	monocots	Cyperaceae	*Cyperus*			C		1
plants	monocots	Cyperaceae	*Gahnia aspera*			C		1
plants	monocots	Hemerocallidaceae	*Dianella nervosa*			C		1
plants	monocots	Hemerocallidaceae	*Dianella*			C		1
plants	monocots	Laxmanniaceae	*Laxmannia gracilis*	slender wire lily		C		1
plants	monocots	Laxmanniaceae	*Lomandra filiformis*			C		1
plants	monocots	Laxmanniaceae	*Eustrephus latifolius*	wombat berry		C		1
plants	monocots	Laxmanniaceae	*Lomandra confertifolia subsp. pallida*			C		1
plants	monocots	Orchidaceae	*Cymbidium canaliculatum*			C		1
plants	monocots	Poaceae	*Aristida jerichoensis var. subspinulifera*			C		1/1
plants	monocots	Poaceae	*Poaceae*			C		2
plants	monocots	Poaceae	*Aristida*			C		3
plants	monocots	Poaceae	*Eragrostis*			C		2
plants	monocots	Poaceae	*Bothriochloa*			C		1
plants	monocots	Poaceae	*Perotis rara*	comet grass		C		1
plants	monocots	Poaceae	*Eriachne rara*			C		1/1
plants	monocots	Poaceae	*Eulalia aurea*	silky browntop		C		1
plants	monocots	Poaceae	*Melinis repens*	red natal grass	Y			2
plants	monocots	Poaceae	*Aristida ramosa*	purple wiregrass		C		3/1
plants	monocots	Poaceae	*Chloris inflata*	purpletop chloris	Y			1
plants	monocots	Poaceae	*Chloris virgata*	feathertop rhodes grass	Y			1
plants	monocots	Poaceae	*Panicum effusum*			C		2
plants	monocots	Poaceae	*Setaria surgens*			C		1
plants	monocots	Poaceae	*Aristida lignosa*			C		1/1
plants	monocots	Poaceae	*Chloris truncata*			C		2
plants	monocots	Poaceae	*Digitaria orbata*			C		1
plants	monocots	Poaceae	*Dinebra ligulata*			C		1/1
plants	monocots	Poaceae	*Themeda triandra*	kangaroo grass		C		6

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Poaceae	*Cenchrus ciliaris*		Y			6
plants	monocots	Poaceae	*Entolasia stricta*	wiry panic		C		2
plants	monocots	Poaceae	*Eriochloa procera*	slender cupgrass		C		2
plants	monocots	Poaceae	*Phalaris paradoxa*	paradoxa grass	Y			1/1
plants	monocots	Poaceae	*Sporobolus caroli*	fairy grass		C		1
plants	monocots	Poaceae	*Urochloa piligera*			C		1
plants	monocots	Poaceae	*Aristida benthamii*			C		1
plants	monocots	Poaceae	*Astrebla squarrosa*	bull mitchell grass		C		1
plants	monocots	Poaceae	*Chrysopogon fallax*			C		1
plants	monocots	Poaceae	*Digitaria bicornis*			C		1
plants	monocots	Poaceae	*Eragrostis brownii*	Brown's lovegrass		C		2
plants	monocots	Poaceae	*Eragrostis sororia*			C		2
plants	monocots	Poaceae	*Cymbopogon ambiguus*	lemon grass		C		2
plants	monocots	Poaceae	*Digitaria ammophila*	silky umbrella grass		C		5/1
plants	monocots	Poaceae	*Enteropogon ramosus*			C		1/1
plants	monocots	Poaceae	*Eragrostis speciosa*			C		1/1
plants	monocots	Poaceae	*Paspalidium gracile*	slender panic		C		2
plants	monocots	Poaceae	*Sporobolus sessilis*			C		1/1
plants	monocots	Poaceae	*Bothriochloa pertusa*		Y			3
plants	monocots	Poaceae	*Cymbopogon refractus*	barbed-wire grass		C		3/1
plants	monocots	Poaceae	*Dichanthium sericeum*			C		1
plants	monocots	Poaceae	*Enneapogon truncatus*			C		1/1
plants	monocots	Poaceae	*Eragrostis tenellula*	delicate lovegrass		C		2
plants	monocots	Poaceae	*Cymbopogon bombycinus*	silky oilgrass		C		1
plants	monocots	Poaceae	*Digitaria breviglumis*			C		1
plants	monocots	Poaceae	*Elytrophorus spicatus*			C		1
plants	monocots	Poaceae	*Eragrostis parviflora*	weeping lovegrass		C		2
plants	monocots	Poaceae	*Eremochloa bimaculata*	poverty grass		C		1
plants	monocots	Poaceae	*Heteropogon contortus*	black speargrass		C		4
plants	monocots	Poaceae	*Sporobolus natalensis*		Y			1/1
plants	monocots	Poaceae	*Alloteropsis semialata*	cockatoo grass		C		1
plants	monocots	Poaceae	*Aristida queenslandica*			C		1
plants	monocots	Poaceae	*Enneapogon polyphyllus*	leafy nineawn		C		1/1
plants	monocots	Poaceae	*Panicum queenslandicum*			C		1
plants	monocots	Poaceae	*Paspalidium criniforme*			C		1
plants	monocots	Poaceae	*Paspalidium globoideum*	sago grass		C		1/1
plants	monocots	Poaceae	*Eragrostis leptostachya*			C		1
plants	monocots	Poaceae	*Walwhalleya subxerophila*			C		1/1
plants	monocots	Poaceae	*Cymbopogon queenslandicus*			C		1
plants	monocots	Poaceae	*Hyparrhenia rufa subsp. rufa*		Y			2/2
plants	monocots	Poaceae	*Chloris divaricata var. divaricata*	slender chloris		C		1
plants	monocots	Poaceae	*Aristida queenslandica var. dissimilis*			C		1
plants	monocots	Poaceae	*Panicum queenslandicum var. acuminatum*			C		1/1
plants	monocots	Pontederiaceae	*Monochoria cyanea*			C		2

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

Flora Species List

Family	Genus	Species
Mimosaceae	Acacia	*Acacia angusta*
Mimosaceae	Acacia	*Acacia argyrodendron*
Mimosaceae	Acacia	*Acacia catenulata*
Mimosaceae	Acacia	*Acacia decora*
Mimosaceae	Acacia	*Acacia excelsa*
Mimosaceae	Acacia	*Acacia harpophylla*
Mimosaceae	Acacia	*Acacia holosericea*
Mimosaceae	Acacia	*Acacia leiocalyx*
Mimosaceae	Acacia	*Acacia nilotica**
Mimosaceae	Acacia	*Acacia pendula*
Mimosaceae	Acacia	*Acacia salicina*
Mimosaceae	Acacia	*Acacia shirleyi*
Mimosaceae	Acacia	*Acacia victoriae*
Cactaceae	Acanthocerus	*Acanthocerus pentagonus**
Amaranthaceae	Achyranthes	*Achyranthes aspera*
Fabaceae	Aeschynomene	*Aeschynomene indica*
Sapindaceae	Alectryon	*Alectryon diversifolius*
Sapindaceae	Alectryon	*Alectryon oleifolius*
Sapindaceae	Alectryon	*Alectryon pubescens*
Casuarinaceae	Allocasuarina	*Allocasuarina luehmannii*
Poaceae	Alloteropsis	*Alloteropsis semialata*
Rhamnaceae	Alphitonia	*Alphitonia excelsa*
Apocynaceae	Alstonia	*Alstonia constricta*
Amaranthaceae	Alternanthera	*Alternanthera denticulata*
Amaranthaceae	Alternanthera	*Alternanthera nana*
Lythraceae	Ammannia	*Ammannia multiflora*
Loranthaceae	Amyema	*Amyema quandang*
Poaceae	Ancistrachne	*Ancistrachne uncinata*
Capparaceae	Apophyllum	*Apophyllum anomalum*
#N/A	Aquatic	*Aquatic grass*
Mimosaceae	Archidendropsis	*Archidendropsis basaltica*
Papaveraceae	Argemone	*Argemone ochroleuca**
Poaceae	Aristida	*Aristida benthamii*
Poaceae	Aristida	*Aristida calycina*
Poaceae	Aristida	*Aristida latifolia*
Poaceae	Aristida	*Aristida leptopoda*
Poaceae	Aristida	*Aristida personata*
Aristolochiaceae	Aristolochia	*Aristolochia meridionalis ssp. centralis*
Apocynaceae	Asclepias	*Asclepias curassavica**
Poaceae	Astrebla	*Astrebla elymoides*
Poaceae	Astrebla	*Astrebla pectinata*
Poaceae	Astrebla	*Astrebla squarrosa*
Sapindaceae	Atalaya	*Atalaya hemiglauca*
Chenopodiaceae	Atriplex	*Atriplex muelleri*
Pittosporaceae	Auranticarpa	*Auranticarpa rhombifolia*
Asteraceae	Bidens	*Bidens pilosa*
Nyctaginaceae	Boerhavia	*Boerhavia dominii*
Nyctaginaceae	Boerhavia	*Boerhavia pubescens*
Poaceae	Bothriochloa	*Bothriochloa bladhii*
Poaceae	Bothriochloa	*Bothriochloa decipiens*
Poaceae	Bothriochloa	*Bothriochloa erianthoides*
Poaceae	Bothriochloa	*Bothriochloa ewartiana*
Poaceae	Bothriochloa	*Bothriochloa pertusa**
Sterculiaceae	Brachychiton	*Brachychiton populneus*
Sterculiaceae	Brachychiton	*Brachychiton rupestris*
Phyllanthaceae	Breynia	*Breynia oblongifolia*
Acanthaceae	Brunoniella	*Brunoniella australis*
Asteraceae	Calotis	*Calotis cuneata*
Asteraceae	Calotis	*Calotis scabiosifolia*
Capparaceae	Capparis	*Capparis canescens*
Capparaceae	Capparis	*Capparis lasiantha*
Capparaceae	Capparis	*Capparis loranthifolia*
Capparaceae	Capparis	*Capparis mitchellii*
Capparaceae	Capparis	*Capparis sarmentosa*
Apocynaceae	Carissa	*Carissa lanceolata*
Apocynaceae	Carissa	*Carissa ovata*
Caesalpiniaceae	Cassia	*Cassia brewsteri var. brewsteri*
Casuarinaceae	Casuarina	*Casuarina cristata*
Casuarinaceae	Casuarina	*Casuarina cunninghamiana*
Casuarinaceae	Casuarina	*Casuarina cunninghamiana*
Poaceae	Cenchrus	*Cenchrus ciliaris**
Asteraceae	Centipeda	*Centipeda minima*
Caesalpiniaceae	Chamaecrista	*Chamaecrista mimosoides*
Euphorbiaceae	Chamaesyce	*Chamaesyce dallachyana*

Poaceae	Chloris	*Chloris divaricata*
Poaceae	Chloris	*Chloris gayana**
Poaceae	Chloris	*Chloris inflata*
Poaceae	Chloris	*Chloris truncata*
Poaceae	Chloris	*Chloris ventricosa*
Poaceae	Chloris	*Chloris virgata**
Asteraceae	Chrysocephalum	*Chrysocephalum apiculatum*
Poaceae	Chrysopogon	*Chrysopogon filipes*
Asteraceae	Cirsium	*Cirsium vulgare**
Rutaceae	Citrus	*Citrus glauca*
Vitaceae	Clematicissus	*Clematicissus opaca*
Lamiaceae	Clerodendrum	*Clerodendrum floribundum*
Commelinaceae	Commelina	*Commelina ensifolia*
Convolvulaceae	Convolvulus	*Convolvulus sp.*
Myrtaceae	Corymbia	*Corymbia clarksoniana*
Myrtaceae	Corymbia	*Corymbia dallachyana*
Myrtaceae	Corymbia	*Corymbia erythrophloia*
Myrtaceae	Corymbia	*Corymbia tessellaris*
Amaryllidaceae	Crinum	*Crinum flaccidum*
Fabaceae	Crotalaria	*Crotalaria mitchellii*
Fabaceae	Crotalaria	*Crotalaria novae-hollandiae*
Fabaceae	Crotolaria	*Crotolaria sp.*
Asteraceae	Cyanthillium	*Cyanthillium cinereum*
Orchidaceae	Cymbidium	*Cymbidium canaliculatum*
Poaceae	Cymbopogon	*Cymbopogon obtectus*
Poaceae	Cymbopogon	*Cymbopogon refractus*
Poaceae	Cynodon	*Cynodon dactylon**
Cyperaceae	Cyperus	*Cyperus bifax*
Cyperaceae	Cyperus	*Cyperus difformis**
Cyperaceae	Cyperus	*Cyperus exaltatus*
Cyperaceae	Cyperus	*Cyperus fulvus*
Cyperaceae	Cyperus	*Cyperus gracilis*
Cyperaceae	Cyperus	*Cyperus javanicus*
Cyperaceae	Cyperus	*Cyperus nutans*
Cyperaceae	Cyperus	*Cyperus polystachyos*
Cyperaceae	Cyperus	*Cyperus rotundus**
Cyperaceae	Cyperus	*Cyperus sp.*
Poaceae	Dactyloctenium	*Dactyloctenium radulans*
Loranthaceae	Dendrophthoe	*Dendrophthoe glabrescens*
Celastraceae	Denhamia	*Denhamia cunninghamii*
Celastraceae	Denhamia	*Denhamia oleaster*
Fabaceae	Desmodium	*Desmodium macrocarpum*
Hemerocallidaceae	Dianella	*Dianella longifolia*
Hemerocallidaceae	Dianella	*Dianella sp.*
Poaceae	Dichanthium	*Dichanthium sericeum*
Poaceae	Dichanthium	*Dichanthium setosum*
Poaceae	Digitaria	*Digitaria breviglumis*
Poaceae	Digitaria	*Digitaria brownii*
Poaceae	Digitaria	*Digitaria didactyla*
Poaceae	Digitaria	*Digitaria sp.*
Ebenaceae	Diospyros	*Diospyros humilis*
Acanthaceae	Dipteracanthus	*Dipteracanthus australasicus ssp. corynothecus*
Sapindaceae	Dodonaea	*Dodonaea viscosa*
Poaceae	Echinochloa	*Echinochloa colona*
Boraginaceae	Ehretia	*Ehretia membranifolia*
Chenopodiaceae	Einadia	*Einadia hastata*
Celastraceae	Elaeodendron	*Elaeodendron australe var. integrifolium*
Poaceae	Eleusine	*Eleusine indica**
Chenopodiaceae	Enchylaena	*Enchylaena tomentosa*
Poaceae	Enneapogon	*Enneapogon virens*
Poaceae	Eragrostis	*Eragrostis elongata*
Poaceae	Eragrostis	*Eragrostis lovegrass*
Poaceae	Eragrostis	*Eragrostis sororia*
Scrophulariaceae	Eremophila	*Eremophila bignoniiflora*
Scrophulariaceae	Eremophila	*Eremophila debilis*
Scrophulariaceae	Eremophila	*Eremophila deserti*
Scrophulariaceae	Eremophila	*Eremophila maculata*
Scrophulariaceae	Eremophila	*Eremophila mitchellii*
Cactaceae	Eriocereus	*Eriocereus martinii**
Poaceae	Eriochloa	*Eriochloa crebra*
Poaceae	Eriochloa	*Eriochloa decumbens*
Apiaceae	Eryngium	*Eryngium paludosum*
Fabaceae	Erythrina	*Erythrina vespertilio*
Erythroxylaceae	Erythroxylum	*Erythroxylum australe*
Myrtaceae	Eucalyptus	*Eucalyptus camaldulensis*

Myrtaceae	Eucalyptus	*Eucalyptus cambageana*
Myrtaceae	Eucalyptus	*Eucalyptus coolabah*
Myrtaceae	Eucalyptus	*Eucalyptus crebra*
Myrtaceae	Eucalyptus	*Eucalyptus melanophloia*
Myrtaceae	Eucalyptus	*Eucalyptus microcarpa*
Myrtaceae	Eucalyptus	*Eucalyptus orgadophila*
Myrtaceae	Eucalyptus	*Eucalyptus platyphylla*
Myrtaceae	Eucalyptus	*Eucalyptus populnea*
Myrtaceae	Eucalyptus	*Eucalyptus tereticornis*
Asteraceae	Euchiton	*Euchiton sphaericus*
Euphorbiaceae	Euphorbia	*Euphorbia tannensis ssp. Eremaea*
Laxmanniaceae	Eustrephus	*Eustrephus latifolius*
Convolvulaceae	Evolvulus	*Evolvulus alsinoides*
Convolvulaceae	Evolvulus	*Evolvulus alsinoides*
Moraceae	Ficus	*Ficus opposita*
Cyperaceae	Fimbristylis	*Fimbristylis dichotoma*
Asteraceae	Flaveria	*Flaveria australasica*
Rutaceae	Flindersia	*Flindersia australis*
Rutaceae	Flindersia	*Flindersia dissosperma*
Fabaceae	Galactia	*Galactia tenuiflora*
Rubiaceae	Gardenia	*Gardenia vilhelmii*
Rutaceae	Geijera	*Geijera parviflora*
Phyllanthaceae	Glochidion	*Glochidion ferdinandi*
Fabaceae	Glycine	*Glycine tabacina*
Fabaceae	Glycine	*Glycine tomentella*
Amaranthaceae	Gomphrena	*Gomphrena celosioides**
Proteaceae	Grevillea	*Grevillea parralella*
Proteaceae	Grevillea	*Grevillea striata*
Sparrmanniaceae	Grewia	*Grewia latifolia*
Proteaceae	Hakea	*Hakea lorea*
Haloragaceae	Haloragis	*Haloragis stricta*
Boraginaceae	Heliotropium	*Heliotropium amplexicaule**
Poaceae	Heteropogon	*Heteropogon contortus*
Malvaceae	Hibiscus	*Hibiscus stuartii*
Malvaceae	Hibiscus	*Hibiscus trionum var. vesicarius*
Violaceae	Hybanthus	*Hybanthus*
Violaceae	Hybanthus	*Hybanthus enneaspermus*
Fabaceae	Indigofera	*Indigofera hirsuta*
Fabaceae	Indigofera	*Indigofera linifolia*
Fabaceae	Indigofera	*Indigofera pratensis*
Convolvulaceae	Ipomoea	*Ipomoea lonchophylla*
Convolvulaceae	Ipomoea	*Ipomoea plebeia**
Poaceae	Iseilema	*Iseilema membranaceum*
Oleaceae	Jasminum	*Jasminum lineare*
Juncaceae	Juncus	*Juncus aridicola*
Juncaceae	Juncus	*Juncus usitatus*
Verbenaceae	Lantana	*Lantana camara**
Poaceae	Leptochloa	*Leptochloa decipiens var. decipiens*
Poaceae	Leptochloa	*Leptochloa digitata*
Mimosaceae	Leucaena	*Leucaena leucocephala*
Laxmanniaceae	Lomandra	*Lomandra longifolia*
Laxmanniaceae	Lomandra	*Lomandra multiflora*
Myrtaceae	Lophostemon	*Lophostemon grandiflorus*
Myrtaceae	Lophostemon	*Lophostemon suaveolens*
Fabaceae	Lotus	*Lotus australis*
Caesalpiniaceae	Lysiphyllum	*Lysiphyllum carronii*
Caesalpiniaceae	Lysiphyllum	*Lysiphyllum hookeri*
Fabaceae	Macroptilium	*Macroptilium lathyroides*
Chenopodiaceae	Maireana	*Maireana microphylla*
Apocynaceae	Marsdenia	*Marsdenia pleiadenia*
Apocynaceae	Marsdenia	*Marsdenia viridiflora*
Marsileaceae	Marsilea	*Marsilea hirsuta*
Poaceae	Megathyrsus	*Megathyrsus maximus**
Myrtaceae	Melaleuca	*Melaleuca bracteata*
Myrtaceae	Melaleuca	*Melaleuca fluviatilis*
Myrtaceae	Melaleuca	*Melaleuca leucadendra*
Meliaceae	Melia	*Melia azedarach*
Poaceae	Melinis	*Melinis repens**
Phrymaceae	Mimulus	*Mimulus gracilis*
Pontederiaceae	Monochoria	*Monochoria cyanea*
Commelinaceae	Murdannia	*Murdannia graminea*
Scrophulariaceae	Myoporum	*Myoporum acuminatum*
Mimosaceae	Neptunia	*Neptunia gracilis*
Rubiaceae	Opercularia	*Opercularia sp.*
Cactaceae	Optunia	*Optunia stricta**

Cactaceae	Optunia	*Optunia tomentosa**
Hydrocharitaceae	Ottelia	*Ottelia sp*
Meliaceae	Owenia	*Owenia acidula*
Oxalidaceae	Oxalis	*Oxalis perennans*
Poaceae	Panicum	*Panicum decompositum*
Poaceae	Panicum	*Panicum effusum*
Poaceae	Panicum	*Panicum laevinode*
Poaceae	Panicum	*Panicum queenslandicum*
Poaceae	Panicum	*Panicum simile*
Apocynaceae	Parsonsia	*Parsonsia lanceolata*
Asteraceae	Parthenium	*Parthenium hysterophorus **
Poaceae	Paspalidium	*Paspalidium caespitosum*
Poaceae	Paspalidium	*Paspalidium distans*
Poaceae	Paspalidium	*Paspalidium globoideum*
Poaceae	Paspalidium	*Paspalidium sp.*
Poaceae	Paspalum	*Paspalum dilatatum*
Passifloraceae	Passiflora	*Passiflora foetida**
Passifloraceae	Passiflora	*Passiflora suberosa**
Poaceae	Perotis	*Perotis rara*
Polygonaceae	Persicaria	*Persicaria orientalis*
Polygonaceae	Persicaria	*Persicaria sp*
Picrodendraceae	Petalostigma	*Petalostigma pubescens*
Phyllanthaceae	Phyllanthus	*Phyllanthus maderaspatensis*
Phyllanthaceae	Phyllanthus	*Phyllanthus virgatus*
Pittosporaceae	Pittosporum	*Pittosporum angustifolium*
Pittosporaceae	Pittosporum	*Pittosporum spinescens*
Lamiaceae	Plectranthus	*Plectranthus parviflorus*
Polygalaceae	Polygala	*Polygala sp.*
Polygonaceae	Polygonum	*Polygonum plebeium*
Convolvulaceae	Polymeria	*Polymeria calycina*
Portulacaceae	Portulaca	*Portulaca oleracea*
Portulacaceae	Portulaca	*Portulaca pilosa*
Acanthaceae	Pseuderanthemum	*Pseuderanthemum variable*
Poaceae	Pseudographis	*Pseudographis spinosa*
Rubiaceae	Psydrax	*Psydrax attenuata*
Rubiaceae	Psydrax	*Psydrax johnsonii*
Rubiaceae	Psydrax	*Psydrax odorata*
Dennstaedtiaceae	Pteridium	*Pteridium esculentum*
Fabaceae	Rhynchosia	*Rhynchosia minima*
Acanthaceae	Rostellularia	*Rostellularia adscendens*
Acanthaceae	Rostellularia	*Rostellularia obtusa*
Chenopodiaceae	Salsola	*Salsola kali**
Santalaceae	Santalum	*Santalum acuminatum*
Santalaceae	Santalum	*Santalum lanceolatum*
Apocynaceae	Sarcostemma	*Sarcostemma viminale*
Cyperaceae	Schoenoplectus	*Schoenoplectus litoralis*
Asteraceae	Senecio	*Senecio brigalowensis*
Fabaceae	Sesbania	*Sesbania cannabina**
Poaceae	Setaria	*Setaria sphacelata**
Poaceae	Setaria	*Setaria surgens*
Malvaceae	Sida	*Sida cordifolia**
Malvaceae	Sida	*Sida fibulifera*
Malvaceae	Sida	*Sida filiformis*
Malvaceae	Sida	*Sida rhombifolia**
Malvaceae	Sida	*Sida rohlenae*
Malvaceae	Sida	*Sida subspicata*
Solanaceae	Solanum	*Solanum ellipticum*
Solanaceae	Solanum	*Solanum esuriale*
Poaceae	Sorghum	*Sorghum nitidum*
Poaceae	Sporobolus	*Sporobolus actinocladus*
Poaceae	Sporobolus	*Sporobolus caroli*
Poaceae	Sporobolus	*Sporobolus diandra*
Poaceae	Sporobolus	*Sporobolus mitchellii*
Verbenaceae	Stachytarpheta	*Stachytarpheta jamaicensis**
Orobanchaceae	Striga	*Striga curviflora*
Fabaceae	Stylosanthes	*Stylosanthes hamata**
Fabaceae	Swainsona	*Swainsona galegifolia*
Combretaceae	Terminalia	*Terminalia oblongata*
Combretaceae	Terminalia	*Terminalia ovalifolia*
Poaceae	Themeda	*Themeda quadrivalvens**
Poaceae	Themeda	*Themeda triandra*
Menispermaceae	Tinospora	*Tinospora smilacina*
Aizoaceae	Trianthema	*Trianthema portulacastrum*
Aizoaceae	Trianthema	*Trianthema triquetra*
Zygophyllaceae	Tribulus	*Tribulus terrestris**

Boraginaceae	Trichodesma	*Trichodesma zeylanicum*
Hemerocallidaceae	Tricoryne	*Tricoryne sp.*
Poaceae	Tripogon	*Tripogon loliiformis*
Poaceae	Urochloa	*Urochloa mosambicensis**
Poaceae	Urochloa	*Urochloa panicoides**
Mimosaceae	Vachellia	*Vachellia farnesiana**
Mimosaceae	Vachellia	*Vachellia nilotica**
Rhamnaceae	Ventilago	*Ventilago viminalis*
Asteraceae	Verbesina	*Verbesina encelioides**
Fabaceae	Vigna	*Vigna lanceolata*
Fabaceae	Vigna	*Vigna vexillata*
Campanulaceae	Wahlenbergia	*Wahlenbergia gracilis*
Poaceae	Walwhalleya	*Walwhalleya subxerophila*
Asteraceae	Wedelia	*Wedelia spilanthoides*
Asteraceae	Xanthium	*Xanthium pungens**
Aizoaceae	Zaleya	*Zaleya galericulata**
Fabaceae	Zornia	*Zornia muriculata*

Appendix C

Fauna Species List

Family	Scientific Name	Common name	Source[1]	EPBC Act[2]	NC Act[3]	Incidental AECOM January 2017	River red gum riparian woodland	Eucalyptus and Corymbia open woodland	Dawson gum and brigalow woodland	Brigalow and belah woodland	OXbow wetland	Natural grasslands	Modified grasslands	Shrubby brigalow regrowth with gilgai	Dams	Incidentals	Adjacent to the Project Footprint
Birds																	
Accipitridae	*Accipiter fasciatus*	Brown Goshawk	2007										X			X	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle	2007, 2016, 2017			X	X	X					X			X	
Accipitridae	*Aviceda subcristata*	Pacific baza	2016						X							X	
Accipitridae	*Elanus axillaris*	Black-shouldered Kite	2007, 2016, 2017			X							X			X	
Accipitridae	*Haliastur sphenurus*	Whistling Kite	2007, 2010, 2016, 2017				X	X					X			X	
Accipitridae	*Milvus migrans*	Black Kite	2007, 2010, 2016					X					X			X	
Aegotheliade	*Aegotheles cristatus*	Australian Owlet Nightjar	2007				X				X						
Alaudidae	*Cincloramphus cruralis*	Brown Songlark	2007													X	
Alaudidae	*Cincloramphus mathewsi*	Rufous Songlark	2007													X	
Alaudidae	*Megalurus timoriensis*	Tawny Grassbird	2007									X	X			X	
Anatidae	*Anas gracilis*	Grey Teal	2007, 2010								X				X		
Anatidae	*Anas superciliosa*	Pacific Black Duck	2007, 2010, 2016, 2017				X				X				X	X	
Anatidae	*Aythya australis*	Hardhead	2007												X		
Anatidae	*Cynus atratus*	Black swan	2016												X		
Anatidae	*Dendrocygna arcuata*	Wandering Whistling Duck	2007												X		
Anatidae	*Dendrocygna eytoni*	Plumed Whistling Duck	2007, 2010, 2017								X				X		
Anatidae	*Chenonetta jubata*	Australian Wood Duck	2007, 2010, 2017								X				X		
Anhingidae	*Anhinga melanogaster*	Darter	2007								X				X		
Apodidae	*Apus pacificus*	Fork-tailed Swift	2005	SLC	Mi												X
Apodidae	*Hirundapus caudacutus*	White-throated Needletail	2005	SLC	Mi												X
Ardeidae	*Ardea novaehollandiae*	White-faced Heron	2010, 2016, 2017			X		X	X		X					X	
Ardeidae	*Ardea pacifica*	White-necked Heron	2007, 2010					X			X				X		
Ardeidae	*Ardea intermedia*	Intermedia Egret	2007								X				X		
Ardeidae	*Nycticorax caledonicus*	Nankeen Night Heron	2010				X										
Artamidae	*Artamus cinereus*	Black-faced Woodswallow	2007, 2017			X		X								X	
Artamidae	*Artamus personatus*	Masked woodswallow	2016									X	X				
Artamidae	*Cracticus torquatus*	Grey Butcherbird	2007, 2017			X				X		X				X	
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird	2007, 2010, 2016, 2017			X		X	X			X	X	X		X	
Artamidae	*Gymnorhina tibicen*	Australian Magpie	2007, 2010, 2016, 2017			X	X	X			X					X	
Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo	2007, 2010, 2016, 2017			X		X	X		X				X		
Cacatuidae	*Eolophus roseicapillus*	Galah	2010, 2016, 2017			X	X	X			X					X	
Cacatuidae	*Nymphicus hollandicus*	Cockatiel	2007										X			X	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo Shrike	2007, 2016, 2017					X					X				
Campephagidae	*Coracina tenuirostris*	Cicadabird	2007				X										
Campephagidae	*Lalage leucomela*	Varied Triller	2007													X	
Casuariidae	*Dromaius novaehollandiae*	Emu	2007, 2016, 2017			X		X								X	
Centropodidae	*Centropus phasianinus*	Pheasant Coucal	2010, 2016, 2017				X				X					X	
Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel	2007								X				X		
Charadriidae	*Vanellus miles*	Masked Lapwing	2007, 2010, 2016, 2017			X	X	X			X		X		X		
Ciconiidae	*Ephippiorhynchus (Ephippiorhynchus) asiaticus*	Black-necked Stork	2016										X		X		
Climacteridae	*Climacteris affinis*	White-browed Treecreeper	2010								X						
Columbidae	*Geopelia striata*	Peaceful Dove	2007, 2010, 2016				X	X			X					X	
Columbidae	*Geopelia humeralis*	Bar-shouldered Dove	2007					X								X	
Columbidae	*Geophaps scripta scripta*	Squatter Pigeon	2010, 2016	V	V			X	X				X			X	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon	2007, 2010					X					X			X	
Columbidae	*Phaps chalcoptera*	Common Bronzewing	2007					X									

Coraciidae	*Eurystomus orientalis*	Dollarbird	2007, 2010, 2016, 2017				X					X			X								
Corcoracidae	*Struthidea cinerea*	Apostlebird	2007, 2010, 2016, 2017			X	X		X												X			
Corvidae	*Corvus orru*	Torresian Crow	2007, 2010, 2016, 2017			X	X		X		X		X	X		X		X		X	X			
Cuculidae	*Cacomantis variolosus*	Brush Cuckoo	2007																		X			
Cuculidae	*Chrysococcyx minutillus*	Little Bronze-Cuckoo	2007																		X			
Cuculidae	*Eudynamys scolopacea*	Common Koel	2007, 2010					X		X														
Cuculidae	*Scythrops novaehollandia*	Channel-billed Cuckoo	2007, 2017							X						X								
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird	2007							X														
Dicruridae	*Grallina cyanoleuca*	Magpie Lark	2007, 2010, 2016, 2017			X	X		X												X			
Dicruridae	*Rhipidura leucophyrys*	Willie Wagtail	2010, 2016, 2017			X	X		X												X			
Dicruridae	*Rhipidura albiscapa*	Grey fantail	2016				X					X												
Dicruridae	*Rhipidura rufifrons*	Rufous Fantail	2007				X																	
Dicruridae	*Dicrurus bracteatus*	Spangled Drongo	2007							X														
Falconidae	*Falco berigora*	Brown Falcon	2007, 2016																		X			
Falconidae	*Falco cenchroides*	Nankeen Kestrel	2007, 2010, 2016, 2017			X	X					X			X						X			
Falconidae	*Falco hypoleucos*	Grey Falcon	2005		V																			X
Gruidae	*Grus rubicunda*	Brolga	2007, 2010, 2016, 2017			X				X			X								X			
Halcyonidae	*Dacelo leachii*	Blue-winged Kookaburra	2007, 2016				X																	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra	2007, 2010, 2016, 2017			X	X		X		X		X			X					X			
Halcyonidae	*Todiramphus macleayii*	Forest Kingfisher	2007, 2016				X					X				X								
Halcyonidae	*Todiramphus sanctus*	Sacred Kingfisher	2007, 2010				X																	
Hirundinidae	*Hirundo ariel*	Fairy Martin	2007																		X			
Hirundinidae	*Hirundo neoxena*	Welcome Swallow	2007, 2010																		X			
Laridae	*Hydroprogne caspia*	Caspian tern	2007	SLC	Mi																			X
Maluridae	*Malurus lambertii*	Variegated Fairy-wren	2007				X					X												
Maluridae	*Malurus melanocephalus*	Red-backed Fairy-wren	2007, 2010, 2016, 2017				X		X												X			
Meliphagidae	*Entomyzon cyanotis*	Blue-faced Honeyeater	2007, 2010, 2016, 2017			X	X		X			X							X		X			
Meliphagidae	*Lichenostomus chrysops*	Yellow-faced Honeyeater	2007																		X			
Meliphagidae	*Manorina flavigula*	Yellow-throated Miner	2007							X									X					
Meliphagidae	*Manorian melanocephala*	Noisy Miner	2007, 2010, 2016							X		X	X			X					X			
Meliphagidae	*Philemon citreogularis*	Little Friarbird	2007, 2010					X		X														
Meliphagidae	*Philemon corniculatus*	Noisy Friarbird	2007, 2016, 2017			X		X		X		X									X			
Meliphagidae	*Plectorhyncha lanceolata*	Striped Honeyeater	2007							X														
Meliphagidae	*Anthochaera chrysoptera*	Little Wattlebird	2007							X														
Meropidae	*Merops ornatus*	Rainbow Bee-eater	2007, 2016					X					X											
Motacillidae	*Anthus australis*	Richard's Pipit	2010					X																
Motacillidae	*Anthus novaeseelandiae*	Australasian pipit	2016, 2017			X								X		X					X			
Oriolidae	*Oriolus sagittatus*	Olive-backed Oriole	2007					X								X								
Oriolidae	*Sphecotheres viridis*	Figbird	2007					X		X														
Otididae	*Ardeotis australis*	Australian Bustard	2010					X								X					X			
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler	2007							X		X												
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush	2007					X																
Pardalotidae	*Gerygone olivacea*	White-throated Gerygone	2007, 2010, 2016					X		X			X											
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote	2007					X																
Pardalotidae	*Pardalotus striatus*	Striated Pardalote	2007, 2016					X		X														
Pardalotidae	*Smicronis brevirostris*	Weebill	2010							X														
Passeridae	*Neochmia modesta*	Plum-headed Finch	2007, 2016													X					X			
Passeridae	*Neochmia temporalis*	Red-browed Finch	2007																		X			
Passeridae	*Taeniopygia bichenovii*	Double-barred Finch	2007, 2010, 2016							X						X		X			X			
Passeridae	*Taeniopygia guttata*	Zebra Finch	2007, 2016													X					X			

Pelicanidae	*Pelecanus conspicillatus*	Australian pelican	2016								X						
Petroicidae	*Melanodryas cucullata*	Hooded Robin	2007													X	
Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant	2010								X						
Phalacrocoracidae	*Phalacrocorax melanoleuc*	Little Pied Cormorant	2007, 2016, 2017				X				X						
Phalacrocoracidae	*Phalacrocorax sulcirostris*	Black Cormorant	2007												X		
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant	2017								X				X		
Phasianidae	*Coturnix chinensis*	King Quail	2007													X	
Phasianidae	*Coturnix pectoralis*	Stubble Quail	2007										X			X	
Phasianidae	*Coturnix ypsilophora*	Brown quail	2016					X								X	
Podargidae	*Podargus strigoides*	Tawny Frogmouth	2007, 2016, 2017				X		X		X		X				
Podicipedidae	*Tachybaptus novaehollan*	Australasian Grebe	2007												X		
Pomatostomidae	*Pomatostomus temporalis*	Grey-crowned Babbler	2010, 2016, 2017					X	X				X				
Psittacidae	*Aprosmictus erythropterus*	Red-winged Parrot	2007, 2016				X	X					X			X	
Psittacidae	*Platycercus adscitus*	Pale-headed Rosella	2007, 2010, 2016, 2017			X	X	X	X				X			X	
Psittacidae	*Platycercus eximius*	Eastern Rosella	2007					X									
Psittacidae	*Trichoglossus haematodus*	Rainbow Lorikeet	2007, 2010, 2016, 2017				X	X				X	X			X	
Psittacidae	*Trichoglossus chlorolepido*	Scaly-breasted Lorikeet	2007				X	X				X					
Rostratulidae	*Rostratula australis*	Australian Painted Snipe	2007	E	V					X							
Scolopacidae	*Gallinago hardwickii*	Latham's Snipe	2005	SLC	Mi												X
Strigidae	*Ninox novaeseelandiae*	Southern Boobook	2007					X			X						
Sturnidae	*Acridotheres tristis*	Common myna	2016													X	
Sylviidae	*Cisticola exilis*	Golden-headed Cisticola	2007				X										
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis	2007													X	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis	2007, 2016, 2017			X	X	X			X				X		
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill	2007												X		
Threskiornithidae	*Platalea regia*	Royal Spoonbill	2007												X		
Tytonidae	*Tyto alba*	Eastern Barn Owl	2007, 2017				X						X				
Reptiles																	
Agamidae	*Pogona barbata*	Bearded Dragon	2007													X	
Colubridae	*Boiga irregularis*	Brown Tree Snake	2007, 2010				X										
Colubridae	*Dendrelaphis punctulata*	Common Tree Snake	2007				X	X									
Colubridae	*Tropidonophis mairii*	Keelback	2017				X										
Elapidae	*Demansia vestigiata*	Lesser Black Whip Snake	2007													X	
Elapidae	*Densionia maculata*	Ornamental Snake	2009, 2010	V	V					X				X			
Elapidae	*Hoplocephalus bitorquatus*	Pale-headed Snake	2007				X										
Elapidae	*Pseudechis australis*	King Brown Snake	2007													X	
Elapidae	*Pseudonaja textilis*	Eastern Brown Snake	2007, 2016, 2017				X				X		X				
Elapidae	*Furina diadema*	Red-naped Snake	2010					X									
Elapidae	*Suta suta*	Curl Snake	2007													X	
Gekkonidae	*Diplodactylus steindachne*	BoX-patterned Gecko	2007													X	
Gekkonidae	*Gehyra dubia*	Dubious Dtella	2007, 2009, 2010				X	X			X						
Gekkonidae	*Gehyra variegata*	Variegated Tree Dtella	2007, 2010					X									
Gekkonidae	*Heteronotia binoei*	Bynoe's Gecko	2007, 2009, 2010					X		X	X						
Gekkonidae	*Oedura monilis*	Ocellated Velvet Gecko	2007													X	
Gekkonidae	*Strophurus williamsi*	Eastern Spiny-tailed Gecko	2007													X	
Gekkonidae	*Nephrurus levis*	Knob-tailed Gecko	2010										X				
Pythonidae	*Morelia spilota*	Carpet Python	2009							X							
Scincidae	*Carlia pectoralis*	Open-litter rainbow skink	2010										X				
Scincidae	*Cryptoblepharus carnabyi*	Wall Skink	2007, 2010					X									
Scincidae	*Ctenotus robustus*	Eastern Striped Skink	2007, 2010					X		X							
Scincidae	*Ctenotus strauchii*	Eastern Barred Wedgesnout Ctenotus	2007													X	
Scincidae	*Lerista fragilis*	Eastern Mulch-slider	2007													X	
Amphibians																	

Bufonidae	*Bufo marinus**	Cane Toad	2007, 2009, 2010, 2016, 2017				X		X		X		X				
Hylidae	*Cyclorana brevipes*	Short-footed Frog	2007				X						X				
Myobatrachidae	*Limnodynastes tasmanien*	Spotted Grass Frog	2007, 2009, 2010					X			X				X		
Myobatrachidae	*Cyclorana novoholliandae*	New Holland Frog	2007, 2010				X								X		
Myobatrachidae	*Cyclorana platycephala*	Water-holding Frog	2009							X							
Myobatrachidae	*Litoria alboguttata*	Striped Burrowing Frog	2007, 2009, 2010				X	X		X	X		X				
Myobatrachidae	*Litoria caerulea*	Green Tree Frog	2007, 2009, 2010, 2016, 2017				X	X	X	X	X		X	X			
Myobatrachidae	*Litoria fallax*	Eastern Sedge Frog	2007								X				X		
Myobatrachidae	*Litoria inermis*	Bumpy Rocket Frog	2007, 2009, 2010, 2016				X	X		X	X				X		
Myobatrachidae	*Litoria latopalmata*	Broad-palmed Rocket Frog	2010								X						
Myobatrachidae	*Litoria nasuta*	Striped Rocket Frog	2009							X					X		
Myobatrachidae	*Platyplectrum ornatum*	Ornate Burrowing Frog	2007, 2009, 2010, 2017				X	X		X	X		X				
Myobatrachidae	*Litoria rothii*	Roth's Tree Frog	2009					X			X						
Myobatrachidae	*Litoria rubella*	Desert Tree Frog	2007, 2009, 2010, 2016				X	X		X	X						
Mammals																	
Bovidae	*Bos taurus**	Cattle	2007													X	
Canidae	*Canis familiaris**	Dog	2007													X	
Canidae	*Vulpes vulpes**	FoX	2016					X									
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail Bat	2007, 2010				X	X			X		X				
Equidae	*Equus caballus*	Horse (brumby)	2017			X							X			X	
Felidae	*Felis cattus**	Cat	2007													X	
Leporidae	*Lepus europaeus**	European hare	2007										X			X	
Leporidae	*Oryctolagus cuniculus**	European Rabbit	2007, 2016, 2017			X										X	
Macropodidae	*Aepyprymnus rufescens*	Rufous Bettong	2007, 2017			X							X				
Macropodidae	*Macropus giganteus*	Eastern Grey Kangaroo	2007, 2010, 2016, 2017			X		X					X		X	X	
Macropodidae	*Macropus rufogriseus*	Red-necked Wallaby	2017			X		X									
Macropodidae	*Wallabia bicolour*	Swamp Wallaby	2007				X	X									
Molossidae	*Chaerephon jobensis*	Greater Northern Freetail Bat	2007, 2016								X						
Molossidae	*Mormopterus beccarii*	Becari's Free-tailed Bat	2007								X		X				
Molossidae	*Mormopterus lumsdenae*	Northern Free-tailed Bat	2016								X						
Molossidae	*Mormopterus ridei*	Ride's Free-tailed Bat	2016								X						
Molossidae	*Tadarida australis*	White-striped Mastiff Bat	2007													X	
Muridae	*Mus musculus**	House Mouse	2007													X	
Peramelidae	*Isoodon macrourus*	Northern Brown Bandicoot	2007, 2017				X	X									
Phalangeridae	*Trichosurus vulpecula*	Common Brush-tailed Possum	2007, 2010, 2016, 2017				X	X			X					X	
Phascolarctidae	*Phascolarctos cinereus*	Koala	2009	V	V												X
Pseudocheiridae	*Petauroides volans*	Greater Glider	2007, 2010	V			X										
Pteropidae	*Pteropus scapulatus*	Little Red Flying FoX	2007				X										
Suidae	*Sus scrofa**	Pig	2007, 2016					X				X	X		X		
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked echidna	2007		SLC											X	
Vespertillionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	2007, 2016				X	X			X		X				
Vespertillionidae	*Chalinolobus morio*	Chocolate wattled bat	2016								X						
Vespertillionidae	*Chalinolobus picatus*	Little pied bat	2016														
Vespertillionidae	*Miniopterus schreibersii oc*	Common Bent-wing Bat	2007				X										
Vespertillionidae	*Miniopterus australis*	Little Bent-wing Bat	2007														
Vespertillionidae	*Myotis macropus*	Large-footed Myotis	2007													X	
Vespertillionidae	*Scotorepens balstoni*	Inland Broad-nosed bat	2016								X						
Vespertillionidae	*Scotorepens greyii*	Little Broad-nosed Bat	2007, 2016				X				X		X				
Vespertillionidae	*Vespadelus baverstocki*	Inland forest bat	2016								X						
Vespertillionidae	*Vespadelus troughtoni*	Eastern Cave Bat	2007								X						

[1] Source: SKM 2007 fauna survey (2007), SKM 2010 fauna survey (2010), EcoServe (2005), EcoServe (2009), AECOM Biodiversit Survey (2016), AECOM Biodiversit Survey (2017)

[2] Conservation status under the Commonwealth EPBC Act: E (endangered), V (vulnerable)

[3] Conservation status under the Queensland NC Act: E (endangered), V (vulnerable), R (rare), NT (near threatened)

* Introduced species

Appendix D

Landscape Fragmentation and Connectivity Tool Output

Department of Environment and Heritage Protection (DEHP)
Landscape Fragmentation and Connectivity (LFC) Tool version 1.4 LOGFILE
Process started at 17-09-2020 11:07:00 AM
Python version: 2.7.16 (v2.7.16:413a49145e, Mar 4 2019, 01:30:55) [MSC v.1500 32 bit (Intel)]
Arcpy version: 10.7.1
Username: McKeeJ2

INPUT PARAMETERS
Output Workspace: P:\605X\60507031\4. Tech Work Area\4.99 GIS\01_Data\PROJECT_DATA\Saraji_2020_data\Jessie
Threshold lookup table: P:\605X\60507031\4. Tech Work Area\4.99
GIS\01_Data\PROJECT_DATA\Saraji_2020_data\Jessie\LFC_data.gdb\tbl_Regional_frag_local_threshold
Remnant cover layer: P:\605X\60507031\4. Tech Work Area\4.99
GIS\01_Data\PROJECT_DATA\Saraji_2020_data\Jessie\LFC_data.gdb\QLD_VEG_RVM_100K_v2p0
Remnant cover layer edited: False
Regional buffer extent: 20 kilometres
Local buffer extent: 5 kilometres
Impact layer: P:\605X\60507031\4. Tech Work Area\4.99
GIS\01_Data\PROJECT_DATA\Saraji_2020_data\Jessie\Project_Footprint_GDA94_Z55.shp
layer projection: GDA_1994_MGA_Zone_55
Raster cell resolution for analysis: 10 metres
Edge Width: 50 metres
(The distance from non-remnant landscapes through to the core ecosystem - the edge of remnant ecosystems)
Default projection: P:\605X\60507031\4. Tech Work Area\4.99 GIS\01_Data\PROJECT_DATA\Saraji_2020_data\Jessie\scripts\QLD
Albers Equal Area Conic.prj

11:07:00   Checking out the spatial analyst tool - required for LFC

11:07:00   _____BEGINNING LANDSCAPE FRAGMENTATION AND CONNECTIVITY ANALYSIS_____

11:07:00   This tool will categorise the landscape into:
{0: 'non-rem', 1: 'patch', 2: 'edge', 3: 'perforated', 4: 'core (< 100 hectares)', 5: 'core (100-500 hectares)', 6: 'core
(> 500 hectares)', 7: 'water'}

11:07:03   Deleted existing files in output folder
11:07:30   Deleted existing pre-impact file geodatabase

```
11:07:54        Deleted existing post-impact file geodatabase
11:07:57        Copying across impact site feature(s) and calculating area in hectares (AreaHA)
11:07:59        Making a local copy of the impact site
11:08:01        Preparing remnant cover layer for analysis
11:08:03        Created regional scale buffer of 20 kilometres
11:08:05        Created local scale buffer of 5 kilometres
11:08:16        Clipped the remnant cover to the regional buffer extent
11:08:19        Unioned the pre impact remnant layer with the impact site
11:08:27        Attributed the impact area as not RVM Cat B
11:08:27        Area of RVM Cat B clearing is 1282.15 hectares
11:08:27        SQL selection used is "RVM_CAT" = 'B' and "Cover" = 'Not RVM Cat B' on shapefile
P:\605X\60507031\4. Tech Work Area\4.99
GIS\01_Data\PROJECT_DATA\Saraji_2020_data\Jessie\main_output\clip_remcover_post.shp

11:08:32        Categorised the cover attributes in clip_remcover_pre.shp ready for raster conversion
11:09:02        Converted clip_remcover_pre.shp to raster

11:09:07        Categorised the cover attributes in clip_remcover_post.shp ready for raster conversion
11:09:36        Converted clip_remcover_post.shp to raster

11:09:36        Run Landscape fragmentation analysis on the pre impact regional landscape

REGULATED VEGETATION TYPES BEING EXTRACTED FROM LAND COVER
IDENTIFICATION OF CORE, PATCH, EDGE AND PERFORATIONS
COMBINING FRAGMENTATION CLASSES
CLASSIFYING CORE FOREST PATCHES BY AREA
COMPOSING FINAL FRAGMENTATION MAP
COMPOSING FINAL FRAGMENTATION MAP
(FRAGMENTATION CALCULATION TIME WAS 21.6 MINUTES)

11:31:12        Run Landscape fragmentation analysis on the post impact regional landscape

REGULATED VEGETATION TYPES BEING EXTRACTED FROM LAND COVER
IDENTIFICATION OF CORE, PATCH, EDGE AND PERFORATIONS
COMBINING FRAGMENTATION CLASSES
CLASSIFYING CORE FOREST PATCHES BY AREA
```

```
COMPOSING FINAL FRAGMENTATION MAP
COMPOSING FINAL FRAGMENTATION MAP
(FRAGMENTATION CALCULATION TIME WAS 12.5 MINUTES)

Extracting a local subset of lfc_regional_pre_impact
Extracting a local subset of lfc_regional_post_impact

Collating pre and post impact statistics and trigger assessment
11:44:35        Summarising area statistics for: lfc_localmsk_pre_impact
11:44:35        Summarising area statistics for: lfc_localmsk_post_impact
11:44:36        Summarising area statistics for: lfc_regional_pre_impact
11:44:37        Summarising patch count for lfc_localmsk_pre_impact
11:44:47        Summarising patch count for lfc_localmsk_post_impact

Analysing impact on Connectivity Areas

SIGNIFICANCE TEST ONE

The regional total area is 272887.98
The regional extent of core remnant is 114791.28
The regional extent of core remnant is 42.07 percent
This level of regional fragmentation sets a local impact threshold of: 10.0 percent

The table below lists the local impact thresholds for categories of regional core remnant extent:

REGIONAL CORE CATEGORY         LOCAL IMPACT THRESHOLD
< 10                           2.0
10 - 30                        5.0
30 - 50                        10.0
50 - 70                        20.0
70 - 90                        30.0
>90                            50.0

Area of core at the local scale (pre impact): 13242.73
Area of core at the local scale (post impact): 12010.1
Percent change of core at the local scale (post impact): 9.31 percent
```

SIGNIFICANCE TEST TWO

The number of core remnant areas occurring on the site: 13
The number of core remnant areas remaining on the site post impact: 7
(Only core polygons greater than or equal to 1 hectare are included)

RESULT

11:45:10 This analysis has determined a SIGNIFICANT impact on connectivity areas
(A significant reduction in core remnant at the local scale is False OR a change from core to non-core remnant at the site scale is True)
(Total area of RVM Cat B clearing is 1282.15 hectares)

The significance table has been written to: ..\main_output\lfc_significance_assessment.csv
The local scale summary table has been written to: ..\main_output\lfc_local_scale_summary.csv
The site scale summary table has been written to: ..\main_output\lfc_site_scale_summary.csv
Layer files unable to be copied into project directory.

Please scrutinise the output tables and spatial layers to confirm the desktop modelling of connectivity area impact

This analysis used an unedited copy of the Regulated Vegetation layer.

11:50:02 _____COMPLETED LANDSCAPE FRAGMENTATION AND CONNECTIVITY ANALYSIS_____