



CHAPTER 11 – TERRESTRIAL ECOLOGY

STANMORE ID EXTENSION PTY LTD
ISAAC DOWNS EXTENSION PROJECT

TABLE OF CONTENTS

11.1	Introduction	11-1
11.2	Regulatory Framework	11-4
11.2.1	Overview	11-4
11.2.2	Environment Protection and Biodiversity Conservation Act 1999	11-4
11.2.3	EPBC Act Environmental Offsets Policy	11-4
11.2.4	Australian Weeds Strategy	11-4
11.2.5	Environmental Protection Act 1994	11-4
11.2.6	Vegetation Management Act 1999	11-4
11.2.7	Planning Act 2016	11-5
11.2.8	Nature Conservation Act 1992	11-5
11.2.9	Water Act 2000	11-6
11.2.10	Fisheries Act 1994	11-6
11.2.11	Biosecurity Act 2014	11-6
11.2.12	Environmental Offsets Act 2014	11-6
11.2.13	Queensland Environmental Offsets Policy, version 1.17	11-6
11.2.14	Isaac Region Biosecurity Plan 2024 -2027	11-6
11.2.15	Environmental Objectives and Performance Outcomes	11-7
11.2.16	EIS Guidelines	11-9
11.2.16.1	EIS Information Guideline – Terrestrial Ecology	11-9
11.2.16.2	EIS Information Guideline – Biosecurity	11-9
11.3	Desktop Information and Assessment	11-10
11.3.1	Site description	11-10
11.3.1.1	Bioregion and Habitat Context	11-10
11.3.1.2	Catchment and Land Use Context	11-10
11.3.1.3	Existing Vegetation	11-10
11.3.2	Past Ecological Assessments	11-11
11.3.3	Methodology	11-12
11.3.3.1	Database Review	11-12
11.3.3.2	Likelihood of Occurrence	11-13
11.3.4	Desktop Assessment Results	11-15
11.3.4.1	Likelihood of occurrence	11-15
11.3.4.2	Matters of National Environmental Significance	11-19
11.3.4.3	Matters of State Environmental Significance	11-20
11.3.4.4	Environmentally Sensitive Areas	11-20
11.3.5	Habitat Mapping and Definition	11-20
11.4	Field Assessment and Environmental Values	11-21
11.4.1	Methodology	11-21
11.4.1.1	Survey Extent and Timing	11-21
11.4.1.2	Climatic Conditions	11-22
11.4.1.3	Survey Methodology and Survey Effort	11-22
11.4.1.4	GIS Mapping	11-38
11.4.2	Regional Ecosystem Map Amendment Request	11-38
11.4.3	Field Assessment Results	11-38
11.4.3.1	Field-verified Regulated Vegetation	11-38
11.4.3.2	Field-verified Vegetation Communities	11-42
11.4.3.3	Field-verified Threatened Ecological Communities	11-45
11.4.3.4	Flora	11-47
11.4.3.5	Fauna	11-47

11.4.3.6	Introduced Flora and Fauna, and Biosecurity Risks	11-57
11.4.3.7	Aquatic Ecosystems, Watercourses, Wetlands and GDEs	11-57
11.4.3.8	Presence of Climate Refugia	11-58
11.4.3.9	Matters of National Environmental Significance	11-58
11.4.3.10	Matters of State Environmental Significance	11-60
11.4.3.11	Environmental Sensitive Areas	11-62
11.5	Potential Risks and Impact Assessment.....	11-63
11.5.1	Overview	11-63
11.5.2	Potential Direct Impacts	11-63
11.5.2.1	Vegetation Clearing	11-63
11.5.2.2	Habitat Removal and Loss of Connectivity and Integrity	11-65
11.5.3	Potential Indirect Impacts	11-65
11.5.3.1	Increase in Pest and Invasive Weeds	11-66
11.5.3.2	Fragmentation and Edge Effects.....	11-66
11.5.3.3	Erosion and Sedimentation	11-67
11.5.3.4	Fauna Mortality or Injury.....	11-67
11.5.3.5	Hydrological Changes	11-68
11.5.3.6	Groundwater Dependent Ecosystems	11-69
11.5.3.7	Terrestrial Ecology Impacts Resulting from the Diversion of Conrock Gully	11-69
11.5.3.8	Air Quality Impacts	11-70
11.5.3.9	Artificial Light Impacts	11-70
11.5.3.10	Noise and Vibration Impacts	11-71
11.5.3.11	Bushfire Risk	11-71
11.5.3.12	Influence of Climate Change.....	11-71
11.5.4	Summary of MNES Impacts	11-72
11.5.4.1	Impacts to TECs and Threatened Flora Species	11-72
11.5.4.2	Impacts to MNES Threatened and Migratory Species Habitat.....	11-73
11.5.4.3	Consistency with International Obligations	11-74
11.5.5	Summary of MSES Impacts	11-77
11.5.6	Summary of ESA Impacts	11-80
11.5.7	Potential Cumulative Impacts.....	11-80
11.5.7.1	Cumulative impacts on MNES and MSES.....	11-80
11.5.7.2	Cumulative impact on Ecosystem Resilience	11-82
11.6	Mitigation and Management Measures	11-82
11.6.1	Measures to Avoid and Minimise Impacts.....	11-82
11.6.2	Retention of Buffer Zones and Habitat Connectivity	11-86
11.6.3	Decommissioning and Rehabilitation	11-87
11.6.4	General Impact Mitigation.....	11-87
11.6.5	Management and Monitoring Plans	11-98
11.6.5.1	Overview	11-98
11.6.5.2	Weed and Pest Management Plan	11-98
11.6.5.3	MNES Species Management Plan	11-99
11.6.5.4	High-risk Species Management Program.....	11-100
11.7	Significant Impacts Assessments and Offsets.....	11-101
11.7.1	MNES Significant Impact Assessment.....	11-101
11.7.1.1	Overview	11-101
11.7.1.2	Brigalow TEC.....	11-102
11.7.1.3	Natural Grasslands TEC.....	11-105
11.7.1.4	Poplar Box Woodland on Alluvial Plains TEC	11-106
11.7.1.5	Semi-evergreen Vine Thickets TEC	11-110
11.7.1.6	<i>Dichanthium queenslandicum</i> , King Bluegrass	11-110

11.7.1.7	Australian Painted Snipe.....	11-111
11.7.1.8	Common Greenshank	11-114
11.7.1.9	Koala.....	11-115
11.7.1.10	Greater Glider (Southern and Central)	11-121
11.7.1.11	<i>Dichanthium setosum</i> , Bluegrass.....	11-126
11.7.1.12	Squatter Pigeon	11-127
11.7.1.13	Sharp-tailed Sandpiper	11-131
11.7.1.14	Ornamental Snake	11-132
11.7.1.15	Fork-tailed Swift	11-137
11.7.1.16	Oriental Cuckoo	11-139
11.7.2	MSES Significant Residual Impact Assessment	11-141
11.7.3	MNES and MSES Offset Requirements	11-148
11.8	Conclusion	11-149
11.9	References	11-151

Tables

Table 11-1	Environmental Objectives and Performance Outcomes.....	11-7
Table 11-2	EIS Information Guideline - Terrestrial Ecology	11-9
Table 11-3	EIS Information Guideline - Biosecurity	11-9
Table 11-4	Information Sources Reviewed During the Desktop Assessment	11-12
Table 11-5	Explanation of terms used in the likelihood of occurrence assessment	11-14
Table 11-6	Likelihood of Occurrence Assessment - Summary.....	11-16
Table 11-7	Survey Dates, Method and Summary of Methods.....	11-22
Table 11-8	Survey Effort.....	11-24
Table 11-9	Habitat Descriptions and Targeted Survey Effort for Potentially Occurring TECs and Species	11-28
Table 11-10	Field Verified REs within the Survey area	11-39
Table 11-11	TECs Confirmed Present Within the Survey Area	11-58
Table 11-12	Commonwealth-listed Threatened Flora Species that have Suitable Habitat Verified Within the Survey Area	11-58
Table 11-13	Commonwealth-listed Threatened and Migratory Species Habitat Verified Within the Survey Area.....	11-59
Table 11-14	Field-Verified MSES Within the Survey Area.....	11-60
Table 11-15	Field Verified ESAs Within the Survey Area	11-62
Table 11-16	Impacts to Vegetation Communities	11-64
Table 11-17	Extent of MNES.....	11-75
Table 11-18	Extent of MSES Prescribed Matters	11-78
Table 11-19	Impact Area for Applicable ESAs.....	11-80
Table 11-20	Avoidance of Vegetation Communities	11-84
Table 11-21	Avoidance of MNES	11-85
Table 11-22	Avoidance of MSES	11-86
Table 11-23	Project Mitigation Measures	11-88
Table 11-24	Assessment of Significance of Impacts to the Brigalow TEC	11-103
Table 11-25	Assessment of Significance of Impacts to the Poplar Box TEC.....	11-107
Table 11-26	Assessment of Significance of Impacts to the Australian Painted Snipe	11-112
Table 11-27	Assessment of Significance of Impacts to the Koala	11-116
Table 11-28	Assessment of Significance of Impacts to the Greater Glider	11-122
Table 11-29	Assessment of Significance of Impacts to the Squatter Pigeon	11-128
Table 11-30	Assessment of Significance of Impacts to Ornamental Snake	11-133

Table 11-31	Assessment of Significance of Impacts to the Fork-tailed Swift.....	11-137
Table 11-32	Assessment of Significance of Impacts to the Oriental Cuckoo	11-139
Table 11-33	SRI Assessment for MSES – Regulated Vegetation	11-143
Table 11-34	SRI Assessment for MSES - Connectivity Areas.....	11-144
Table 11-35	SRI Assessment for MSES - Protected Wildlife Habitat	11-145
Table 11-36	Assessment of Significance of Impacts to the Short-beaked Echidna.....	11-147

Figures

Figure 11-1	Project Locality	11-3
Figure 11-2	Field Verified REs in the Survey Area	11-41
Figure 11-3	Field Verified Vegetation Communities in the Survey Area	11-44
Figure 11-4	Threatened Ecological Communities	11-46
Figure 11-5	Threatened Flora Habitat	11-49
Figure 11-6	Squatter Pigeon Habitat	11-50
Figure 11-7	Threatened Wetland Birds Habitat.....	11-51
Figure 11-8	Migratory Species Habitat	11-52
Figure 11-9	Koala Habitat	11-53
Figure 11-10	Greater Glider Habitat	11-54
Figure 11-11	Short-beaked Echidna Habitat.....	11-55
Figure 11-12	Ornamental Snake Habitat	11-56

11. TERRESTRIAL ECOLOGY

11.1 Introduction

This chapter presents the findings of the terrestrial ecology assessment undertaken to support the environmental impact statement (EIS) for the Isaac Downs Extension Project (the Project). The assessment draws on desktop review, field surveys and habitat mapping to identify the terrestrial ecological values present within and surrounding the Project area, and to assess the potential impacts of the Project on those values.

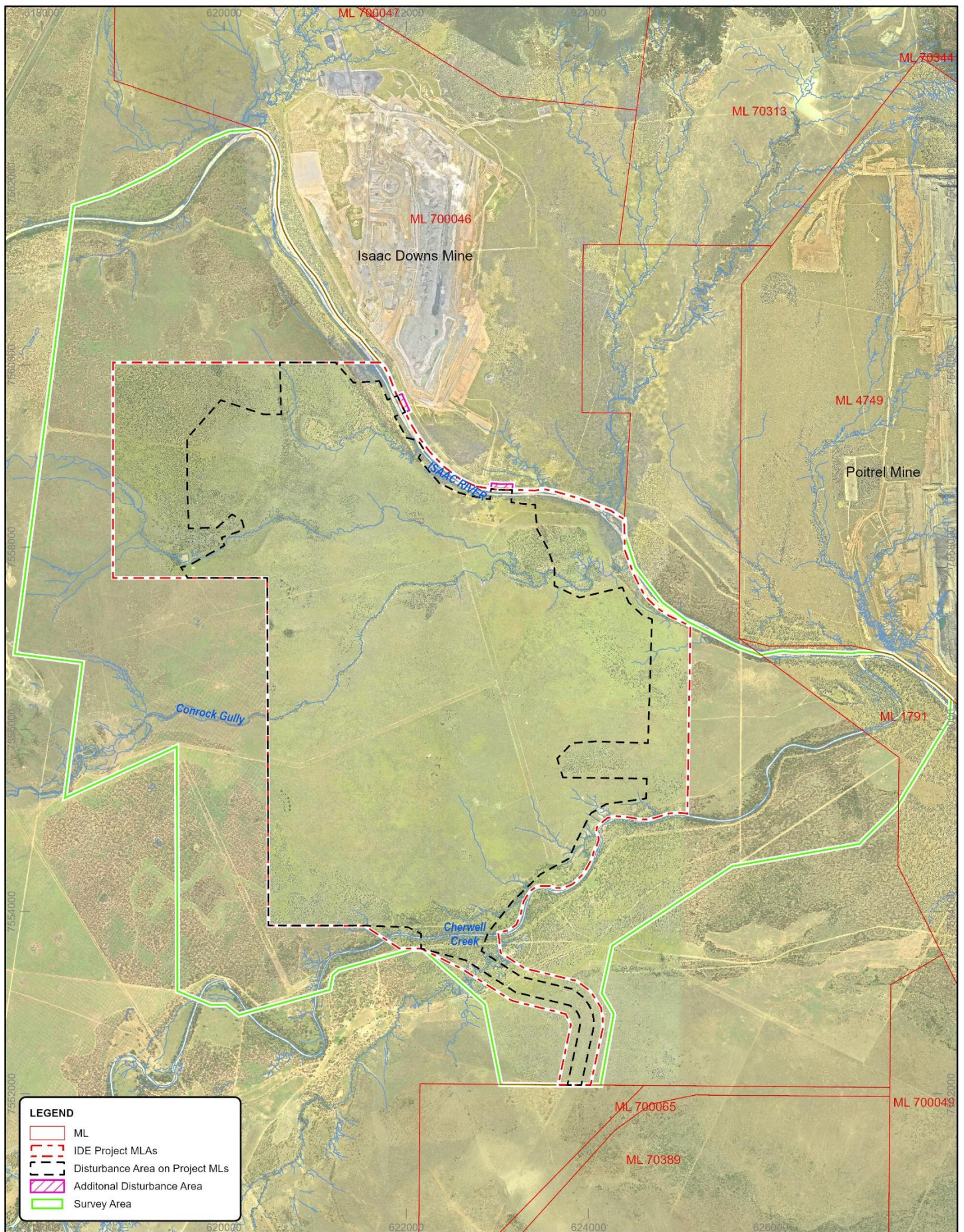
This chapter has been prepared to describe the existing terrestrial ecology values relevant to the Project, including matters of national environmental significance (MNES) and matters of state environmental significance (MSES), and to assess the potential direct and indirect impacts associated with construction, operation and rehabilitation. It also outlines the measures proposed to avoid, minimise, mitigate and, where required, offset impacts to ecological values.

Information in this chapter is primarily based on the Terrestrial Ecological Assessment prepared by Trend Environmental Pty Ltd (Trend) (**Appendix P**). This chapter also draws on information from other EIS chapters and technical studies, as referenced throughout the chapter.

The following terms have been adopted throughout this chapter, and shown on the various maps where relevant:

- **Project area:** The area of the four mining lease (ML) applications for the Project (2,707 ha) plus 2.5 ha on Isaac Downs Mine (IDM) ML 700046, and is 2,709.5 ha.
- **Survey area:** The Survey area refers to the broader area assessed by ecologists during field surveys. Survey area is 5,227 ha. This area extends beyond the defined 'Project area' and 'Disturbance area' to ensure that ecological values in adjacent environments were adequately surveyed. Surveying a wider area enables a more comprehensive evaluation of potential impacts, particularly on surrounding habitats, species, and ecological processes that may be indirectly affected by the Project. The Survey area is shown on Figure 11-1.
- **Disturbance area:** The Disturbance area is the sum of the 'Disturbance area on Project MLs' and the 'Additional disturbance area'. The Disturbance area is 2,083 ha and forms the basis for assessing terrestrial ecological impacts. The Survey area encompasses the disturbance area.
 - **Disturbance area on Project MLs:** The Disturbance area on the Project MLs is 2,080 ha and represents the subset of the Project area (i.e. the four ML applications for the Project) where disturbance activities associated with the Project will occur (Disturbance area) on Project MLs shown in Figure 11-1.
 - **Additional disturbance area:** The Additional disturbance area comprises areas totalling 2.5 hectares (ha) on IDM ML 700046 (as shown on Figure 11-1) that require an amendment to the IDM State approvals (environmental authority (EA) and progressive rehabilitation and closure plan (PRCP) schedule) for connecting linear infrastructure with the Project, in areas not currently authorised for disturbance. The disturbance area to be assessed for the EPBC Referral for the Project includes the 'Disturbance area on Project MLs' + the 'Additional disturbance area'.
- **Area of Interest:** The broader locality within which the Survey area is located, which acts as the buffer area for desktop searches. The Area of Interest was considered to be a 20 km buffer area, which provides context to the MNES and MSES within the Survey area.
- **Region:** A 50 km buffer area used exclusively for defining species records in the 'likelihood of occurrence' assessment for the Project. This extended buffer area is essential for highly mobile

species, such as migratory species, that may not have records directly adjacent to the Survey area but cannot be excluded as potentially occurring in the area if suitable habitat exists. This approach accounts for the occasional presence of such species in the vicinity due to their mobility.



Datum: GDA2020 Zone 55
 Scale: See Scale Bar
 Date: 5/05/2026 1:14 PM
 Drawn: Minserve
 Source: Minserve/Stanmore
 File: 20260421 Project Location.aprx
 DISCLAIMER: Third party data sources are used in this map compilation.
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 ISAAC DOWNS EXTENSION

Project Location

Figure | 11-1

11.2 Regulatory Framework

11.2.1 Overview

The relevant Commonwealth and State legislation applicable to terrestrial ecology are described in this section. The legislation provides for the protection of terrestrial ecological values, including MNES and MSES. MNES are protected under Commonwealth legislation. MSES are protected under State legislation.

For further information on the legislation and approval's process for the Project refer to **Chapter 2**.

11.2.2 Environment Protection and Biodiversity Conservation Act 1999

The purpose of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is to protect and manage nationally and internationally important MNES. The EPBC Act recognises nine MNES, including listed threatened species and communities, listed migratory species, RAMSAR wetlands and world heritage properties.

A protected matters database search can be conducted which lists all MNES that are considered known or likely to occur within a given area. This search identifies the MNES that are most relevant to a project which therefore have the potential to be impacted.

11.2.3 EPBC Act Environmental Offsets Policy

Offsets under the EPBC Act Environmental Offsets Policy (DSEWPaC, 2012a) may apply to compensate for any significant residual impacts of a controlled action on an MNES after avoidance and mitigation measures have been employed. This policy sets out offset requirements under the EPBC Act.

11.2.4 Australian Weeds Strategy

The Australian Weeds Strategy provides a framework to provide guidance and identify priorities for weed management on a national level, with the aim of minimising the impact of weeds on Australia's environmental, economic, and social assets. Under the Australian Weeds Strategy, 32 weeds of national significance (WoNS) are currently recognised (DAWR, 2012). These weeds have been identified due to their invasiveness, potential for spread, and environmental and socio-economic impacts.

11.2.5 Environmental Protection Act 1994

The *Environmental Protection Act 1994* (EP Act) is administered by the Department of Environment, Tourism, Science and Innovation (DETSI) and was established to protect Queensland's environment, while allowing for development that improves the total quality of life, both now and in the future.

The EP Act provides maps under the *Environmental Protection 2019* (EP Regulation) that identify the locations of Wetland Protection Areas (WPA), which are buffer areas that protect High Ecologically Significant (HES) wetlands from high impact earthworks

The EP Regulation also lists categories of environmentally significant areas (ESAs) protected under the EP Act. ESAs are places designated for special protection due to their ecological, landscape, or historical importance. There are three categories of ESAs: Category A, B and C.

11.2.6 Vegetation Management Act 1999

The purpose of the *Vegetation Management Act 1999* (VM Act) is to regulate the clearing of native vegetation in Queensland, to conserve native vegetation, prevent the loss of biodiversity and maintain ecological processes. The VM Act applies to all vegetation, other than that in State forests, national parks and certain other tenures defined under the *Forestry Act 1959* (Forestry Act) and the *Nature Conservation*

Act 1992 (NC Act). Approval under the VM Act is not required for activities on a ML, nevertheless the VM Act provides the categorisation of vegetation used in assessments for resource projects on MLs.

The VM Act uses a series of maps to determine what vegetation is regulated and would require assessment should it be cleared for development. Regulated vegetation is categorised by its level of protection, including Category A (vegetation offsets/compliance notices), Category B (remnant), Category C (high-value regrowth), Category R (reef regrowth watercourse), and Category X (exempt clearing work on freehold, indigenous and leasehold land).

Categories containing remnant or regrowth vegetation are classified into protection types for regional ecosystems (REs): endangered, of concern or least concern. For activities not on an ML, the VM Act also regulates the clearing of vegetation that is considered essential habitat for species of State significance or intersects mapped wetlands and watercourses.

REs can be considered either or both an MSES or an ESA based on their different protection statuses under the VM Act, or biodiversity status. Their VM Act status is used for defining MSES under the *Environmental Offsets Act 2014* (EO Act) and the other relevant environmental legislation, while the biodiversity status is used for defining some ESAs under the EP Act. Where relevant, this chapter defines which status has been used to avoid confusion.

11.2.7 Planning Act 2016

The *Planning Act 2016* (Planning Act) outlines how development applications are assessed and approved in Queensland. However, where activities are undertaken on a ML they do not constitute assessable development under the Planning Act. No off tenement (ML) activities are proposed for the Project.

The Project will involve the clearing of native vegetation that is regulated vegetation under the VM Act. However, approval for vegetation clearing will be under the EP Act environmental authority for activities on a ML. Accordingly, the Project will not be assessed through a standard development application against State development assessment provisions (e.g. State code 16).

11.2.8 Nature Conservation Act 1992

The purpose of the NC Act is to protect Queensland's natural areas and biota, through the creation of national parks, reserves, conservation areas and the protection of threatened and special flora and fauna. The NC Act regulates development in protected areas and where protected species have been recorded by upholding a permit and licensing system for the taking and keeping of native wildlife.

The *Nature Conservation (Animals) Regulation 2020* and *Nature Conservation (Plants) Regulations 2020* provide lists of flora and fauna species that are recognised as extinct, extinct in the wild, critically endangered, vulnerable, near threatened, and special least concern (SLC). Should these species or their habitat be present in the vicinity of any project, this may result in permit requirements under the NC Act to interfere with them, such as Species Management Programs (SMP) for interfering with animal breeding places or Protected Plant Clearing Permits for clearing protected plants.

Under the NC Act, a high-risk SMP will be required for the Project where clearing activities are likely to impact the breeding place of State-listed threatened fauna.

The NC Act also regulates development within Koala habitat areas in southeast Queensland through the *Nature Conservation (Koala) Conservation Plan 2017*, and provides the flora survey trigger mapping, which shows 'high-risk' areas for protected plants (those protected under the NC Act) within non-protected areas, which is used to assist flora survey and clearing permit requirements for impacted developments.

No protected plants were identified within the Survey area, and no trigger areas were present. Therefore, a Protected Plants Clearing Permit under this Act is not required. No other authorities under the NC Act are required for the Project.

11.2.9 Water Act 2000

The purpose of the *Water Act 2000* (Water Act) is to sustainably plan, manage and protect the State's water resources. Waters mapped in the watercourse identification map are protected. Activities within 'mapped' waters may require a Riverine Protection Permit, including activities such as destroying vegetation, excavating, or placing fill, unless the exemption requirements apply to the activity.

11.2.10 Fisheries Act 1994

The *Fisheries Act 1994* (Fisheries Act) is responsible for ensuring Queensland fisheries resources remain economically viable and socially acceptable; and any development is ecologically sustainable. The Fisheries Act regulates development which is likely to impact on marine plants (e.g. mangroves); fish passage when development is considered waterway barrier works; and declared fish habitat areas. The Fisheries Act does not apply to activities on a ML.

11.2.11 Biosecurity Act 2014

The *Biosecurity Act 2014* (Biosecurity Act) provides management measures to protect the environment from pests and diseases in Queensland. Under the Biosecurity Act, invasive plants and animals are categorised as either a 'prohibited matter' or 'restricted matter'. Local governments in Queensland are required to develop a Biosecurity Plan to manage the matters that are present within the local area.

11.2.12 Environmental Offsets Act 2014

Under the EO Act, an environmental offset is defined as an activity undertaken to counterbalance a significant residual impact (SRI) of a prescribed activity on a prescribed environmental matter. An environmental offset may be required as a condition of an approval under various legislation, where following consideration of avoidance and mitigation measures, a prescribed activity is likely to result in an SRI on a prescribed environmental matter.

The EO Act, EO Regulation and the Queensland Environmental Offsets Policy (DETSI, 2025) comprise the Queensland Environmental Offsets Framework. According to this framework, it is necessary to provide offsets for any SRIs on MSES. However, as stated in the EO Act, an offset for a prescribed environmental matter which has been assessed under the EPBC Act is not subject to offset conditions under the EO Act.

The EO Regulation lists prescribed environmental matters that are MSES regulated under the EO Act and specifies the prescribed activities for which offsets may apply. A prescribed environmental matter includes but is not limited to protected areas, endangered or vulnerable wildlife, essential habitat, prescribed REs, connectivity areas, wetlands and watercourses, fish habitat areas, waterways for fish passage and marine plants.

SRIs for prescribed activities recognised under the EP Act are determined through the application of criteria outlined in the Queensland Environmental Offsets Policy - Significant Residual Impact Guideline (DEHP, 2014c).

11.2.13 Queensland Environmental Offsets Policy, version 1.17

The *Queensland Environmental Offsets Policy - Significant Residual Impact Guideline* (DEHP, 2014c) came into force in June 2016. It provides a single, consistent, whole-of-government policy for the assessment of offset proposals to satisfy offset conditions in Queensland. The Policy details how offset proposals are assessed to meet the requirements of the EO Act.

11.2.14 Isaac Region Biosecurity Plan 2024 -2027

The *Isaac Region Biosecurity Plan* (Liveability and Sustainability, 2024) defines stakeholder roles and responsibilities in the management of pest, plants and animals. Within the focus of this document, pest

animals and weeds are described as non-native invasive species that can have, or threaten to have, significantly negative impacts economically, culturally, environmentally, and socially.

11.2.15 Environmental Objectives and Performance Outcomes

The environmental objectives and performance outcomes, based on the EP Regulation and terms of reference (ToR) for the Project's EIS, that are relevant to the terrestrial ecology assessment, are provided in Table 11-1. A corresponding EIS section reference is provided demonstrating how the Project meets these environmental objectives and performance outcomes.

Table 11-1 Environmental Objectives and Performance Outcomes

Requirement	Environmental Objectives and Performance Outcomes	EIS Reference
EP Regulations	The choice of the site, at which the activity is to be carried out, minimises serious environmental harm on areas of high conservation value and special significance and sensitive land uses at adjacent places.	11.6, 11.6.1 12.4, 12.5 7.4, 7.5
Terms of Reference	The project minimises serious environmental harm on areas of high conservation value and special significance and sensitive land uses at adjacent places.	
Performance Outcomes		
1 Both of the following apply— (a) areas of high conservation value and special significance likely to be affected by the proposal are identified and evaluated and any adverse effects on the areas are minimised, including any edge effects on the areas;		11.6.1, 11.6.2 12.5
(b) the activity does not have an adverse effect beyond the site.		11.7, 11.7.1, 11.7.2 12.5
2 Both of the following apply— (a) areas of high conservation value and special significance likely to be affected by the proposal are identified and evaluated and any adverse effects on the areas are minimised, including any edge effects on the areas;		11.6.1, 11.6.2, 11.7.1, 11.7.2 12.4, 12.5
(b) critical design requirements will prevent emissions having an irreversible or widespread impact on adjacent areas.		11.6, 11.6.1, 11.6.2
Requirement	Environmental Objective	EIS Reference
EP Regulations	The activity is operated in a way that protects the environmental values of land, including soils, subsoils, landforms and associated flora and fauna.	11.6, 11.6.5, 11.7.1, 11.7.2 12.4, 12.5
Terms of Reference	The activity will be operated in a way that protects the environmental values of land including soils, subsoils, landforms and associated flora and fauna.	
Performance Outcomes		

2 (a) activities that disturb land, soils, subsoils, landforms and associated flora and fauna will be managed in a way that prevents or minimises adverse effects on the environmental values of land;		11.6, 11.6.5 Chapter 7
Requirement	Environmental Objective	EIS Reference
EP Regulations	The location for the activity on a site protects all environmental values relevant to adjacent sensitive uses.	11.6, 11.6.1 12.4, 12.5
Terms of Reference	The location for the activity on a site protects all environmental values relevant to adjacent sensitive use.	7.4, 7.5
Performance Outcomes		
1 The location for the activity means there will be no adverse effect on any environmental values.		Not applicable
2 Both of the following apply— (a) the activity, and components of the activity, are carried out on the site in a way that prevents or minimises adverse effects on the use of surrounding land and allows for effective management of the environmental impacts of the activity;		11.6, 11.6.1, 11.6.2, 11.6.3, 11.6.4, 11.6.5, 7.4, 7.5
(b) areas used for storing environmentally hazardous materials in bulk are located taking into consideration the likelihood of flooding.		9.4, 9.9 17.5, 17.9, 17.10
Additional Environmental Objective		
Terms of Reference	The project manages the impacts on the environment by seeking to achieve ecological sustainability, including protected wildlife and habitat.	11.6.2, 11.6.4, 11.6.5
	Critical habitat receives special management considerations and protection through a management plan for the project.	11.6.5, 11.6.5.3, 11.6.5.4 Appendix AG Appendix AH Appendix AI
	The project avoids significant residual impacts to matters of national environmental significance (MNES) and matters of state environmental significance (MSES), mitigates impacts where they cannot be avoided, and offsets any residual impacts.	11.7.1, 11.7.2, 11.7.3 12.4.11, 12.4.12, 12.5.10, 12.5.11 Appendix S Appendix R
	The construction, operation and decommissioning of the project must be consistent with all statutory and regulatory requirements of the federal, state and local government and be consistent with their relevant plans, strategies, policies and guidelines that relate to the terrestrial and aquatic ecological environment.	11.2, 11.5, 11.6 12.2, 12.4, 12.5
	There will be no potential or actual adverse effect on a wetland as part of carrying out the activity.	12.4.1.2, 12.5.3

11.2.16 EIS Guidelines

11.2.16.1 EIS Information Guideline – Terrestrial Ecology

The EIS assessment has been undertaken in accordance with the 'EIS Information Guideline – Terrestrial Ecology'¹. The relevant EIS sections where the requirement of this guideline have been addressed are provided in Table 11-2.

Table 11-2 *EIS Information Guideline - Terrestrial Ecology*

Guideline Requirement	Section of the EIS
Ecological surveys	11.3.2, 11.4.1, 11.4.1.1, 11.4.1.2, 11.4.1.3, 11.4.3
Who may undertake ecological surveys and prepare the EIS	Chapter 1 - Section 1.9
Desktop assessment	11.3
Field surveys	11.4, 11.4.1, 11.4.1.1, 11.4.1.2, 11.4.1.3, 11.4.3
Describe existing terrestrial ecological values	11.3, 11.3.1, 11.4, 11.4.3
Potential impacts	11.5, 11.7
Avoidance and mitigation measures	11.6, 11.6.5, 11.7

11.2.16.2 EIS Information Guideline – Biosecurity

The EIS assessment has been undertaken in accordance with the 'EIS Information Guideline – Biosecurity'². The relevant EIS sections where the requirement of this guideline have been address are provided in Table 11-3.

Table 11-3 *EIS Information Guideline - Biosecurity*

Guideline Requirement	Section of the EIS
General biosecurity obligation	11.2.11
Existing biosecurity risk	11.4, 11.4.1.3, 11.4.3.6
Potential carriers	11.5.3, 11.5.3.1
Managing biosecurity risk	11.6, 11.6.5.2

¹ https://www.detsi.qld.gov.au/_global/policy-register/policy-register-pdf?getdoc=5309&name=eis-tm-terrestrial-ecology-information-guide.pdf

² https://www.detsi.qld.gov.au/_global/policy-register/policy-register-pdf?getdoc=5297&name=eis-tm-biosecurity-information-guide.pdf

11.3 Desktop Information and Assessment

11.3.1 Site description

11.3.1.1 Bioregion and Habitat Context

The Project is situated within the Brigalow Belt bioregion, which spans approximately 216,000 km² across central Queensland and northern New South Wales (NSW). The bioregion is divided under the Interim Biogeographic Regionalisation for Australia (IBRA) into two IBRA regions: the Brigalow Belt North and Brigalow Belt South. The Project occurs within the Brigalow Belt North bioregion. The Brigalow Belt North bioregion comprises 14 IBRA subregions. The Project occurs within the Northern Bowen Basin subregion.

Vegetation within the bioregion and subregion historically included extensive forests and woodlands dominated by *Acacia harpophylla* (Brigalow) on clay soils. At its peak, *Acacia harpophylla* communities covered around six million hectares across Queensland, but widespread clearing for agriculture has since reduced their extent (Sattler & Williams, 1999b). In addition to remnant *Acacia harpophylla* communities, other ecosystem types typical of the bioregion include:

- Eucalypt forests and woodlands (often dominated by *Eucalyptus crebra* [Narrow-leaved Ironbark], *Eucalyptus populnea* [Poplar Box], and *Eucalyptus cambageana* [Dawson's Gum]).
- Grasslands and open downs.
- Dry rainforest and semi-evergreen vine thickets.
- Cypress pine woodlands.
- Riparian corridors and floodplain communities (often dominated by *Eucalyptus tereticornis* [Queensland Blue Gum] and *Eucalyptus camaldulensis* [River Red Gum]).

These diverse habitat types support a rich assemblage of native flora and fauna, including numerous threatened species and ecological communities protected under the EPBC Act and NC Act.

11.3.1.2 Catchment and Land Use Context

Information on the catchment and land use context for the Project area and surrounds is provided in the following chapters of the EIS:

- Climate - **Chapter 6**.
- Soils, land use and geology - **Chapter 7**.
- Regional and local catchments, watercourses and drainage features - **Chapter 8**.
- Groundwater dependent ecosystems (GDEs) - **Chapter 10**.
- Wetlands - **Chapter 12**, with information also provided in Section 11.4.3.7.

The Survey area has a long history of cattle grazing, predominantly associated with Winchester Downs Station. The vegetation communities have been subject to historical clearing, fragmentation, and grazing-related modification, with varying levels of regrowth and remnant persistence.

Livestock grazing is the dominant land use across the Fitzroy region, occupying approximately 121,511 km², or 78% of the total area (Dougall et al., 2014). Other major land uses include mining, dryland cropping (5%), nature conservation (8%), and forestry (6%).

Land zones 3, 4, 5, 8 and 9 were mapped as occurring in the Survey area, based on the State Vegetation Management mapping. Additional detail on these land zones is provided in Section 2.3 of **Appendix P**.

11.3.1.3 Existing Vegetation

The vegetation across the Survey area comprise a mix of non-remnant pasture, remnant, dieback remnant and regrowth vegetation at varying stages of structural and floristic recovery. These patterns reflect a long history of pastoral land use, primarily cattle grazing, which has shaped the landscape through clearing, modification, and ongoing land management.

The Survey area contains small mosaic patches of remnant vegetation communities including *Acacia harpophylla* forest and woodland, often occurring in association with *Eucalyptus cambageana*, *Eucalyptus populnea* and *Eucalyptus crebra*, particularly on heavy clay soils and weathered Tertiary surfaces. *Eucalyptus orgadophila* (Mountain Coolibah) woodlands are also present, particularly on loamy and basalt-derived substrates in the northern and southern extents. These communities occur as a mosaic of intact remnant patches, regrowth vegetation at various stages of development, and cleared or disturbed non-remnant pasture.

The central and northern portions of the Survey area support broad sand and clay plains, often interspersed with open pasture, native grasslands, dieback vegetation and open woodlands.

Riparian vegetation occurs along and adjacent to Conrock Gully, the Isaac River and Cherwell Creek. Riparian vegetation along Conrock Gully is generally a mix of *Eucalyptus coolabah* (Coolibah), *Acacia harpophylla* and *Eucalyptus populnea*, while riparian vegetation along the Isaac River and Cherwell Creek is a mix of *Eucalyptus camaldulensis*, *Eucalyptus tereticornis*, *Corymbia clarksoniana* (Clarkson's Bloodwood) and *Corymbia tessellaris* (Moreton Bay Ash). The riparian habitats provide important linear habitat connectivity for fauna species across the Survey area.

Patches of ephemeral wetland habitat also occurs, dominated by *Eucalyptus camaldulensis*, *Eucalyptus tereticornis* and/or *Eucalyptus coolabah*.

Many of the vegetation communities that occur within the Survey area exhibit signs of historical disturbance, including thinning, understorey modification, and pasture grass invasion.

The Survey area is situated within a rural landscape historically used for cattle grazing, which has been the dominant land use prior to mining and exploration activities. The Survey area has been progressively modified through vegetation clearing, infrastructure development, and pasture improvement, resulting in a mixed landscape comprising remnant vegetation, regrowth communities, and cleared pasture.

Analysis of historical aerial imagery obtained from QImagery and Google Earth reveals the timeline of land use change and clearing across the Survey area (see Section 2.3.9 of **Appendix P**):

The cumulative effect of these land use changes has resulted in a heterogeneous landscape, with areas of intact remnant vegetation, regrowth at varying successional stages, and non-remnant pasturelands. Grazing activities have shaped not only the vegetation structure but also the extent and distribution of weed invasion, groundcover composition, and soil condition. Pastoral infrastructure remains dispersed throughout the Survey area and includes fence lines, access tracks, bores, windmills, water tanks, troughs, and dams. These features reflect historical property management practices and continue to influence landscape condition and ecological connectivity.

Overall, the legacy of grazing and land clearing is evident across the Survey area, particularly in areas with younger regrowth, fragmented vegetation, and modified ground layers, while other portions retain significant ecological value through the presence of intact remnant communities.

11.3.2 Past Ecological Assessments

To date, a number of desktop and field ecological assessments for other nearby projects have been completed within and surrounding the Survey area. These assessments focussed on understanding the ecological values and identifying potential impacts from proposed exploration or mining operations, unrelated to the Project. The following ecological assessments have been completed within parts of the Survey area:

- 2007 – *Chapter 10 Nature Conservation. Integrated Isaac Plains Project EIS* (Matrix Consulting, 2007).
- 2010 – *Flora and Fauna Ecological Assessment, Moranbah South Coal Mine. Environment Protection and Biodiversity Conservation Act 1999. Proposed Seismic Survey, Moranbah South. Prepared for Anglo American Metallurgical Coal Pty Ltd* (Ison Environmental Planners, 2010).

- 2012 – *EIS assessment report under the Environmental Protection Act 1994. Moranbah South Project proposed by Anglo American Metallurgical Coal Pty Ltd* (Statewide Environmental Assessments, 2012).
- 2020 - *Terrestrial Ecology Impact Assessment Report. Isaac Downs Project* (EcoSM, 2020).

These previous ecological assessment reports were reviewed as part of the desktop study for the Project. Where data were relevant (e.g. threatened species records), they have been incorporated into the mapping and results for the Project, while other data (such as RE verification) has been refined further during the Project's field surveys.

11.3.3 Methodology

11.3.3.1 Database Review

A comprehensive desktop assessment and literature review were undertaken to identify the ecological values that were known or likely to occur within the Survey area. The desktop assessment included Commonwealth and State database searches, the analysis of mapping, aerial satellite images, and aerial photographs, and reviews of Conservation Advices, Recovery Plans, Draft Referral Guidelines, Listing Advices, the Department of Climate Change, Environment, Energy and Water (DCCEEW) Species Profile and Threats Database (SPRAT) database, and published research.

Where available, historical ecological data and previous ecological reports from the Survey area were also reviewed to provide additional context (see Section 11.3.2). This review informed the likelihood of occurrence assessments for listed flora and fauna (Section 11.3.4.1).

In addition to the ecological data review, existing survey methodologies and guidelines were examined to inform the design of the targeted field survey program and ensure our survey methods and effort aligned with current Commonwealth and State guidelines.

The databases and documents reviewed during the desktop assessment included those listed below in Table 11-4. For the results of the database searches refer to Appendix C of **Appendix P**.

Table 11-4 Information Sources Reviewed During the Desktop Assessment

Type	Source
Database Searches	DCCEEW EPBC Act Protected Matters Search Tool (PMST), using 20 km search radius
	Department of Natural Resources, Mines and Energy (DNRME) Regulated Vegetation and RE Mapping, including essential habitat, watercourse and wetland, and protected plants flora survey trigger mapping
	DETSI WildNet Conservation Significant species record database
	Atlas of Living Australia (ALA) threatened flora and fauna species records
	DETSI MSES Report
	DETSI ESA mapping
	DETSI mapped wetlands under the Queensland Wetlands Program and the <i>Environmental Protection (Water and Wetland Biodiversity) Policy 2019</i> (i.e. HES and general ecological significance [GES] wetlands) under the EP Regulation.
	DETSI Biodiversity Planning Assessment State and Regional biodiversity corridors
	DoR Detailed Surface Geology Mapping
Conservation and Listing Advice and Recovery Plans	All conservation and listing advice, and recovery plans for threatened ecological communities (TECs) and threatened and migratory species, available on the DCCEEW SPRAT database

Type	Source
	DCCEEW SPRAT database
Targeted Guidelines	Survey
	<i>EPBC Act Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the EPBC Act, 2011</i> (DSEWPaC, 2011a).
	<i>EPBC Act Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptile listed as threatened under the EPBC Act, 2011</i> (DSEWPaC, 2011b).
	<i>EPBC Act Survey guidelines for Australia's threatened bats</i> (DEWHA, 2010a).
	<i>EPBC Act Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act, 2010</i> (DEWHA, 2010b).
	<i>EPBC Act Survey guidelines for Australia's threatened frogs</i> (DEWHA, 2010c)
	<i>A review of koala habitat assessment criteria and methods</i> (Youngentob et al., 2021) and the <i>National Recovery Plan for the EPBC Act listed Koala, Phascolarctos cinereus</i> (DAWE, 2022b).
	<i>Guide to Greater Glider Habitat in Queensland</i> (Eyre, Smith, et al., 2022)
	<i>Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles</i> (DCCEEW, 2023).
	<i>Survey Guidelines for the Ornamental Snake</i> (Denisonia maculata; DCCEEW, 2025b)
	<i>Terrestrial Vertebrate Fauna Survey Guidelines for Queensland</i> (Eyre, Ferguson, et al., 2022)
Other Methodologies	Survey
	<i>Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland</i> (Neldner et al., 2023)
	<i>Flora Survey Guidelines—Protected Plants</i> (DES, 2020a)
	<i>Guide to determining terrestrial habitat quality—Methods for assessing habitat quality under the Queensland Environmental Offsets Policy v1.3 2020</i> (DES, 2020b)
	<i>BioCondition—A condition assessment framework for terrestrial biodiversity in Queensland. Assessment manual</i> (T. J. Eyre et al., 2015)
	<i>Offsets Assessment Guide, 2012</i> (DCCEEW., 2012)
	<i>How to use the Offsets Assessment Guide</i> (DCCEEW, n.d.)
	<i>EPBC Act Environmental Offsets Policy, 2012</i> (DSEWPaC, 2012a)
	<i>Environmental Management Plan Guidelines 2024</i> (DCCEEW, 2024e)
Significant Guidelines	Impact
	<i>MNES Significant Impact Guidelines 1.1, 2013</i> (DoE, 2013b)
	<i>Queensland Environmental Offsets Policy - Significant Residual Impact Guideline</i> (DEHP, 2014c)
Aerial Imagery	Queensland Globe 2025
	Google Earth Pro 2025
	NearMap 2025
	GeoResGlobe 2025

11.3.3.2 Likelihood of Occurrence

A likelihood of occurrence assessment was undertaken as part of the desktop assessment to identify the TECs and threatened and migratory species (both Commonwealth and State-listed threatened and migratory species), and State-listed SLC species, that have previously been recorded in the vicinity or are

considered likely to occur, or may occur, based on location, habitat suitability, and available species records.

To determine habitat preferences and refine likelihood ratings, a literature review of relevant Commonwealth and State documents was undertaken including but not limited to approved Conservation Advices, Recovery Plans, Listing Advices, and Referral Guidelines. The outcomes of the likelihood of occurrence assessment were used to focus field survey efforts on those TECs and threatened, migratory and SLC species occurring or potentially occurring within the Project area.

The likelihood of occurrence assessment for the Project was undertaken using the Area of Interest (20 km buffer area from the Survey area) and Region (50 km buffer area from the Survey area). The TECs, and threatened, migratory and SLC species were identified using results from the EPBC Act PMST, WildNet database, and ALA database (database search result reports are provided in Appendix C of **Appendix P**).

Each matter was assigned a likelihood category of ‘known to occur’, ‘likely to occur’, ‘may occur’ or ‘unlikely to occur’, based on the definitions provided in Table 11-5. These definitions were applied as a guide, with professional judgement used to decide likelihood ratings where species-specific ecology or behaviour (e.g. aerial, cryptic or migratory nature) warranted refinement. Matters that have ‘potential to occur’ comprise those that are ‘known to occur’, ‘likely to occur’ or ‘may occur’.

Following completion of the field surveys, the likelihood of occurrence results were reviewed and updated to incorporate confirmed species records and habitat evidence observed within the Survey area. The results of the likelihood of occurrence desktop assessment are presented in Section 11.3.4.1.

Table 11-5 **Explanation of terms used in the likelihood of occurrence assessment**

Terms	Definition
Known to occur	Recorded within the Survey area during the targeted field surveys or previously recorded within the Survey area during recent (<10 years) surveys by other Consultants.
Likely to occur	- The Survey area supports the species habitat with associated habitat attributes (e.g., microhabitats), AND recent (<10 years) records occur within the Area of Interest OR - For project sites within known distribution areas for the Koala, Greater Glider (central and southern; <i>Petauroides volans</i>; herein referred to as Greater Glider) and Ornamental Snake, these species were considered ‘likely to occur’ irrespective of recent and adjacent records, if the species habitat was likely to occur in accordance with habitat definitions provided in Youngentob et al., (2021), Eyre, Smith et al., (2022) and DCCEEW (2023b) respectively.
May occur	The Survey area supports at least marginally suitable habitat (e.g., dispersal habitat) AND historical records (>10 years) occur within the Area of Interest OR recent records (<10 years) occur within the Region.
Unlikely to occur	- The Survey area does not support habitat for the species or associated habitat features, regardless of species records within the Area of Interest or within the Region OR - Species habitat occurs within the Survey area, but no records occur within the Area of Interest or only historical records within the Region.

11.3.4 Desktop Assessment Results

11.3.4.1 Likelihood of occurrence

The outcomes of the likelihood of occurrence desktop assessment are formulated and provided in tables in Appendix B of **Appendix P**, which provides information on habitats, species records and rationale for determination of likelihood of occurrence. The desktop level assessment was based on potential occurrence within the Survey area. A summary of the likelihood of occurrence assessment is provided in Table 11-6.

Table 11-6 Likelihood of Occurrence Assessment - Summary

Name	Status		Likelihood of Occurrence
	QLD ²	CTH ¹	
Threatened Ecological Communities			
Brigalow TEC	-	EN	Likely to occur
Natural Grasslands TEC	-	EN	Likely to occur
Poplar Box TEC	-	EN	Likely to occur
SEVT TEC	-	EN	May occur
Listed Threatened Flora Species			
<i>Ptilotus uncinellus</i>	EN	-	Unlikely to occur
<i>Denhamia megacarpa</i> (Large-fruited Denhamia)	EN	-	Unlikely to occur
<i>Bertya pedicellata</i>	NT	-	Unlikely to occur
<i>Bertya opposens</i>	LC	VU	Unlikely to occur
<i>Omphalea celata</i>	VU	VU	Unlikely to occur
<i>Polianthion minutiflorum</i>	VU	VU	Unlikely to occur
<i>Eucalyptus raveretiana</i>	LC	VU	Unlikely to occur
<i>Dichanthium queenslandicum</i> (King Blue-grass)	VU	EN	Likely to occur
<i>Dichanthium setosum</i> (Bluegrass)	LC	VU	May occur
<i>Samadera bidwillii</i> (Quassia)	VU	VU	Unlikely to occur
<i>Solanum adenophorum</i>	EN	-	Unlikely to occur
<i>Solanum elaeagnifolium</i>	EN	-	Unlikely to occur
Listed Threatened Fauna Species			

Name	Status		Likelihood of Occurrence
	QLD ²	CTH ¹	
<i>Erythrotriorchis radiatus</i> (Red Goshawk)	EN	EN	Unlikely to occur
<i>Geophaps scripta scripta</i> (Squatter Pigeon (southern subspecies))	VU	VU	Known to occur
<i>Neochmia ruficauda ruficauda</i> (Star Finch (eastern and southern))	EN	EN	Unlikely to occur
<i>Poephila cincta cincta</i> (Southern Black-throated Finch)	EN	EN	Unlikely to occur
<i>Stagonopleura guttata</i> (Diamond Firetail)	VU	VU	Unlikely to occur
<i>Falco hypoleucos</i> (Grey Falcon)	VU	VU	Unlikely to occur
<i>Rostratula australis</i> (Australian Painted Snipe)	EN	EN, M	Likely to occur
<i>Calidris acuminata</i> (Sharp-tailed Sandpiper)	SLC	VU, M, Mi	May occur
<i>Calidris ferruginea</i> (Curlew Sandpiper)	CR	CE, M, Mi	Unlikely to occur
<i>Gallinago hardwickii</i> (Latham's Snipe)	SLC	VU, M, Mi	Unlikely to occur
<i>Tringa nebularia</i> (Common Greenshank)	Mi	EN, Mi	May occur
<i>Dasyurus hallucatus</i> (Northern Quoll)	LC	EN	Unlikely to occur
<i>Macroderma gigas</i> (Ghost Bat)	EN	VU	Unlikely to occur
<i>Phascolarctos cinereus</i> (Koala)	EN	EN	Known to occur
<i>Petauroides volans</i> (Greater Glider (southern and central))	EN	EN	Known to occur
<i>Nyctophilus corbeni</i> (Corben's Long-eared Bat)	VU	VU	Unlikely to occur
<i>Rheodytes leukops</i> (Fitzroy River Turtle)	VU	VU	Unlikely to occur
<i>Elseya albagula</i> (White-throated Snapping Turtle)	CR	CE	Unlikely to occur
<i>Denisonia maculata</i> (Ornamental Snake)	VU	VU	Known to occur
<i>Acanthophis antarcticus</i> (Common Death Adder)	VU	-	Unlikely to occur

Name	Status		Likelihood of Occurrence
	QLD ²	CTH ¹	
<i>Furina dunmalli</i> (Dunmall's Snake)	VU	VU	Unlikely to occur
<i>Hemiaspis damelii</i> (Grey Snake)	EN	EN	Unlikely to occur
<i>Egernia rugosa</i> (Yakka Skink)	VU	VU	Unlikely to occur
Listed Migratory Species			
<i>Apus pacificus</i> (Fork-tailed Swift)	SLC	M, Mi	May occur
<i>Cuculus optatus</i> (Oriental Cuckoo)	SLC	Mi	May occur
<i>Motacilla flava</i> (Yellow Wagtail)	SLC	M, Mi	Unlikely to occur
<i>Actitis hypoleucos</i> (Common Sandpiper)	SLC	M, Mi	Unlikely to occur
<i>Calidris melanotos</i> (Pectoral Sandpiper)	SLC	M, Mi	Unlikely to occur

¹ Commonwealth (CTH) Status (EPBC Act; Cth): EX = Extinct, EW = Extinct in Wild, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, M = Marine, Mi = Migratory

² Queensland (Qld) status (NC Act EX = Extinct, EW = Extinct in the Wild, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern or SLC = Special least concern

Notes: Greyed out species are considered unlikely to occur.

11.3.4.2 Matters of National Environmental Significance

As part of the desktop assessment, MNES with the potential to occur within the Survey area were identified, as these may be impacted by the Project and therefore required verification during field surveys. This assessment was based on the results of a search of the Commonwealth's EPBC Act PMST for the Survey area using a 20 km radius.

A determination of the likely presence of TECs was undertaken by reviewing whether any of the corresponding REs listed within the relevant DCCEW Conservation or Listing Advice for each of the identified TECs occur within the Survey area.

Based on the PMST, the likelihood of occurrence assessment and the Vegetation Management RE mapping for the Survey area, the desktop assessment identified four TECs that were considered likely to or may occur within the Survey area, namely:

- Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC (Brigalow TEC)
- Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin TEC (Natural Grasslands TEC)
- Poplar Box Grassy Woodland on Alluvial Plains TEC (Poplar Box TEC)
- Semi-evergreen vine thickets (SEVT) of the Brigalow Belt (North and South) and Nandewar Bioregions TEC (SEVT TEC).

The actual presence of TECs within the Survey area was verified during the field surveys. Field-verified TECs were used to assess likely impacts from the Project.

The likelihood of occurrence assessment for threatened and migratory species listed under the MNES identified several threatened flora, birds, mammals and reptiles, and migratory species as either 'may occur', 'likely to occur' or 'known to occur', based on presence during previous surveys undertaken within the Survey area, desktop mapped habitat and verified records within the Area of Interest or Region. These species included:

- Two threatened flora species - *Dichanthium queenslandicum* and *Dichanthium setosum* (bluegrass).
- Four threatened bird species - Squatter Pigeon (southern subspecies; *Geophaps scripta scripta*), Australian Painted Snipe (*Rostratula australis*), Sharp-tailed Sandpiper (*Calidris acuminata*) and Common Greenshank (*Tringa nebularia*).
- Two threatened mammal species – the Koala and Greater Glider (southern and central).
- One threatened reptile species – the Ornamental Snake.
- Two migratory bird species – the Fork-tailed Swift (*Apus pacificus*) and Oriental Cuckoo (*Cuculus optatus*). The Fork-tailed Swift is listed under international agreements including the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), China-Australia Migratory Bird Agreement (CAMBA) and Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA). The Oriental Cuckoo is listed under CAMBA, ROKAMBA and Japan-Australia Migratory Bird Agreement (JAMBA).

Based on the likelihood of occurrence assessment, the Squatter Pigeon, Koala, Greater Glider (southern and central), Ornamental Snake were considered 'known to occur' due to previous detections within the Survey area (based on previous surveys, as per Section 11.3.2), while all other species were considered 'likely to occur' or 'may occur' based on the identification of suitable habitat mapped within the Survey area, and nearby species records (e.g., from the ALA database).

These species were targeted during field surveys to verify their presence and determine the extent of habitat available within the Survey area.

11.3.4.3 Matters of State Environmental Significance

Section 4.3 of **Appendix P** describes the desktop assessment identifying MSES that were potentially occurring within the Survey area based on Vegetation Management regulated vegetation and RE mapping, namely:

- regulated vegetation:
 - regional ecosystems and prescribed regional ecosystems that are endangered or of concern
 - prescribed REs intersecting VM Act watercourses and wetlands
 - essential habitat for listed threatened species
- high ecologically significant wetlands
- protected wildlife habitat
- waterways providing for fish passage
- connectivity areas and integrity of ecosystems.

11.3.4.4 Environmentally Sensitive Areas

Section 4.4 of **Appendix P** describes the desktop assessment identifying ESAs that were potentially occurring within the Survey area. The only ESA with potential to occur in the Survey area is an endangered RE.

11.3.5 Habitat Mapping and Definition

For species habitat mapping, habitat category classifications (e.g. breeding, foraging and dispersal habitat) were defined in accordance with habitat definitions available in the EPBC Act Guidelines or other relevant, most recent, statutory documents (e.g. referral guidelines, approved listing advice(s), approved conservation advice(s), recovery plan(s), threat abatement plan(s) or comparable policy guidelines, and information contained in relevant Commonwealth databases such as the SPRAT database). The habitat definitions for each target species and ecological community are described in Table 11-9, with the targeted survey effort per season detailed for each species.

DCCEEW defines key terms for MNES under the EPBC Act, for assessing the potential for a significant impact on threatened species and ecological communities, and migratory species. These key terms include 'habitat critical to the survival of the species', 'important habitat', 'important population', 'important habitat for migratory species' and 'ecologically significant proportion of a migratory species population'. General definitions for these terms have been provided below in Table 11 of **Appendix P**. Where specific key terms have been defined for MNES, these have been provided in Table 11-9.

Defined species habitat definitions (e.g. breeding, foraging, dispersal) were first defined for each conservation significant species and ecological community identified as potentially occurring within the Survey area. Where available, DCCEEW key defining terms (e.g. critical habitat, important habitat, important populations and ecologically significant proportions of populations) were identified and applied to each conservation significant species and ecological community to ensure consistency with the significant impact assessment framework.

To initially map species habitat to inform targeted surveys, spatial datasets were used including RE mapping (specifically REs that have been notable and historically associated with species habitat as defined within the essential habitat map), aerial imagery, and hydrological features in ArcGIS Pro. Key data sources for these spatial datasets included the Queensland WildNet database, the PMST, and species-specific habitat models.

Targeted field assessments were subsequently undertaken to verify and refine the conservation significant species and ecological communities occurring or potentially occurring within the Survey area and the habitat extents for each. This involved assessing vegetation structure, floristic composition, habitat connectivity, and identifying evidence of fauna presence. Key habitat attributes, such as host plant

occurrence, hollow-bearing trees, water sources, and species-specific microhabitats, were documented. Observations were cross-referenced with known species records and ecological requirements to ensure accurate habitat suitability assessments.

Following field verification, species habitat and key defining terms for the conservation-significant species and ecological communities that were confirmed (known to occur) or had habitat verified within the Survey area were mapped. Field verified species and ecological community maps are provided in Figure 11-2 to Figure 11-12.

These maps contain both species habitat, and where available, the key defining terms which informed the MNES significant impact assessment for the Project (See Section 11.7.1).

11.4 Field Assessment and Environmental Values

The field assessment leveraged the insights obtained from the desktop assessment and likelihood of occurrence assessment and was designed to verify all pertinent ecological values within the Survey area.

The objectives of the field assessment were to:

- Verify REs and vegetation communities within the Survey area.
- Verify any TECs within the Survey area.
- Quantify the area of habitat for Commonwealth- and State-listed threatened, migratory and SLC species within the Survey area, and assess the quality and condition of the habitat.
- Use targeted survey techniques to identify the presence of Commonwealth- and State-listed threatened, migratory and SLC species within the Survey area.
- When a Commonwealth- and State-listed threatened, migratory and SLC species was recorded, estimate the population extent and density of the species within the Survey area.
- Record incidental sightings of all flora and fauna species within the Survey area.
- Record and quantify biosecurity risks including weed and pest animal species within the Survey area, in accordance with the Biosecurity—EIS information guideline (DETSI, 2026a).

The field surveys consisted of:

- a reconnaissance survey
- seasonal targeted surveys (wet and dry season).

11.4.1 Methodology

11.4.1.1 Survey Extent and Timing

The reconnaissance survey was undertaken to assess the accuracy of the desktop assessment information, particularly the RE mapping, and to assist in planning the targeted field survey program. The reconnaissance survey covered the entire Survey area and ensured that appropriate survey effort and methods were applied in accordance with relevant Commonwealth and State ecological survey guidelines.

The targeted field survey program involved seasonal surveys and covered the entire Survey area. The targeted field survey program was undertaken during applicable seasons (wet and dry) to provide the highest chance of detecting threatened, migrant, and vagrant species likely to occur. Survey timing was planned to align with seasonal peaks in flora reproductive activity and fauna detectability, with field surveys conducted between November 2024 and May 2025.

Late dry-season surveys were undertaken as temperatures began to warm, coinciding with a peak in vertebrate activity with the commencement of the breeding season for many fauna species. Late wet-season surveys were undertaken as temperatures decreased but before the onset of cold winter nights, coinciding with an active period for dispersal and migration for many fauna species, as well as the growing season for many grass and forb species.

The specific dates for the timing and survey methods of each survey event are summarised in Table 11-7, along with survey dates.

Table 11-7 Survey Dates, Method and Summary of Methods

Survey Dates	Season	Summary of Survey Methods
4 - 8 November 2024	Late dry season	Reconnaissance Survey - Verification of REs, vegetation communities and TECs
18 - 26 November 2024	Late dry season	Targeted Survey - Verification of REs and TECs, Habitat Quality Assessments, Targeted survey methods
5 - 10 May 2025	Late wet season	Targeted Survey - Verification of REs and TECs, Habitat Quality Assessments, Targeted survey methods
19 - 24 May 2025	Late wet season	Targeted Survey - Verification of REs and TECs, Habitat Quality Assessments, Targeted survey methods

11.4.1.2 Climatic Conditions

Rainfall was minimal during the dry season (September–November 2024), with only isolated low-intensity rainfall events recorded. The wet season (December 2024–May 2025) showed a marked increase in rainfall frequency and intensity, with several significant rainfall peaks exceeding 20 mm, with two events exceeding 60 mm: at the start of February 2025 and at the end of March 2025. Rainfall declined sharply from April 2025 onward, returning to low levels consistent with the onset of the dry season from June 2025.

The dry season survey periods undertaken in November 2024 were characterised by generally hot and dry conditions, with minimum temperatures ranging from 16.4°C to 21.1°C and maximum temperatures ranging from 29.1°C to 39.8°C. Relative humidity ranged from 19% to 66%.

The wet season survey periods undertaken in May 2025 experienced comparatively cooler conditions, with minimum temperatures ranging from 4.8°C to 17.3°C and maximum temperatures ranging from 24.4°C to 29.6°C. Relative humidity ranged from 33% to 69%.

For further information on the climatic conditions during the surveys, refer to Section 3.3.3 of **Appendix P**.

11.4.1.3 Survey Methodology and Survey Effort

The desktop likelihood of occurrence assessment (Section 11.3.4.1) identified several TECs, and threatened and migratory species recognised as MNES under the EPBC Act, as well as threatened and SLC species, whose habitat is recognised as an MSES under the EO Act. Targeted survey efforts were undertaken to verify the presence, absence, or habitat suitability of these MNES and MSES values within the Survey area. Surveys were designed to align with the relevant Commonwealth and State survey guidelines, ensuring appropriate survey design, timing, and effort to maximise detectability and data reliability.

In addition to targeted surveys, a range of vegetation and habitat assessments were also conducted. The survey methods and effort applied are detailed in Table 11-8. For further information detailing the corresponding survey locations, refer to Section 3.3.4 of **Appendix P** and map 2 and 3 in Appendix B of **Appendix P**.

Table 11-9 details:

- the habitat definitions used for each potentially occurring TEC, threatened, migratory and SLC species (as per Section 11.3.4) in the Survey area, to target survey effort;

- any known important populations, important habitat or habitat critical to the survival of each species or TEC, as defined in approved Listing or Conservation Advice, Recovery Plans, Referral guidelines, the DCCEE SPRAT database, and the Commonwealth and State targeted species guidelines
- the survey effort undertaken for each species within the Survey area to achieve the recommended effort within the relevant Commonwealth and State survey guidelines (see also Table 10 of **Appendix P**).

For information detailing the survey limitations, refer to Section 3.8 of **Appendix P**.

Table 11-8 Survey Effort

Survey Type	Target Value	Justification and method	Survey Effort		
			Dry Season 2024	Wet Season 2024	TOTAL
Vegetation Assessments	All remnant and regrowth areas	Vegetation Assessments were undertaken using a combination of Tertiary and Quaternary assessments in accordance with the <i>Methodology for surveying and mapping regional ecosystems and vegetation communities in Queensland v7.0</i> (Neldner et al., 2023). The Tertiary and Quaternary assessments identified the structural composition and the dominant and conspicuous species within a vegetated patch. Verified REs and their corresponding Broad Vegetation Group (BVG) were used to identify and group vegetation communities with similar structural and floristic characteristics within the Survey area.	161		
TEC Verification	Any suspected TEC areas	Suspected TEC patches were evaluated against the key diagnostic criteria and condition thresholds within the relevant DCCEEW Conservation or Listing Advice. These data were then vetted using GIS techniques (e.g., Statewide Landcover and Trees Study (SLATS) Foliage Projection Cover data) to include/exclude areas based on condition and area extent (if relevant).	34, including five for Native Grassland TEC, 18 for Brigalow TEC, and 11 for Poplar Box TEC.		
Habitat Suitability Assessments	All remnant and regrowth areas	Habitat Suitability Assessments were undertaken to assess the potential for vegetation communities to support threatened, migratory and SLC species that were identified as occurring or potentially occurring through the Likelihood of Occurrence assessment in Appendix B. Habitat definitions for the target species used definitions available in the <i>EPBC Act Guidelines</i> or other relevant, most recent, statutory documents (e.g., referral guidelines, approved listing advice(s), approved conservation advice(s), recovery plan(s), threat abatement plan(s) or comparable policy guidelines, and information contained in relevant Commonwealth databases such as the SPRAT database). The habitat definitions have been described per target species in Table 11-9.	34		
Habitat Quality Assessments	All AUs	Habitat Quality Assessments to assess habitat condition were undertaken in accordance with the State's <i>Guide to determining terrestrial habitat quality v1.3 (DES, 2020b)</i> , and the Commonwealth's <i>How to use the Offsets Assessment Guide</i> (Department of Environment, n.d.). These frameworks are based on the BioCondition Manual (Eyre et al., 2015a).	33		

Survey Type		Target Value	Justification and method	Survey Effort		
				Dry Season 2024	Wet Season 2024	TOTAL
Weed Detection Sites		N/A	Where high abundances of weed species were detected, particularly those recognised under Commonwealth or State legislation, a Weed Detection assessment was undertaken to record the species and extent of disturbance.	17		
Targeted Methods	Cage Traps	Medium-sized Mammals	Transect containing four traps per trap site open for a minimum of four nights. Each trap was baited with a mixture of peanut butter, oats and honey; or bacon/chicken necks, coated in fish oil. The cage traps were placed in shaded areas with hessian cloth used to cover the exterior to provide shelter and thermal protection during hot periods. Traps were opened in the afternoon of each day and inspected in the early morning. Note, all trap sets ups were in accordance with Trend Environmental's ethics approval.	Four transects, 64 trap nights	Four transects, 64 trap nights	Eight transects 128 trap nights
	Elliot Traps	Small sized mammals	20 traps at 5 metre (m) intervals along a 100 m transect; open for a minimum four nights in accordance with the <i>Terrestrial Vertebrate Fauna Survey Guidelines for Queensland</i> (T. J. Eyre, Ferguson, et al., 2022). The traps were baited with peanut butter balls, with some coated with fish oil. Traps were placed within shaded areas with suitable microhabitat features within the immediate vicinity. Traps were opened in the afternoon of each day and inspected early in the morning.	Six transects, 480 trap nights	Six transects, 480 trap nights	Twelve transect, 960 trap nights
	Pitfall and Funnel Traps	Reptiles and amphibians	Four buckets at 7.5 m intervals on a T-design using 45 m of silt fence; with six funnel traps 3 m from the distal ends of the T-design. Traps were open for a minimum of four nights, in accordance with the <i>Terrestrial Vertebrate Fauna Survey Guidelines for Queensland</i> (T. J. Eyre, Ferguson, et al., 2022). Leaf litter, small sticks and a saturated sponge for moisture were placed in each bucket. White vinegar was used around the outside of the pitfalls where needed as an ant deterrent. Pitfall and funnel traps were inspected early in the morning, with closure of traps during the day.	Four trap sites, 64 trap nights for pitfalls and 96 trap nights for funnels	Four trap sites, 64 trap nights for pitfalls and 96 trap nights for funnels	Eight trap sites, 128 trap nights for pitfalls, and 192 trap nights for funnels
	Harp Trap	Bats	Harp traps were set up in restricted flyways in well vegetated areas, such as along creek lines and tracks, placed where fringing vegetation abutted the trap edges on both sides and above. A minimum of two trap nights per sampling site was undertaken. Harp traps were left set in the late afternoon, inspected at dawn, and closed during the day.	Four trap sites, 10 trap nights	Nil	Four trap sites, 10 trap nights
	Infrared Camera Traps	All fauna	Infrared camera traps were deployed to capture diurnal and nocturnal fauna. Traps were routinely baited daily. Each trap was baited with cat food; or chicken necks coated in fish oil. Camera traps were randomly placed to gain representative cover within the Survey area. The were place where microhabitat features were suitable e.g., near dams and wetlands, within	3 cameras, 13 trap	10 cameras, 27 trap sites, 200 trap nights,	230 trap nights.

Survey Type		Target Value	Justification and method	Survey Effort		
				Dry Season 2024	Wet Season 2024	TOTAL
			creek lines, and near dense vegetation stands. A minimum of one trap night per location was undertaken.	sites, 30 trap nights	including 100 surrounding the HES wetland targeting Squatter Pigeon and wetland birds	
	Acoustic Device	Bats	Acoustic bat detection devices were used to identify the presence of threatened bat species. Devices were deployed where suitable habitat features and flyways occurred. A minimum of two trap nights per location was undertaken.	One device, four trap sites, 10 trap nights	Two devices, four trap sites, 20 trap nights	Eight trap sites, 30 trap nights
	Scat and sign searches	All fauna	Searches included looking for signs of animal activity, such as tracks, scats, scratches, nests, and burrows. Searches were usually conducted during vegetation assessments, fauna habitat assessments and active searches, as well as sporadic, opportunistic searches within suitable habitat. As a result, these search locations have not been shown on Map 3, Appendix A.	~25	~25	~50
	Diurnal Active searches	Reptiles and amphibians	Non-destructive diurnal active searches of all microhabitat features within a 50 x 50 m area for 15-minute periods to detect presence of fauna. Where possible, two personnel conducted active searches adjacent to each other, covering a 100 x 100 m area, in accordance with the <i>Terrestrial Vertebrate Fauna Survey Guidelines for Queensland</i> (T. J. Eyre, Ferguson, et al., 2022). Active searches were undertaken at all times of the day, including in the morning when temperatures rise and reptiles are basking and starting to become active. Searches focused on key habitat features such as dense leaf litter and fallen woody debris, soil cracks, rocky areas and crevices, hollow logs and burrows.	6	35	41
	Spotlight Transects	Nocturnal fauna	Spotlighting transects were performed by two personnel per spotlighting event, approximately 50 m apart in suitable habitat areas of targeted threatened nocturnal species particularly the Koala, Greater Glider and Ornamental Snake.	Six person hours	Twelve person hours	18 person hours

Survey Type		Target Value	Justification and method	Survey Effort		
				Dry Season 2024	Wet Season 2024	TOTAL
			Spotlighting transects were undertaken in accordance with the <i>Terrestrial Vertebrate Fauna Survey Guidelines for Queensland</i> (T. J. Eyre, Ferguson, et al., 2022). Given the large size of the Survey area, spotlighting transects involved a combination of walking and driven transects, covering anywhere from 2 km to 10 km per spotlighting night. Binoculars and spotlights with red filters were used during the spotlight transects.			
	Bird surveys	Avian species	Standardised bird surveys were undertaken in accordance with the Birdlife Australia methodology, where one personnel undertook a 2 ha/20-minute standardised survey. The observer recorded the number and species of birds observed or heard aurally.	Nine bird surveys, Three person hours	21 bird surveys, Seven person hours	30 bird surveys, Ten person hours
	Flushing surveys	Squatter Pigeon (southern)	Two ecologists walked the Survey area conducting flushing surveys for the Squatter Pigeon, in accordance with <i>EPBC Act Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act, 2010</i> (DEWHA, 2010b). Note, flushing surveys are not represented on Map 3, Appendix B as these were incidentally completed when completing all other survey types.	~125 person hours, over ten days, including ~60 hours during reconnaissance survey	~80 person hours, over ten days	~265 person hours, over 25 days
	Land-based area searches	Australian Painted Snipe	Land-based area searches surrounding wetland habitat were undertaken to target the Australian Painted Snipe. Note, land-based area searches are not represented on Map 3, Appendix B as these were incidentally completed when completing other survey types surrounding wetland habitats.	Five person hours, over ten days	Seven person hours, over ten days	Twelve person hours, over 20 days
Animal Breeding Place Survey		Animal Breeding Places	Animal breeding places were recorded in accordance with the <i>Information Sheet Species Management Program Requirements for tampering with a protected animal breeding place in Queensland</i> (DES, 2020c)	~50 person hours	~50 person hours	~100 person hours
Incidental Observations		All flora and fauna	All fauna observed incidentally within the Survey area were recorded.	N/A		

Table 11-9 Habitat Descriptions and Targeted Survey Effort for Potentially Occurring TECs and Species

Family	Scientific Name	Common Name	Key Habitat Terms used by DCCEW	Defined Species Habitat Definitions	Targeted Survey Effort	
					Dry Season 2024	Wet Season 2025
THREATENED FLORA						
Poaceae	<i>Dichanthium queenslandicum</i>	King Bluegrass	None defined	Suitable habitat - Black cracking clay in tussock grasslands, mainly in association with other species of blue grasses (<i>Dichanthium</i> spp. and <i>Bothriochloa</i> spp.) but also with other grasses restricted to this soil type (Fletcher, 2001).	Random meanders in suitable habitat areas (RE11.3.21, 11.8.11). 154 vegetation assessments. Incidental records.	Random meanders in suitable habitat areas (RE11.3.21, 11.8.11). Seven vegetation assessments. Incidental records.
Poaceae	<i>Dichanthium setosum</i>	Bluegrass	None defined	Suitable habitat - Associated with heavy basaltic black soils and stony red-brown hard-setting loam with clay subsoil (Ayers et al., 1996) and is found in moderately disturbed areas such as cleared woodland, grassy roadside remnants, grazed land and highly disturbed pasture.	Random meanders in suitable habitat areas (RE11.3.21, 11.8.11). 154 vegetation assessments. Incidental records.	Random meanders in suitable habitat areas (RE11.3.21, RE11.8.11). Seven vegetation assessments. Incidental records.
THREATENED ECOLOGICAL COMMUNITIES						
Brigalow TEC			Areas critical to the survival of the ecological community are all patches that meet the key diagnostic criteria and conditions thresholds in the Approved Conservation advice for the TEC (TSSC, 2013)	As per the key diagnostic criteria and condition thresholds in the Approved Conservation Advice for the TEC (TSSC, 2013).	154 vegetation assessments. 15 TEC assessments in suspect Brigalow TEC patches.	Seven vegetation assessments. Three TEC assessments in suspect Brigalow TEC patches.
Natural Grasslands TEC			None defined (TSSC, 2009).	As per the key diagnostic criteria and condition thresholds in the Listing Advice for the TEC (TSSC, 2009).	154 vegetation assessments. Three TEC assessments in	Seven vegetation assessments. Two TEC assessments in

Family	Scientific Name	Common Name	Key Habitat Terms used by DCCEEW	Defined Species Habitat Definitions	Targeted Survey Effort	
					Dry Season 2024	Wet Season 2025
					suspect Natural Grassland TEC patches.	suspect Natural Grassland TEC patches.
Poplar Box TEC			Areas critical to the survival of the ecological community are the best quality, most intact patches of the ecological community (Class A – Highest condition; DoEE, 2019)	As per the key diagnostic criteria and condition thresholds in the Conservation Advice for the TEC (DoEE, 2019)	154 vegetation assessments. Ten TEC assessments in suspect Poplar Box TEC patches.	Seven vegetation assessments. Two TEC assessments in suspect Brigalow TEC patches.
SEVT TEC			Areas critical to the survival of the ecological community are all patches that meet the definition of the TEC (DCCEEW, 2023a).	As per the definition Conservation Advice for Semi-evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions TEC (DCCEEW, 2023a).	154 vegetation assessments.	Seven vegetation assessments.
THREATENED BIRDS						
Columbid ae	<i>Geophaps scripta scripta</i>	Squatter Pigeon (southern)	No critical habitat for the survival of the species has been defined. And no important habitat has been defined. An important population is defined as the southern boundary of its known distribution (southern Queensland). Therefore, all of the relatively small, isolated and sparsely distributed sub-populations occurring south of the Carnarvon Ranges in Central Queensland (the Project is north of the Carnarvon Ranges) are considered to be important sub-populations of the subspecies (Squatter Pigeon Workshop, 2011). This includes, but is not limited to:	Habitat for the Squatter Pigeon was defined as breeding, foraging and dispersal as per the following definitions (DCCEEW, 2025a): Breeding habitat: Any remnant or regrowth open-forest to sparse, open-woodland or scrub dominated by Eucalyptus, Corymbia, Acacia or Callitris species, on sandy or gravelly soils with patchy perennial tussock grasses or a mix of perennial tussock grasses and low shrubs and forbs, within 1 km from permanent and seasonal water (including but not limited to areas mapped as Queensland land zones 3, 5 or 7). Foraging habitat: Any remnant or regrowth open-forest to sparse, open-woodland or scrub dominated by Eucalyptus, Corymbia,	Nine Bird plot surveys – Three survey hours over multiple days. Flushing surveys - Whole Survey area walked or driven (~125 hours), including ~60 hours during reconnaissance survey. 30 Camera trap nights.	21 Bird plot surveys - seven survey hours over multiple days. Flushing surveys - Whole Survey area to be walked or driven (~80 hours). 200 Camera trap nights, including 100 surrounding a large wetland. Incidental records.

Family	Scientific Name	Common Name	Key Habitat Terms used by DCCEEW	Defined Species Habitat Definitions	Targeted Survey Effort	
					Dry Season 2024	Wet Season 2025
			- Populations occurring in the Condamine River catchment and Darling Downs of southern Queensland; - The populations known to occur in the Warwick-Inglewood-Texas region of southern Queensland; and - Any populations potentially occurring in northern NSW.	Acacia or Callitris species, on sandy or gravelly soils with patchy perennial tussock grasses that can include low shrubs and forbs, within 1 – 3 km from permanent and seasonal water (including but not limited to areas mapped as Queensland land zones 3, 5 or 7). Dispersal habitat: Any forest or woodland occurring between patches of foraging or breeding habitat that facilitates movement between patches of foraging and breeding habitat and/or waterbodies.	34 Habitat suitability assessments. Incidental records.	
Rostratuli dae	<i>Rostratula australis</i>	Australian Painted Snipe	Wetland habitat suitable for breeding is considered habitat that is critical to the species survival (DSEWPac, 2013b). No important habitat defined for this species.	Habitat for the Australian Painted Snipe was defined as breeding, foraging and dispersal as per the following definitions: Breeding habitat - Australian Painted Snipe 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 all, or 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 (Rogers et al., 2005) Foraging and dispersal habitat – Species does not breed in Australia. Foraging and dispersal habitat includes shallow, permanent or ephemeral, freshwater wetlands which provide areas of bare, exposed wet mud and a mosaic of ground cover (tufted grasses, sedges, small woody	Nine Bird plot surveys – Three survey hours over multiple days. Five hours land-based area searches surrounding wetland, over multiple days. 34 Habitat suitability assessments. Incidental records.	21 Bird plot surveys - seven survey hours over multiple days. Seven hours land-based area searches surrounding wetland, over multiple days. 100 camera trap nights surrounding the HES wetland. Incidental records.

Family	Scientific Name	Common Name	Key Habitat Terms used by DCCEEW	Defined Species Habitat Definitions	Targeted Survey Effort	
					Dry Season 2024	Wet Season 2025
				plants; Kerswell et. al., 2020). Habitat can include lakes or dams that provide foraging resources and could potentially be used as an individual disperses through the landscape (DSEWPac, 2013b).		
Scolopacidae	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat. Important habitats in Australia for migratory shorebirds under the EPBC Act include those recognised as nationally or internationally important. Wetland habitat is considered internationally important if it regularly supports: 1% of individuals in a population (ecologically significant proportion; 850 individuals for the Sharp-tailed Sandpiper; BirdLife Australia 2020); or - A total abundance of at least 20,000 waterbirds. Wetland habitat is considered nationally important habitat if it regularly supports: 0.1% of the flyway population of a single species of migratory shorebird (ecologically significant proportion; 85 individuals for the Sharp-tailed Sandpiper; BirdLife Australia 2020); or 2,000 migratory shorebirds; or	Foraging and dispersal habitat – Species does not breed in Australia. Foraging and dispersal habitat includes muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline salt lakes inland. They also occur in saltworks and sewage farms (DCCEEW, 2024a).	Nine Bird plot surveys – Three survey hours over multiple days. Five hours land-based area searches surrounding wetland, over multiple days. 34 Habitat suitability assessments. Incidental records.	21 Bird plot surveys - seven survey hours over multiple days. Seven hours land-based area searches surrounding wetland, over multiple days. 100 camera trap nights surrounding a large wetland. Incidental records.

Family	Scientific Name	Common Name	Key Habitat Terms used by DCCEEW	Defined Species Habitat Definitions	Targeted Survey Effort	
					Dry Season 2024	Wet Season 2025
			15 migratory shorebird species. All internationally or nationally important habitat that exceeds the above thresholds is considered habitat critical to the survival of the species.			
Scolopacidae	<i>Tringa nebularia</i>	Common Greenshank	Habitat critical to the survival of Common Greenshank includes a mosaic of feeding and roosting habitat (DCCEEW, 2024b). Important habitats in Australia for migratory shorebirds under the EPBC Act include those recognised as nationally or internationally important. The National Directory of Important Migratory Shorebird Habitat identifies all known feeding and roosting sites of Common Greenshank in Australia as important. During the non-breeding season, important sites have been identified in Australia. In Queensland, the South-east Gulf of Carpentaria, and the Great Sandy Strait are important sites for this species. An Ecologically significant proportion of a population of Common Greenshank is: - Internationally significant – 1,100 individuals (1% of population) - National significant – 110 individuals (0.1% of population; BirdLife Australia 2020)	Foraging and dispersal habitat – Species does not breed in Australia. Foraging and dispersal habitat includes inland wetlands and sheltered coastal habitats. The species uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats. It will also use artificial wetlands, including sewage farms and saltworks dams, inundated rice crops and bores (DCCEEW, 2024b).	Nine Bird plot surveys – Three survey hours over multiple days. Five hours land-based area searches surrounding wetland, over multiple days. 34 Habitat suitability assessments. Incidental records.	21 Bird plot surveys - Seven survey hours over multiple days. Seven hours land-based area searches surrounding wetland, over multiple days. 100 camera trap nights surrounding a large wetland. Incidental records.

Family	Scientific Name	Common Name	Key Habitat Terms used by DCCEW	Defined Species Habitat Definitions	Targeted Survey Effort	
					Dry Season 2024	Wet Season 2025
THREATENED MAMMALS						
Phascolarctidae	<i>Phascolarctos cinereus</i>	Koala	Habitat critical for survival is described as areas that the species relies on to avoid, or halt decline and promote recovery of the species. The Conservation Advice for the Koala states that it is not practical to identify by description or provide spatial information on habitat critical to the survival of the Koala, due to insufficient knowledge and data. In absence of this, habitat critical for survival of the Koala is expected to include habitat occupied and habitat currently unoccupied, areas necessary for population processes and maintenance of genetic diversity and evolutionary potential, and areas required to accommodate future population increase recolonisation, reintroduction, or as climate refugia (DAWE, 2022a). Important habitat not defined for the species. Important population defined as those that are valued for cultural, social and economic reasons. In Queensland, priority areas are identified as SEQ (DAWE, 2022a).	Koala habitat can be broadly defined based on the presence of locally important food trees and ancillary habitat trees as defined in the <i>Review of Koala Habitat Assessment Criteria and Methodology</i> (Youngentob et al., 2021). Koala habitat is further defined however into breeding, foraging and dispersal habitat: Breeding habitat – Contiguous remnant <i>Eucalyptus</i> open forest to woodlands on alluvial and/or cracked rock groundwater where palatable food tree species occur frequently (and are usually dominant). Specifically includes stream fringing open forest or woodland on alluvial terraces where <i>E. tereticornis</i> and <i>E. camaldulensis</i> are dominant. Other important food species on the alluvial terraces can include <i>E. coolibah</i>, <i>E. crebra</i>, <i>E. melanophloia</i> and <i>E. populnea</i>. Foraging habitat – Habitat that provides food resources or aids to movement for the species including remnant and regrowth Eucalyptus open forest to woodlands with more variable water sources (often seasonal) and that have connectivity to breeding habitat areas. Dispersal habitat – All other fragmented and sparsely distributed woodlands and open woodlands, shrub lands and forests, with some food trees.	34 habitat suitability assessments to identify presence of Koala food and habitat trees. Whole Survey area walked or driven recording incidentals (125 hrs). Six person hours spotlighting. ~25 Scat and sign searches. Incidental records.	Whole Survey area to be walked or driven recording incidentals (80 hr). Twelve person hours spotlighting. ~25 Scat and sign searches. Incidental records.

Family	Scientific Name	Common Name	Key Habitat Terms used by DCCEEW	Defined Species Habitat Definitions	Targeted Survey Effort	
					Dry Season 2024	Wet Season 2025
Pseudochiridae	Petauroides volans	Greater Glider (southern/central)	Habitat critical for survival includes: - Large tracts of contiguous eucalypt forest with suitable tree hollows - Smaller fragmented patches if connected to larger habitat patches - Cool microclimate forests areas (gullies, high elevation and slopes) - Short-term post fire refuges All populations are important (TSSC, 2016d). Important habitat not defined for the species.	Greater Glider habitat was defined as 'denning' or 'foraging' habitat, in accordance with the <i>Guide to Greater Glider Habitat in Queensland</i> (Eyre et al., 2022). Below describes the habitat that is described under each definition: Denning habitat – Remnant, connected eucalypt woodlands with >2 hollow bearing trees/ha, hollows medium-large in size (>10cm), on fertile, wetter soils of riparian zones, used for shelter, diurnal refuge and breeding. Foraging habitat – Remnant eucalypt woodlands connected to areas of denning habitat that does not contain >2 hollow bearing trees/ha, medium-large in size (>10 cm). Generally, within 120 m of breeding / denning habitat, reflecting the home range of the species.	34 habitat suitability assessments to identify presence of suitable Eucalypt species with a DBH > 50 cm or > 30 cm. Six person hours spotlighting, 4,224m transect length over an 95ha area of habitat.	Twelve person hours spotlighting, 11,614m cumulative transect length over a 350 ha area of habitat.
THREATENED REPTILES						
Elapidae	<i>Denisonia maculata</i>	Ornamental Snake	No critical habitat for the survival of the species has been defined. Important habitat is identified as gilgai depressions and mounds (DCCEEW, 2023). Habitat connectivity between gilgais and other suitable habitats is also important. As the Ornamental Snake is difficult to detect and population information is limited, the Department regards	Breeding habitat - within, or close to, habitat that is favoured by its prey - frogs. The species is known to prefer woodlands and open forests associated with moist areas, particularly gilgai (melon-hole) mounds and depressions in REs, Land Zone 4, but also lake margins and wetlands, specifically RE 11.4.9, 11.4.8, 11.5.3, 11.4.11, 11.3.2 and 11.3.1 (Brigalow Belt Reptiles Workshop, 2010; Wilson & D.G. Knowles, 1988;) DCCEEW, 2025b). Gilgai formations are found	34 habitat suitability assessments. Six person hours spotlighting. Three replicate pitfall and funnel trapping within suitable habitat.	Twelve person hours spotlighting. Four replicate pitfall and funnel trapping within suitable habitat. 35 active searches (nine person hours). Incidental records.

Family	Scientific Name	Common Name	Key Habitat Terms used by DCCEEW	Defined Species Habitat Definitions	Targeted Survey Effort	
					Dry Season 2024	Wet Season 2025
			important habitat as a surrogate for an important population. Suitable habitat for this species is considered important if it is: - Habitat where the species has been identified during a survey; - Near the limit of the species' known range; - Large patches of contiguous, suitable habitat and viable landscape corridors (necessary for the purposes of breeding, dispersal or maintaining the genetic diversity of the species over successive generations); or - A habitat type where the species is identified during a survey but was previously thought not to support the species (DCCEEW, 2023).	where deep-cracking alluvial soils with high clay contents occur (Brigalow Belt Reptiles Workshop, 2010). Foraging habitat – REs that have been historically recorded to contain populations that are adjacent to preferred habitat and contain the following key habitat features for ornamental snake are present or infrequent – soil cracks, wetlands (especially with frogs present), dense tussock grasses, and vegetation in and around water (DCCEEW, 2025b). Dispersal habitat – Areas currently or previously dominated by brigalow or coolibah 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.	Six active searches (1.5 person hours). Incidental records.	
MIGRATORY AND MARINE SPECIES						
Apodidae	<i>Apus pacificus</i>	Fork-tailed Swift	No critical habitat for the survival of the species has been defined. Important habitat - Non-breeding habitat only which includes all habitats where it is	Foraging and dispersal habitat - The species does not breed in Australia, so only foraging and dispersal habitat for the species can be defined, which includes a range of habitats,	Nine Bird plot surveys – Three survey hours over multiple days.	21 Bird plot surveys - 7 survey hours over multiple days. Incidental records.

Family	Scientific Name	Common Name	Key Habitat Terms used by DCCEEW	Defined Species Habitat Definitions	Targeted Survey Effort	
					Dry Season 2024	Wet Season 2025
			found in Australia (Commonwealth of Australia, 2015). An ecologically significant proportion of a population of Fork-tailed Swift is: - Internationally significant - 1,000 individuals (1% of population) - Nationally significant – 100 individuals (0.1% of population; Commonwealth of Australia, 2015). The proportion of the Fork-tailed Swift population that is likely to result in a significant impact is 1,000 individuals (1%) and 100 (0.1%; Commonwealth of Australia, 2015). Area thresholds of important habitat likely to result in a significant impact for the White-throated Needletail have not been defined due to lack of knowledge (Commonwealth of Australia, 2015).	from inland open plains to wooded areas (Commonwealth of Australia, 2015).	34 Habitat suitability assessments. Incidental records.	
Cuculidae	<i>Cuculus optatus</i>	Oriental Cuckoo	No critical habitat for the survival of the species has been defined. Important habitat - Non-breeding habitat only: monsoonal rainforest, vine thickets, wet sclerophyll forest or open Casuarina, Acacia or Eucalyptus woodlands. Frequently at edges or ecotones between habitat types. Riparian forest is favoured habitat in the Kimberley region (Commonwealth of Australia, 2015).	Foraging and dispersal habitat - The species does not breed in Australia, so only foraging and dispersal habitat for the species can be defined, which includes a monsoonal rainforest, vine thickets, wet sclerophyll forest or open Casuarina, Acacia or Eucalyptus woodlands (Commonwealth of Australia, 2015).	Nine Bird plot surveys – Three survey hours over multiple days. 34 Habitat suitability assessments. Incidental records.	21 Bird plot surveys - seven survey hours over multiple days. Incidental records.

Family	Scientific Name	Common Name	Key Habitat Terms used by DCCEEW	Defined Species Habitat Definitions	Targeted Survey Effort	
					Dry Season 2024	Wet Season 2025
			An ecologically significant proportion of a population of Oriental Cuckoo is: - Internationally significant - 10,000 individuals (1% of population) - Nationally significant—1000 individuals (0.1% of population; Commonwealth of Australia, 2015). The proportion of the Oriental Cuckoo population that is likely to result in a significant impact is 10,000 individuals (1%) and 1,000 (0.1%; Commonwealth of Australia, 2015). Area thresholds of important habitat likely to result in a significant impact to the Oriental Cuckoo is 250,000 ha (Commonwealth of Australia, 2015).			

11.4.1.4 GIS Mapping

Following the completion of field surveys, mapping for MNES and MSES values known to occur or potentially occurring within the Survey area (inclusive of the Project area and Disturbance area) was undertaken. GIS mapping of the Survey area was undertaken to:

- Show ecological values verified within the Survey area.
- Estimate the extent of MNES and MSES within the Survey area, Project area and Disturbance area.
- Understand the potential impacts to MNES and MSES as a result of the Project.
- Aid the development of specific mitigation measures to avoid, minimise and mitigate impacts.

11.4.2 Regional Ecosystem Map Amendment Request

An RE Map Amendment Request (MAR) for the Survey area was submitted to the Queensland Herbarium in July 2025. The MAR sought to refine the mapping of regulated vegetation and REs across the Survey area, primarily through minor reattribution of existing RE boundaries and reclassification of specific REs.

The MAR was supported by extensive field survey data, aerial imagery (1964 – present), LiDAR and geomorphic modelling. Approximately 400 ha of vegetation previously mapped as non-remnant was reclassified to remnant RE11.8.5 and RE11.4.13, following confirmation that natural dieback in 2005–2007 had resulted in misclassification.

The proposed amendments were largely accepted by the Queensland Herbarium, with only minor refinements based on available Queensland Herbarium ground-truthing data and imagery interpretation. Final RE allocations were confirmed in accordance with Queensland Herbarium standards and will be incorporated into Version 15 of the State RE mapping.

The Queensland Herbarium approved RE data have been adopted for use in the Terrestrial Ecology Assessment (**Appendix P**). All field-verified mapping is based on the Queensland Herbarium approved RE data.

11.4.3 Field Assessment Results

11.4.3.1 Field-verified Regulated Vegetation

Regulated vegetation and REs under the VM Act were verified within the Survey area during the field ecological surveys. The field-verified REs within the Survey area are shown in Figure 11-2. For further detailed maps of the field verified REs, refer to Map series 9, Appendix A within **Appendix P**. These REs have been certified by the Queensland Herbarium, through the MAR. Further details on the mapping relevance for these areas in in Section 11.1.

Table 11-10 lists the field-verified REs that were identified within the Survey area during the field ecological surveys. The total Survey area is 5,227.55 ha in size. This is made up of 2,578.06 ha of Category B (Remnant) vegetation and 2,649.49 ha of Category X (Non-remnant) vegetation. This represents 49.32 % remnant, and 50.68 % non-remnant vegetation within the Survey area.

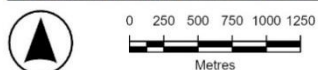
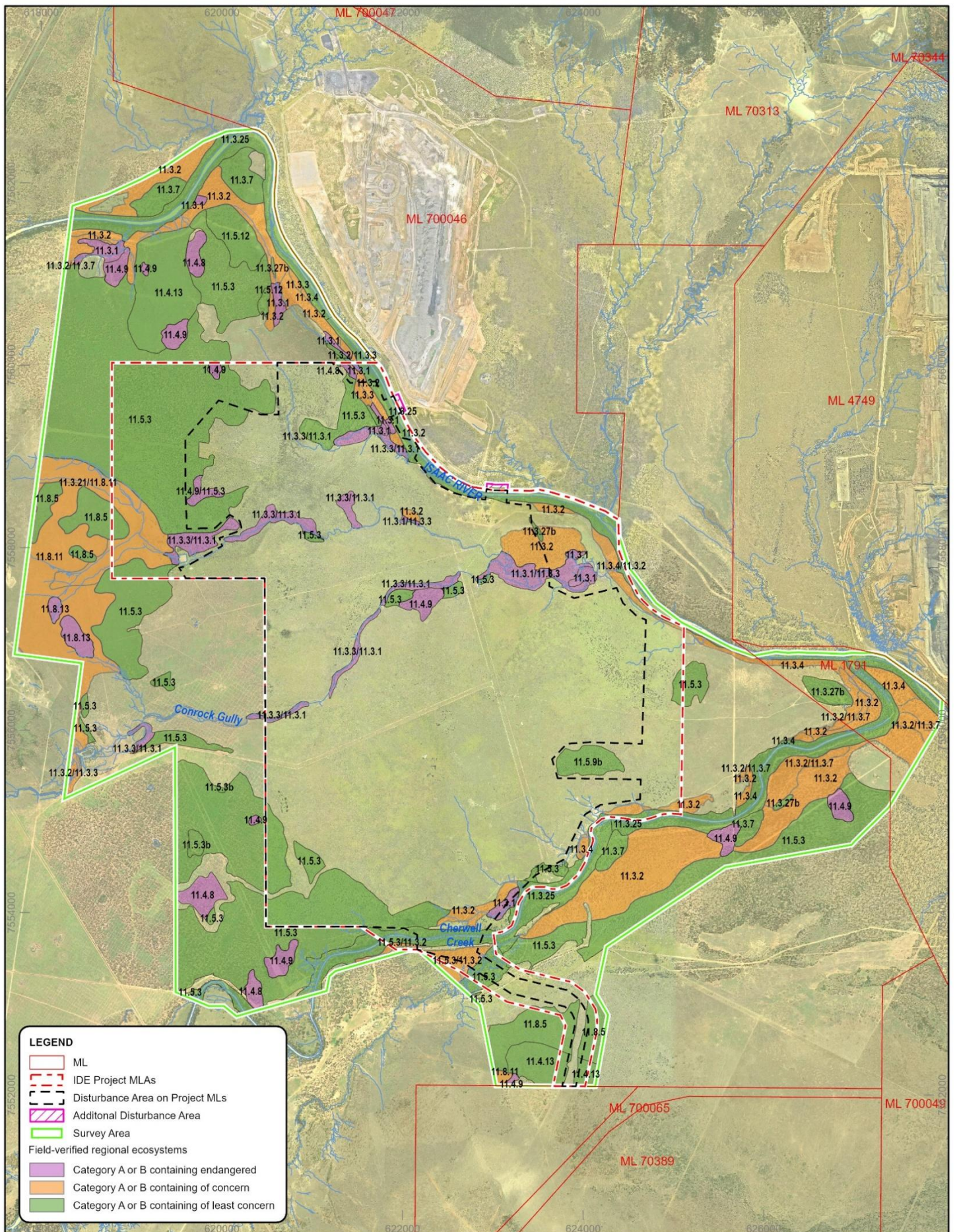
The REs verified consist of least concern, of concern and endangered REs under the VM Act. Some of these REs are recognised as MSES under the EO Act, where they are endangered and of concern (VM Act Class). Field-verified MSES prescribed REs that are endangered and of concern are described in section 11.4.3.10. REs that are MSES prescribed REs in the Survey area include RE11.3.1, 11.3.2, 11.3.3, 11.4.8, 11.4.9 and 11.8.13. Note, RE11.3.21 and 11.8.11 are not considered MSES prescribed REs despite their of concern status as they are grassland ecosystems listed in Schedule 5 of the *Vegetation Management Regulation 2012* (Qld) which are excluded from being prescribed REs.

Some of these REs also represent ESAs, where they are the Category B regulated vegetation category, and have an endangered Biodiversity status. REs that represent ESAs within the Survey area include RE11.3.1, 11.3.21, 11.4.8, 11.4.9 and 11.8.13.

Table 11-10 Field Verified REs within the Survey area

RE	Regulated Vegetation Category ¹	Description	VM Act Class ²	Biodiversity Status ³
11.3.1	B	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on alluvial plains	EN	EN
11.3.2	B	<i>Eucalyptus populnea</i> woodland on alluvial plains	OC	OC
11.3.3	B	<i>Eucalyptus coolabah</i> woodland on alluvial plains	OC	OC
11.3.4	B	<i>Eucalyptus tereticornis</i> and/or <i>Eucalyptus</i> spp. woodland on alluvial plains	OC	OC
11.3.7	B	<i>Corymbia</i> spp. open woodland on alluvial plains	LC	OC
11.3.21	B	<i>Dichanthium sericeum</i> and/or <i>Astrebla</i> spp. grassland on alluvial plains. Cracking clay soils	OC	EN
11.3.25	B	<i>Eucalyptus tereticornis</i> or <i>Eucalyptus camaldulensis</i> woodland fringing drainage lines	LC	OC
11.3.27b	B	Freshwater wetlands	LC	OC
11.4.8	B	<i>Eucalyptus cambageana</i> woodland to open forest with <i>Acacia harpophylla</i> or <i>Acacia argyrodendron</i> on Cainozoic clay plains	EN	EN
11.4.9	B	<i>Acacia harpophylla</i> shrubby woodland with <i>Terminalia oblongata</i> on Cainozoic clay plains	EN	EN
11.4.13	B	<i>Eucalyptus orgadophila</i> open woodland on Cainozoic clay plains	LC	OC
11.5.3	B	<i>Eucalyptus populnea</i> +/- <i>Eucalyptus melanophloia</i> +/- <i>Corymbia clarksoniana</i> woodland on Cainozoic sand plains and/or remnant surfaces	LC	NC
11.5.3b	B	<i>Eucalyptus populnea</i> woodland on closed depressions. Occurs on closed depressions in sandplains.	LC	NC
11.5.9	B	<i>Eucalyptus crebra</i> and other <i>Eucalyptus</i> spp. and <i>Corymbia</i> spp. woodland on Cainozoic sand plains and/or remnant surfaces	LC	NC
11.5.9b	B	<i>Eucalyptus crebra</i> , <i>Eucalyptus tenuipes</i> , <i>Lysicarpus angustifolius</i> +/- <i>Corymbia</i> spp. woodland. Occurs on Cainozoic sandplains formed on plateaus and broad crests of hills and ranges. Soils are generally deep red earths.	LC	NC
11.5.12	B	<i>Corymbia clarksoniana</i> woodland and other <i>Corymbia</i> spp. and <i>Eucalyptus</i> spp. on Cainozoic sand plains and/or remnant surfaces	LC	NC

RE	Regulated Vegetation Category ¹	Description	VM Act Class ²	Biodiversity Status ³
11.8.5	B	<i>Eucalyptus orgadophila</i> open woodland on Cainozoic igneous rocks	LC	NC
11.8.11	B	<i>Dichanthium sericeum</i> grassland on Cainozoic igneous rocks	OC	OC
11.8.13	B	Semi-evergreen vine thicket and microphyll vine forest on Cainozoic igneous rocks	EN	EN
Non-remnant	X	-	-	-



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Field Verified REs
in the Survey Area

11.4.3.2 Field-verified Vegetation Communities

Figure 11-3 shows the vegetation communities verified as occurring within the Survey area during the field ecological assessments. The majority of extant native vegetation across the Survey area comprises Eucalypt open forests and woodlands on a range of landforms including Cainozoic sandplains, alluvial flats, and basalt-derived substrates. Riparian and fringing communities occur along Isaac River, Cherwell Creek, Conrock Gully, and their tributaries, and clay-soil Brigalow forests and woodlands occur in patches. Further details on the mapping relevance for these areas is provided in Section 11.1.

The most degraded vegetation communities were clay-soil Brigalow forests and woodlands. These patches were often less than 100 m wide and subject to intense edge effects from adjoining *Cenchrus ciliaris* (Buffel Grass)*³ dominant pastures, inappropriate fire regimes, weed encroachment, and grazing impacts, including evidence of stock camping under denser canopy remnants and using the seasonal water holes.

Ephemeral wetland communities were also verified within the Survey area, with a particular association with the alluvial plains and flood-prone features adjacent to the Isaac River. These wetlands likely fill during flood events. These wetlands are seasonal, retaining water only for short periods following rainfall. All are subject to grazing impacts with observed signs of pugging, trampling, and weed incursion.

Although ground layers across much of the Survey area have been modified by introduced pastures, especially *Cenchrus ciliaris**, many areas retain structurally intact canopy communities that continue to provide ecological function, particularly along riparian corridors and in remnant woodland patches.

The dominant Broad Vegetation Groups (BVGs) verified within the Survey area included:

- BVG 7 – Semi-evergreen to deciduous microphyll vine thicket.
- BVG 9 – Moist to dry eucalypt open forests to woodlands, usually on coastal lowlands and ranges.
- BVG 11 – Moist to dry eucalypt open forests to woodlands, mainly on basalt areas.
- BVG 16 – Eucalyptus-dominated open forests and woodlands along drainage lines and alluvial plains.
- BVG 17 – *Eucalyptus populnea*, *Eucalyptus melanophloia* (Silver-leaved Ironbark), or *Eucalyptus whitei* (White's Ironbark) dry woodlands to open woodlands on sandplains and depositional plains.
- BVG 18 – Dry eucalypt woodlands to open woodlands primarily on sandplains or depositional plains.
- BVG 25 – *Acacia harpophylla*, sometimes with *Casuarina cristata* open forests to woodlands on heavy clay soils.
- BVG 30 – *Astrebla spp.* and *Dichanthium spp.* tussock grasslands.
- BVG 34 – Wetlands associated with permanent and ephemeral lakes, swamps, claypans; includes fringing woodland and shrubland vegetation.

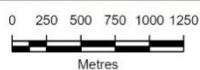
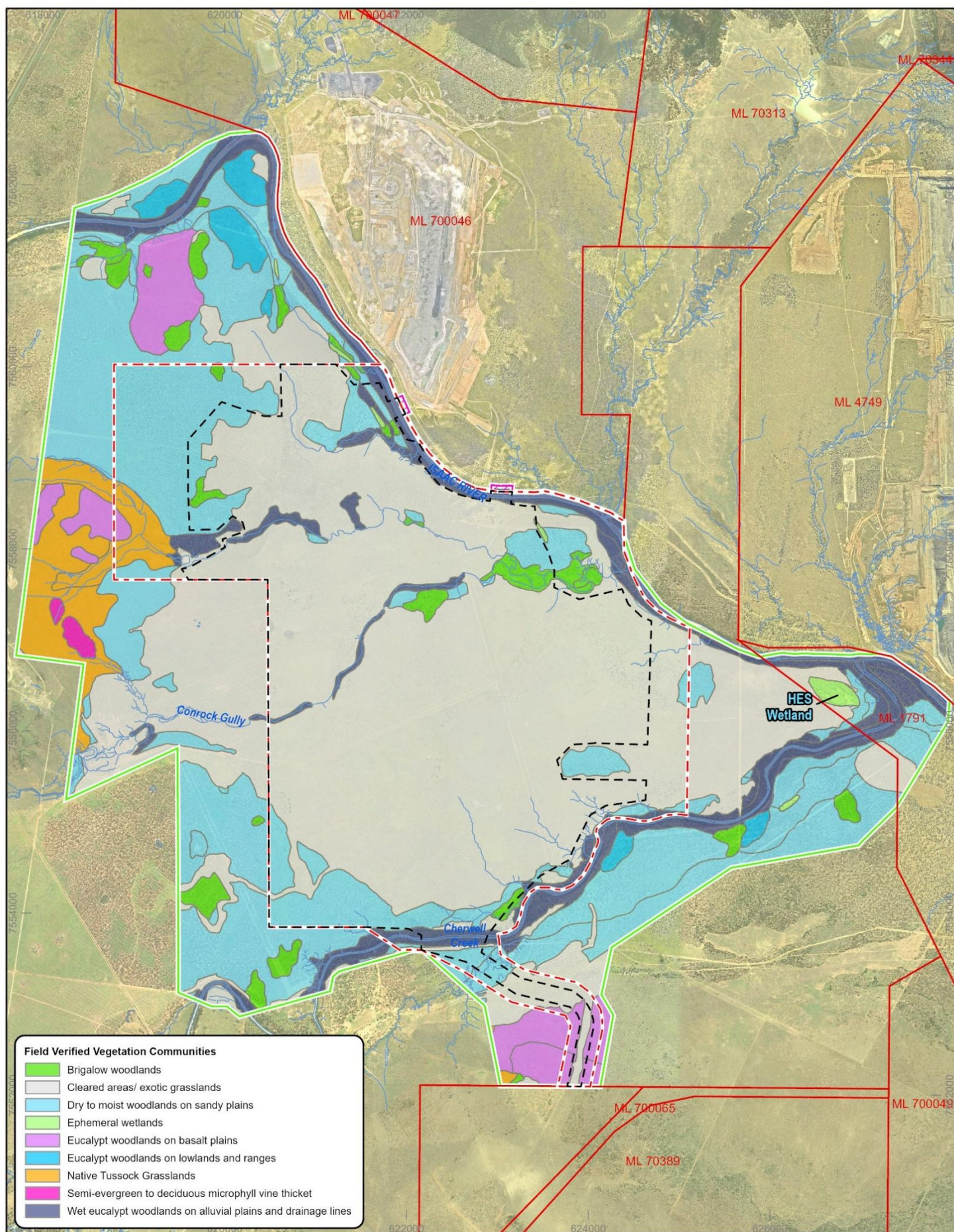
These BVGs were used to group vegetation communities with similar structural and floristic characteristics within the Survey area. The verified vegetation communities within the Survey area are described in Table 22 of **Appendix P**, which also provides details on the corresponding REs, whether the vegetation community provides suitable habitat for conservation significant species, and whether the vegetation community had the ability to conform to a listed TEC.

The vegetation communities verified within the Survey area (Figure 11-3) include:

- Semi-evergreen to deciduous microphyll vine thicket.
- Eucalypt woodlands on lowlands and ranges (Moist to dry eucalypt open forests to woodlands, usually on coastal lowlands and ranges).

³ Introduced species are denoted with an asterisk.

- Eucalypt woodlands on basalt plains (Moist to dry eucalypt open forests to woodlands, mainly on basalt areas).
- Wet eucalypt woodlands on alluvial plains and drainage lines (Eucalyptus-dominated open forests and woodlands along drainage lines and alluvial plains).
- Dry to moist woodlands on sandy plains (Dry woodlands to open woodlands on sandplains and depositional plains).
- Brigalow woodlands (*Acacia harpophylla*, sometimes with *Casuarina cristata* open forests to woodlands on heavy clay soils).
- Native Tussock Grasslands (*Astrebla* spp. (Mitchell Grass) and *Dichanthium* spp. (Bluegrass) tussock grasslands).
- Ephemeral wetlands (Wetlands associated with permanent and ephemeral lakes, swamps, claypans; includes fringing woodland and shrubland vegetation).
- Cleared areas/ exotic grasslands.



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Field Verified Vegetation Communities
 in the Survey Area

11.4.3.3 Field-verified Threatened Ecological Communities

TEC assessments within all patches of vegetation that had the potential to conform to a TEC were undertaken during the field ecological assessments (refer to survey effort in Table 11-9). This included verifying whether each patch met the TEC definition or key diagnostic criteria and condition thresholds (where available) contained in approved conservation or listing advices for these TECs.

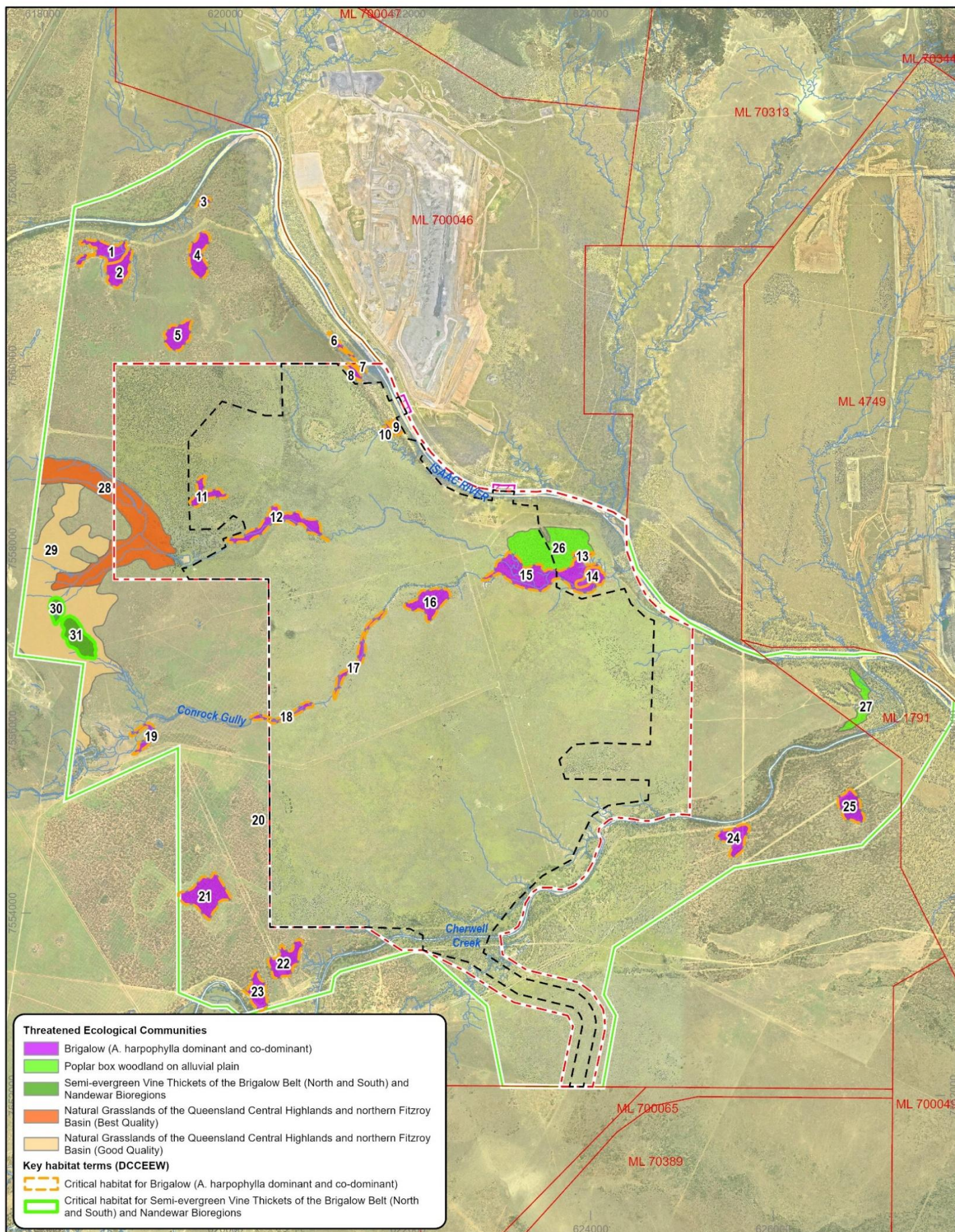
The results of each TEC Assessment are provided Appendix I of **Appendix P**. Details of how each TEC was verified (e.g. against the definition or key diagnostic criteria and condition thresholds) is provided in Section 5.1.3.2 of **Appendix P**.

All four TECs identified in the desktop likelihood of occurrence assessment were confirmed present within the Survey area, namely:

- Brigalow TEC (listed endangered under the EPBC Act).
- Natural Grasslands TEC (listed endangered under the EPBC Act).
- Poplar Box TEC (listed endangered under the EPBC Act).
- SEVT TEC (listed endangered under the EPBC Act).

Where a patch met the definition or criteria and condition thresholds for these TECs they have been mapped, as shown in Figure 11-4.

Further details on the mapping relevance for these areas is provided in Section 11.1.



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 Source: Trend Environmental Consultants
 File: 20260421 TECs.aprx

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Threatened Ecological Communities

11.4.3.4 Flora

11.4.3.4.1 Flora Species Records and Habitat Verification

Both native and introduced flora species were recorded during the field ecological surveys. A full list of the flora species recorded in the Survey area is provided in Appendix E of **Appendix P**. There were a total of 170 flora species from 48 families, consisting of 134 native species and 36 introduced species, recorded within the Survey area. All native flora species were least concern species under the NC Act or not listed under the EPBC Act. No Commonwealth- and State-listed threatened flora species were recorded within the Survey area.

11.4.3.4.2 Conservation Significant Flora Species Records and Habitat Verification

Habitat for threatened flora species was verified within the Survey area for the *Dichanthium queenslandicum* and *Dichanthium setosum*. *Dichanthium queenslandicum* is listed as endangered under the EPBC Act and vulnerable under the NC Act, while *Dichanthium setosum* is listed as vulnerable under the EPBC Act but least concern under the NC Act.

Habitat for these species was verified within native grassland areas (RE11.3.21 and RE11.8.11; Figure 11-5), in the north-western portion of the Survey area. While the habitat areas occurred within the Survey area, they were outside of the Project area and Disturbance area.

An assessment of habitat suitability assessment methodology for *Dichanthium queenslandicum* (King Bluegrass) and *Dichanthium setosum* (bluegrass) is described in Section 5.2.2 of **Appendix P**.

11.4.3.5 Fauna

11.4.3.5.1 Fauna Species Records and Habitat Verification

Both native and introduced fauna species were recorded during the field ecological surveys. A full list of fauna species recorded in the Survey area is provided in Appendix F of **Appendix P**. Conservation Significant species that were recorded during field surveys are described in Section 11.4.3.4.2.

Seven native amphibian species were recorded within the Survey area. All amphibian species were least concern species under the NC Act and were not listed under the EPBC Act. One exotic amphibian was also recorded, the Cane Toad (*Rhinella marina*)*.

A total of 54 bird species were recorded within the Survey area. The majority of the bird species recorded were least concern species under the NC Act and were not listed under the EPBC Act. The exception being two conservation significant species, the threatened Squatter Pigeon and the migratory Oriental Cuckoo.

There were 30 mammal species recorded within the Survey area, predominantly represented by Micro Bats and Macropods. The majority of the mammal species recorded were least concern species under the NC Act and were not listed under the EPBC Act. The exception being three conservation significant species, the threatened Koala and Greater Glider, and the SLC Short-beaked Echidna.

There were 14 reptile species recorded within the Survey area during targeted surveys. All reptile species recorded were least concern species under the NC Act and were not listed under the EPBC Act. While this is the case, the threatened Ornamental Snake has been recorded historically within the Survey area.

For further detail on the fauna species recorded and their habitat verification is provided in Section 5.3.1 of **Appendix P**.

11.4.3.5.2 Conservation Significant Fauna Species and Habitat Verification

Five conservation significant fauna species were recorded within the Survey area during targeted field surveys:

- Squatter Pigeon - listed as vulnerable under both the EPBC Act and NC Act

- Koala - listed as endangered under both the EPBC Act and NC Act
- Greater Glider - listed as endangered under both the EPBC Act and NC Act
- Oriental Cuckoo – listed as migratory under the EPBC Act and SLC under the NC Act
- Short-beaked Echidna – listed as SLC under the NC Act but not listed under the EPBC Act.

In addition to these threatened and SLC species, the Ornamental Snake was previously recorded within the Survey area in 2019 by EcoSM (EcoSM, 2020). However, the Ornamental Snake was not detected during Project field surveys despite targeted surveys for the species in accordance with the Survey guidelines for the Ornamental Snake (*Denisonia maculata*; DCCEEW, 2025b). The Ornamental Snake is listed as vulnerable under both the EPBC Act and NC Act.

Additional species, which were not recorded, but had breeding, foraging and/or dispersal habitat verified within the Survey areas included:

- Australian Painted Snipe - listed as endangered and migratory under the EPBC Act and endangered under the NC Act
- Sharp-tailed Sandpiper - listed as vulnerable, marine and migratory under the EPBC Act and SLC under the NC Act
- Common Greenshank - is listed as endangered and migratory under the EPBC Act and SLC under the NC Act
- Fork-tailed Swift - listed as migratory under the EPBC Act and SLC under the NC Act.

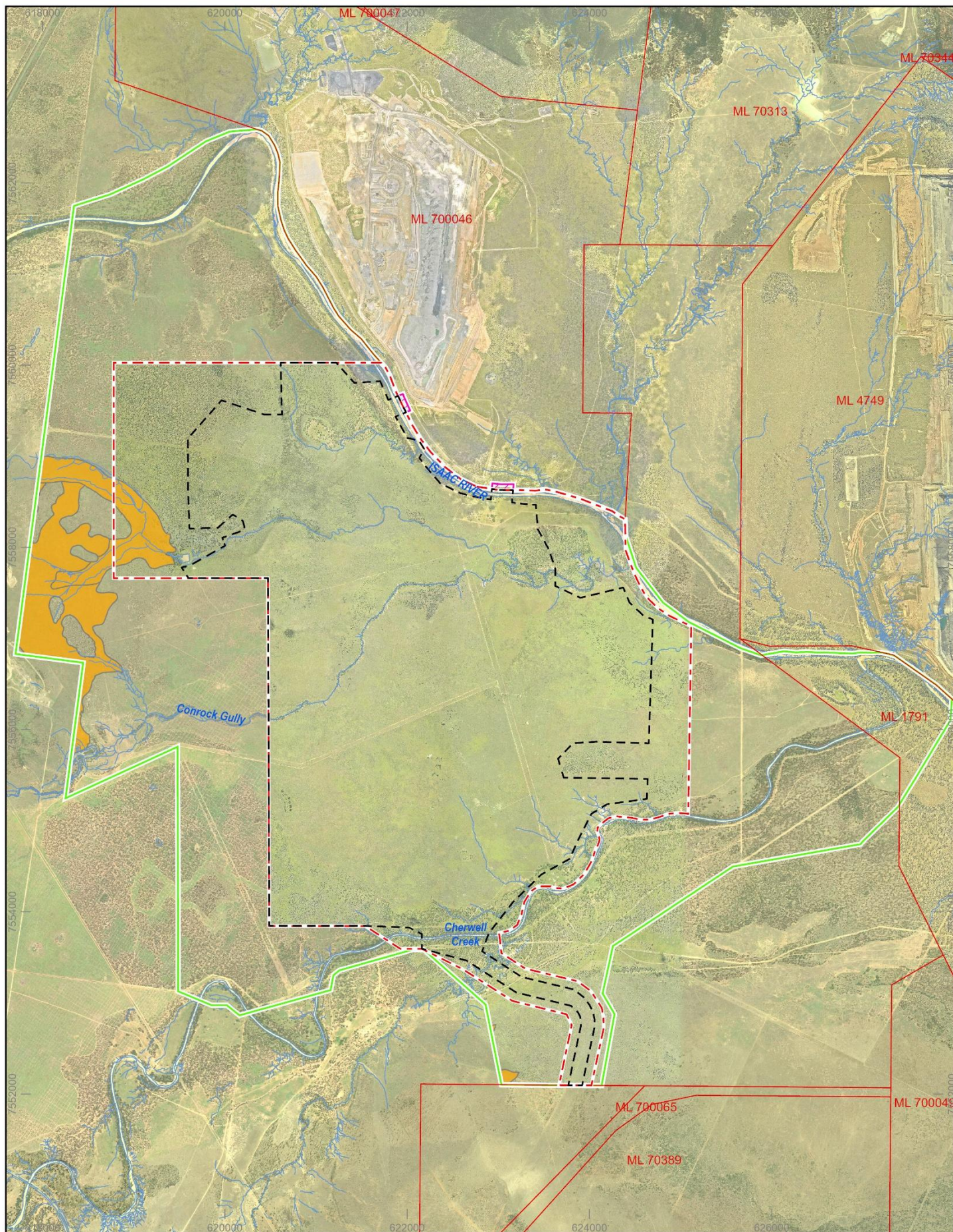
The following maps depict the habitat for each of the conservation significant species, based on the field surveys and defined habitat methodologies:

- Habitat critical to survival of the Squatter Pigeon, comprising breeding, foraging and dispersal habitat, is shown in Figure 11-6
- Habitat critical to survival of the Koala, comprising breeding and foraging habitat, is shown in Figure 11-9
- Habitat critical to survival of the Greater Glider, comprising denning and foraging habitat, is shown in Figure 11-10
- Foraging and dispersal habitat for the Fork-tailed Swift and Oriental Cuckoo is shown in Figure 11-8
- Breeding and foraging habitat for the Short-beaked Echidna is shown in Figure 11-11
- Important habitat for the Ornamental Snake, comprising breeding and foraging habitat, as well as dispersal habitat, is shown in Figure 11-12
- Breeding and/or foraging and dispersal habitat for wetland bird species (Australian Painted Snipe, Sharp-tailed Sandpiper and Common Greenshank) are shown in Figure 11-7, including areas that comprise critical habitat for the Australian Painted Snipe

For each of the identified conservation significant fauna species, Section 5.3.2 of **Appendix P** provides:

- information on the species distribution, preferred habitat and connectivity of habitat
- confirmation that targeted survey guideline requirements have been met
- records of the occurrence of the species in the Survey area, Area of Interest or Region
- habitat quality scores (see also Appendix H of **Appendix P**)
- likelihood of occurrence based on field surveys and records
- where applicable, areas critical to the species survival, important habitat or important populations
- information on threats to the species.

Based on the mapped habitat in the Survey area, it was determined that a significant impact assessment, in accordance with Commonwealth and State guidelines, was required for these species.



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Metres

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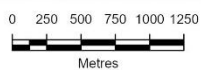
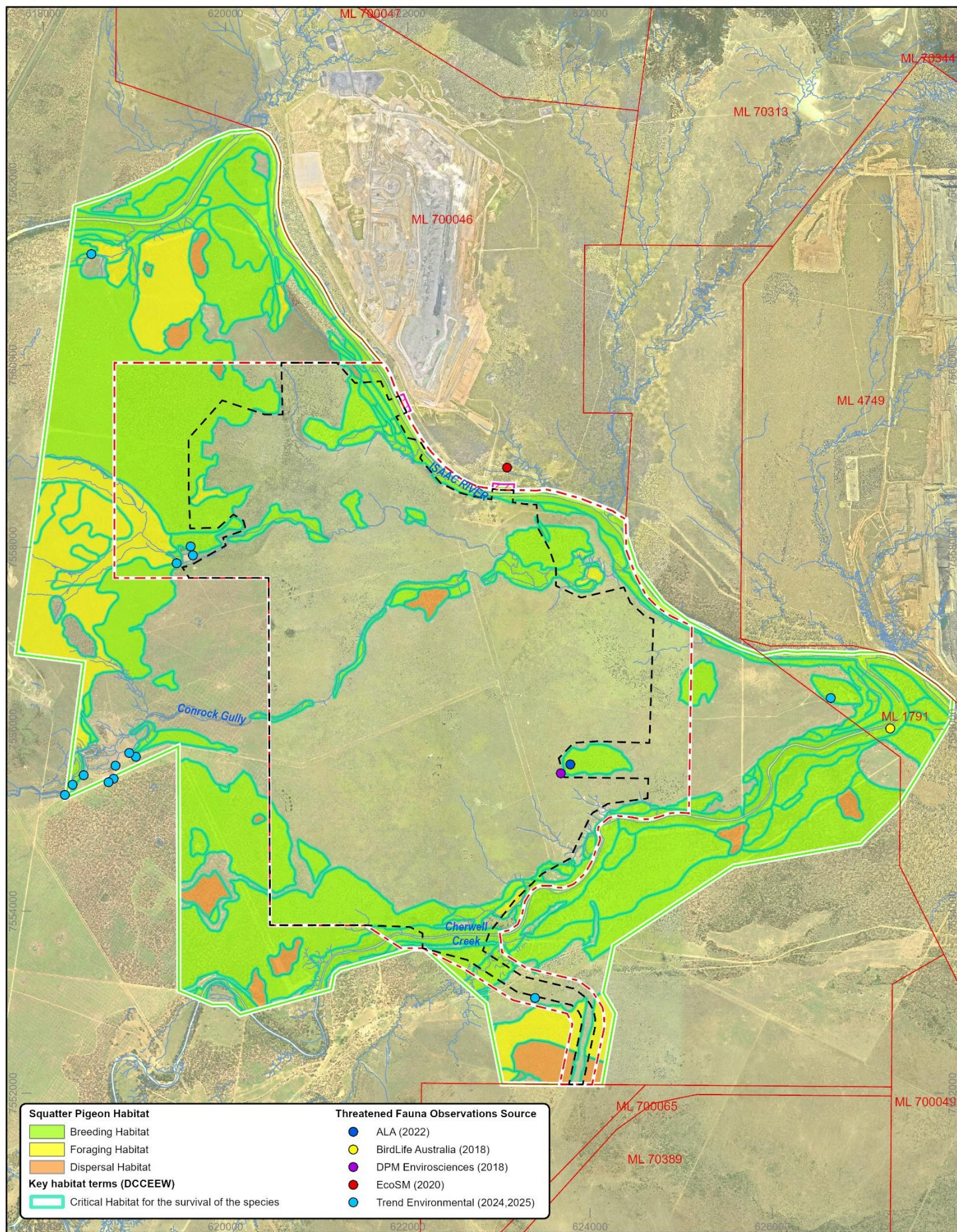
LEGEND

- ML
- Waterway
- IDE Project MLAs
- Disturbance Area on Project MLs
- Additional Disturbance Area
- Survey Area
- Threatened Flora Habitat**
 - Dichanthium queenslandicum*
 - Dichanthium setosum*



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Threatened Flora Habitat



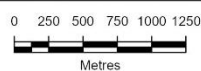
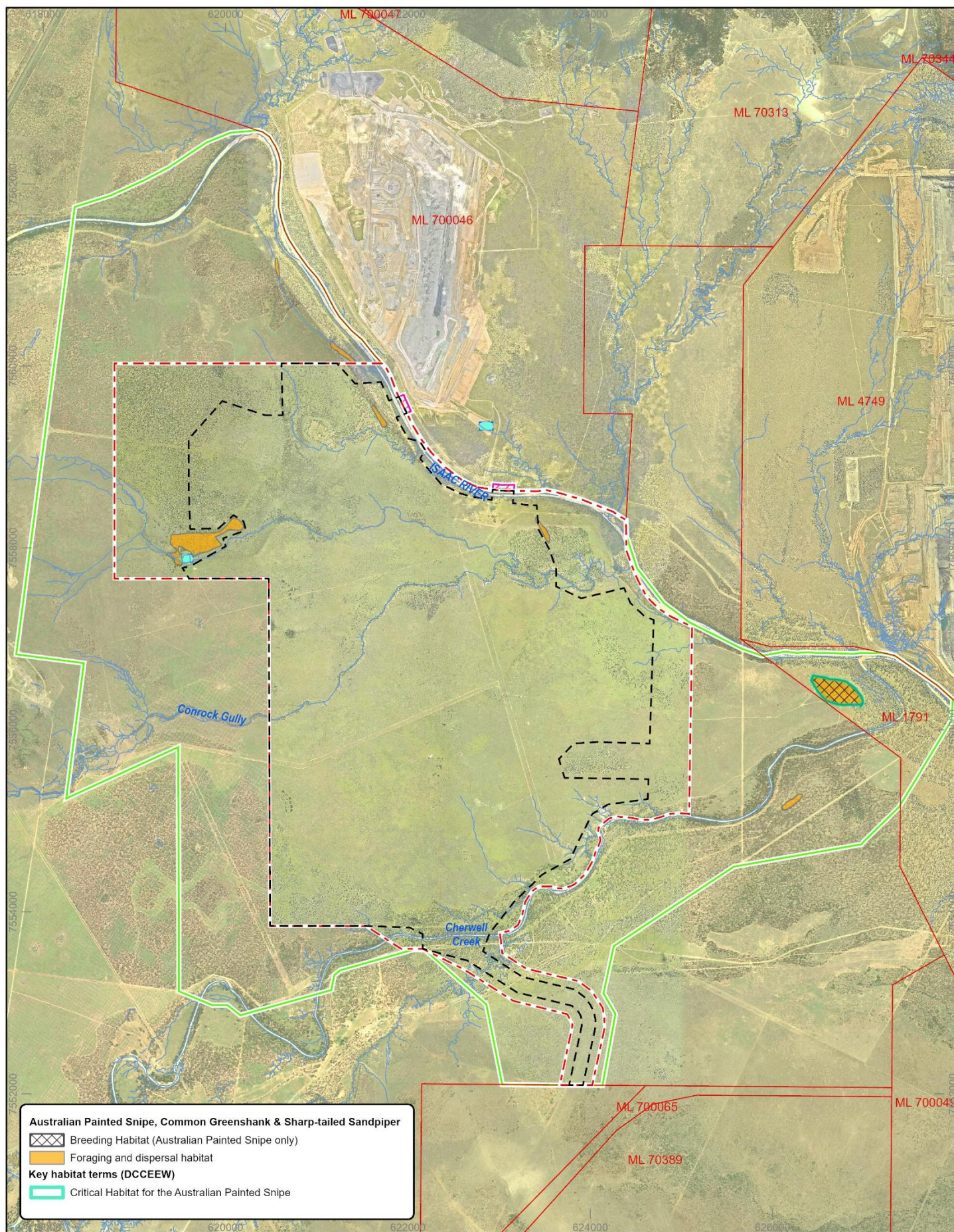
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Squatter Pigeon Habitat



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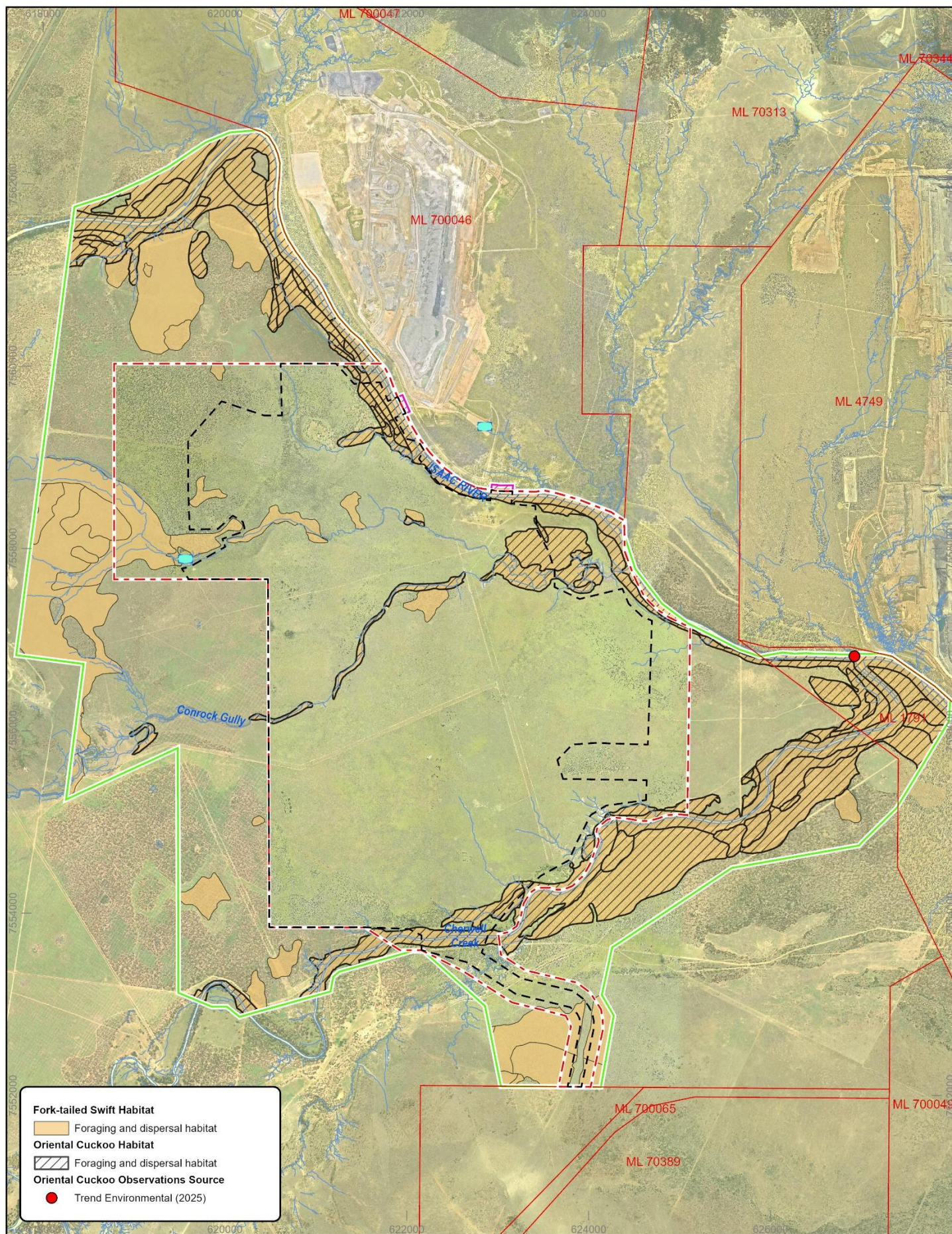
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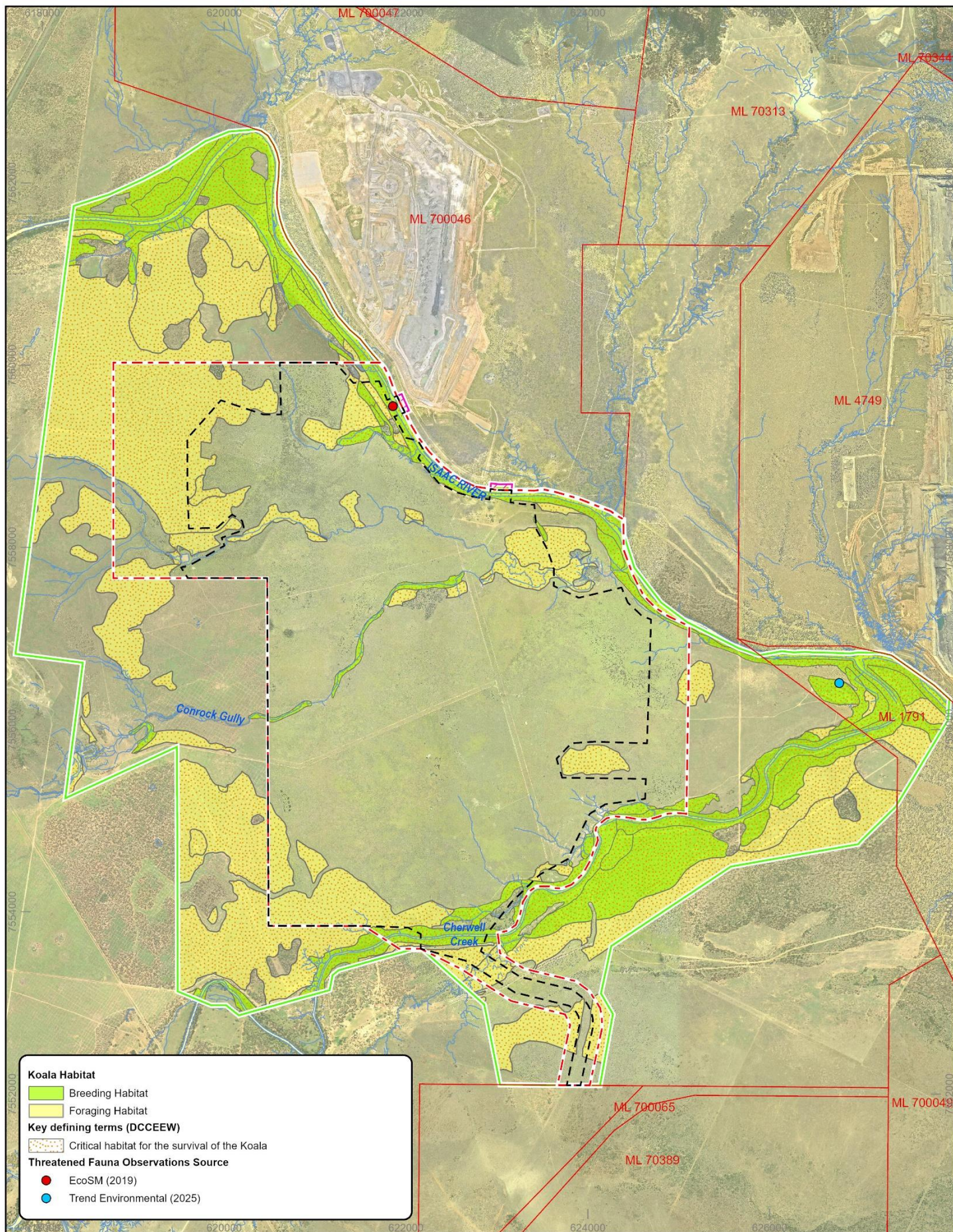
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- Additional Disturbance Area
- Survey Area
- Dams



ISAAC DOWNS EXTENSION

Threatened Wetland Birds Habitat





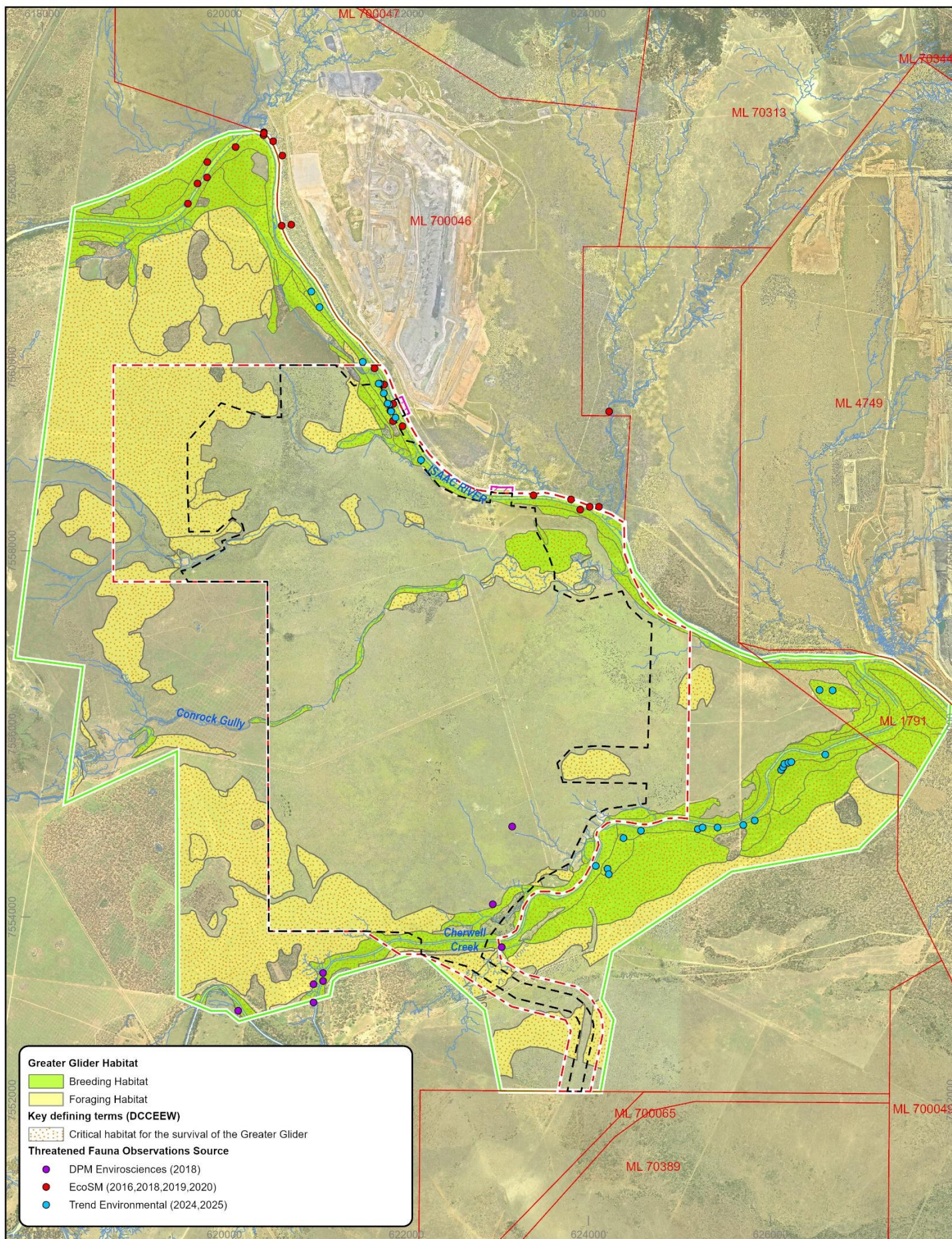
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ISAAC DOWNS EXTENSION

Koala Habitat

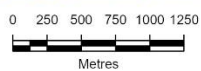
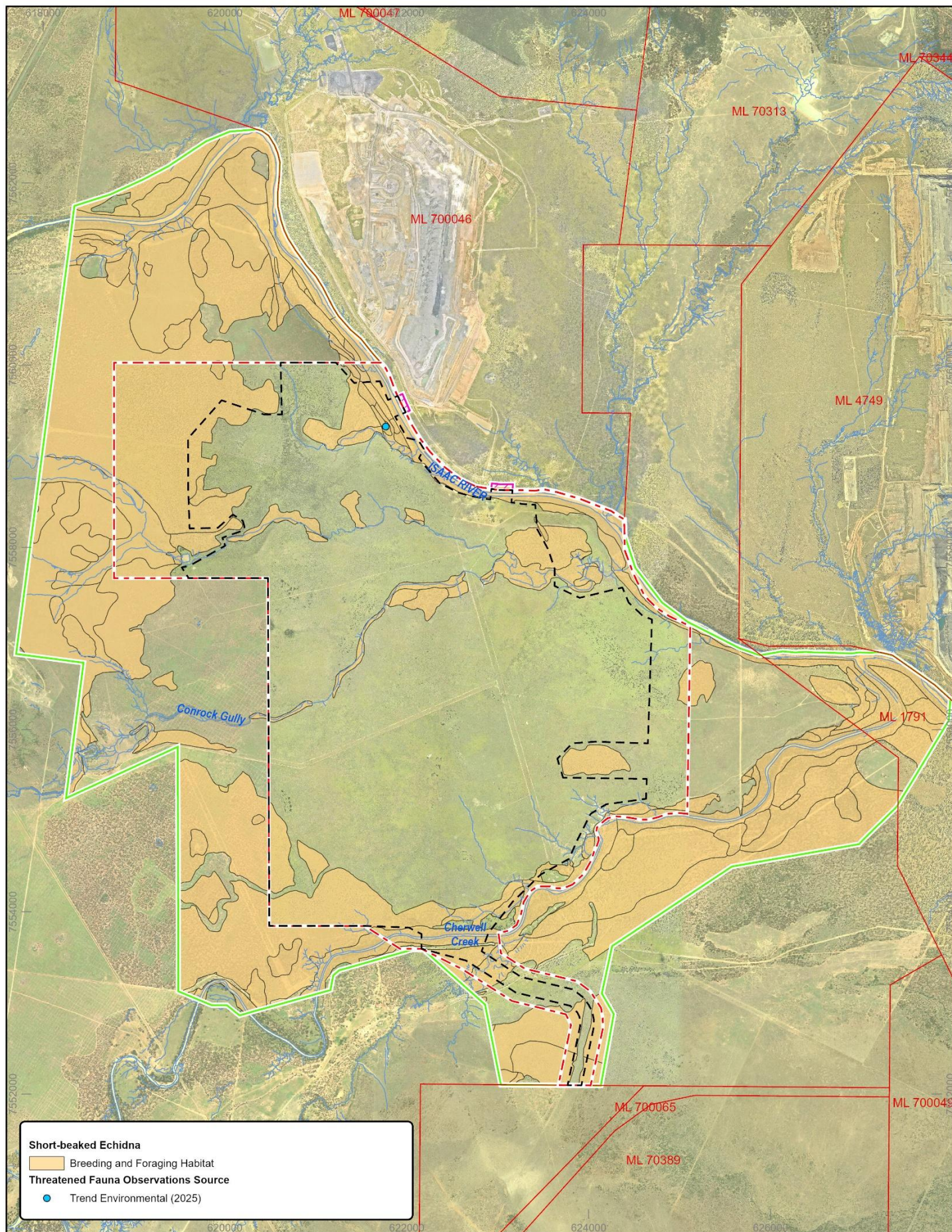


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 ISAAC DOWNS EXTENSION

Greater Glider Habitat



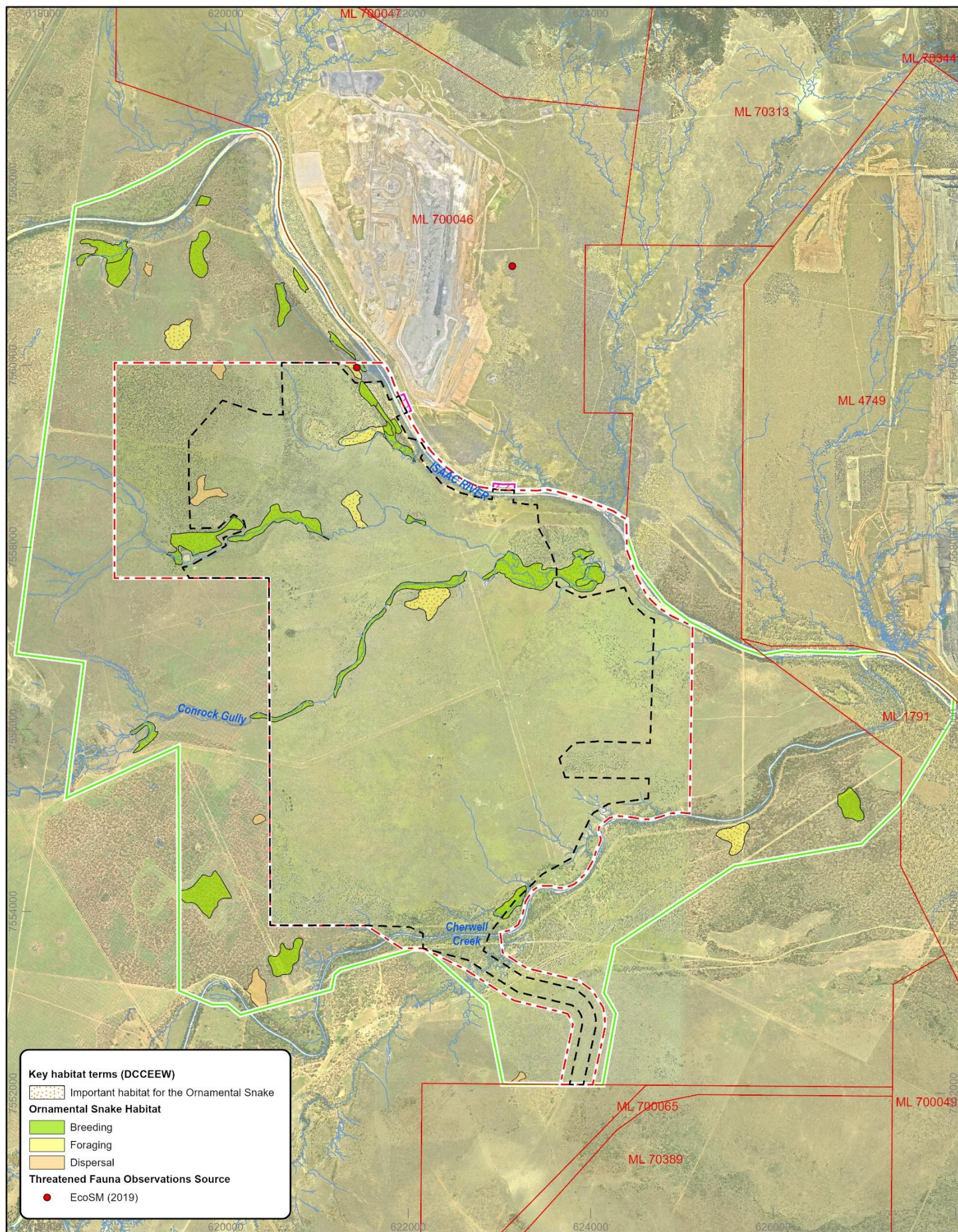
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Short-beaked Echidna Habitat



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 Drawn: Minserv
 Source: Trend Environmental Consultants
 File: 20260421 Ornamental Snake Habitat.aprx

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11.4.3.6 Introduced Flora and Fauna, and Biosecurity Risks

A total of 36 introduced flora species were recorded within the Survey area during field surveys. Introduced flora were concentrated in non-remnant areas of the Survey area. However, weed species were also recorded within the ground and shrub layers of remnant and regrowth polygons.

Section 5.4 of **Appendix P** describes the introduced flora recorded within the Survey area (including scientific names) and their status as a WoNS, biosecurity matter under the Biosecurity Act, and/or a priority weed under the Isaac Region Biosecurity Plan. Fourteen introduced flora species were listed under these legislative instruments, namely Mother of Millions*⁴, Rubber Vine*, Harrisia Cactus*, Hymenachne*, Bellyache Bush*, Lantana*, Creeping Lantana*, Leucaena*, Velvety Prickly Pear*, Prickly Pear*, Parthenium Weed*, Prickly Acacia*, Water Mimosa* and Mimosa Bush*.

Eight introduced and restricted vertebrate fauna species were recorded within the Survey area during field surveys, namely the Cane Toad*, Wild Dog*, European Fox*, Feral Cat*, Feral Deer*, European Rabbit*, Feral Pig* and Domestic Cattle*. Other than the Cane Toad* and Domestic Cattle* all were listed as a biosecurity matter under the Biosecurity Act, and/or a priority pest under the Isaac Region Biosecurity Plan. All habitat within the Survey area is suitable for these introduced fauna species.

11.4.3.7 Aquatic Ecosystems, Watercourses, Wetlands and GDEs

Terrestrial ecology field surveys included areas comprising watercourses, drainage features, wetlands and GDEs in the Survey area, with terrestrial ecology values of these areas included in all mapping described in this chapter. These systems are intrinsically linked to terrestrial ecosystems, and any impacts to aquatic environments have the potential to influence the condition, function and integrity of terrestrial habitats.

Within the Survey area, aquatic ecosystems are primarily associated with the Isaac River, Cherwell Creek and their tributaries, as well as ephemeral drainage features and floodplain depressions. These systems facilitate important interactions between aquatic and terrestrial environments by maintaining soil moisture availability, supporting vegetation condition during dry periods, and influencing the distribution and persistence of riparian and floodplain vegetation communities. GDEs form a component of these interactions, particularly within alluvial and riparian zones of the Isaac River and lower Cherwell Creek where perched groundwater in river sands supports terrestrial vegetation condition and resilience (**Chapter 10**).

In turn, terrestrial vegetation communities contribute to aquatic ecosystem function by providing shading, organic matter inputs, bank stability, and habitat for species that utilise both terrestrial and aquatic environments. These linkages support ecological connectivity, nutrient cycling, and overall ecosystem function across the landscape. These systems play a critical role in maintaining habitat quality, connectivity, and the overall integrity and resilience of terrestrial ecosystems within the Survey area.

Watercourses and drainage features are described in **Chapter 4** and **Chapter 8**, including the status as:

- defined watercourses or drainage features under the Water Act
- waterways for waterway barrier works.

Potential wetlands in and surrounding the Project area are described in **Chapter 12**, based on aquatic ecology fieldwork undertaken for the Project. This fieldwork allowed for classification of potential wetlands into defined wetlands and depressions.

GDEs are described in **Chapter 10**.

Section 5.5 of **Appendix P** provides information confirming the status of watercourses, drainage features and wetlands, as identified through other studies.

⁴ Introduced species are denoted with an asterisk.

11.4.3.8 Presence of Climate Refugia

Potential climate change refugia within the proposed Project area and adjoining landscape were considered for listed threatened and migratory species that may be impacted by the Project. Consistent with Reside et al. (2014) climate change refugia are places that are likely to buffer species from climatic change, support persistence over time, reduce adverse species interactions, and remain available and accessible to species under threat.

The field assessment identified that areas of relatively intact native vegetation, particularly where associated with drainage features and denser vegetation structure of the Isaac River and Cherwell Creek, may provide localised microclimatic buffering and habitat resources that could function as potential climate change refugia at a local scale. However, no large or regionally significant climate change refugia were identified within the Project area.

Where practicable, the retention of native vegetation and maintenance of habitat connectivity within the Project area will assist in maintaining these localised refugia functions for threatened and migratory species potentially occurring in the surrounding landscape.

For further information on the presence of climate refugia refer to Section 5.7 of **Appendix P**.

11.4.3.9 Matters of National Environmental Significance

The following tables summarise the field verified TECs or habitat for Commonwealth listed threatened or migratory species, confirmed in the Survey area:

- Table 11-11 describes TECs, a quality rating where applicable and analogous REs (see Figure 11-4)
- Table 11-12 describes listed threatened flora species habitat and associated vegetation communities (see Figure 11-5)

Table 11-13 describes listed threatened and migratory fauna species and associated vegetation communities (see Figure 11-6 to Figure 11-12).

Table 11-11 TECs Confirmed Present Within the Survey Area

Threatened Ecological Community	Quality Rating	Analogous REs	Status ¹
Brigalow TEC	Not applicable	11.3.1, 11.4.8, 11.4.9	EN
Natural Grasslands TEC	Best and Good Quality	11.3.21, 11.8.11	EN
Poplar Box TEC	Category C	11.3.2	EN
SEVT TEC	N/A	11.8.13	EN

¹Status under the EPBC Act: CE = Critically Endangered, EN = Endangered, VU = Vulnerable.

Table 11-12 Commonwealth-listed Threatened Flora Species that have Suitable Habitat Verified Within the Survey Area

Family	Scientific Name	Common Name	Status		Vegetation Community
			QLD ¹	CTH ²	
THREATENED FLORA					
Poaceae	<i>Dichanthium queenslandicum</i>	King Bluegrass	VU	EN	Native tussock grasslands

Family	Scientific Name	Common Name	Status		Vegetation Community
			QLD ¹	CTH ²	
Poaceae	<i>Dichanthium setosum</i>	Bluegrass	LC	VU	Native tussock grasslands

¹ Queensland Status (NC Act): EX = Extinct, EW = Extinct in Wild, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, SLC = Special Least Concern.

² Commonwealth Status (EPBC Act): EX = Extinct, EW = Extinct in the Wild, CE = Critically Endangered, EN = Endangered, VU = Vulnerable.

Table 11-13 Commonwealth-listed Threatened and Migratory Species Habitat Verified Within the Survey Area

Family	Common Name	Scientific Name	Status ¹		Vegetation Community
			QLD	CTH	
Threatened Birds					
Columbidae	Squatter Pigeon (southern subspecies)	<i>Geophaps scripta scripta</i>	VU	VU	Eucalypt woodlands on lowlands and ranges, Eucalypt woodlands on basalt plains, Wet eucalypt woodlands on alluvial plains and drainage lines, Dry to moist woodlands on sandy plains, Brigalow woodlands, Native Tussock Grasslands and Ephemeral wetlands
Rostratulidae	Australian Painted Snipe	<i>Rostratula australis</i>	EN	EN, Mi	Ephemeral wetlands
Scolopacidae	Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	SLC	VU, M, Mi	
Scolopacidae	Common Greenshank	<i>Tringa nebularia</i>	SLC	EN, Mi	
Threatened Mammals					
Phascolarctidae	Koala	<i>Phascolarctos cinereus</i>	EN	EN	Eucalypt woodlands on lowlands and ranges, Eucalypt woodlands on basalt plains, Wet eucalypt woodlands on alluvial plains and drainage lines, Dry to moist woodlands on sandy plains and Ephemeral wetlands
Pseudocheiridae	Greater Glider (southern and central)	<i>Petauroides volans</i>	EN	EN	
Threatened Reptiles					
Elapidae	Ornamental Snake	<i>Denisonia maculata</i>	VU	VU	Brigalow woodlands and Ephemeral wetlands

Family	Common Name	Scientific Name	Status ¹		Vegetation Community
			QLD	CTH	
Migratory Species					
Apodidae	Fork-tailed Swift	<i>Apus pacificus</i>	SLC	M, Mi	All vegetation communities
Cuculidae	Oriental Cuckoo	<i>Cuculus optatus</i>	SLC	Mi	Eucalypt woodlands on lowlands and ranges, Wet eucalypt woodlands on alluvial plains and drainage lines, Dry to moist woodlands on sandy plains and Ephemeral wetlands

¹ Queensland Status (NC Act): EX = Extinct, EW = Extinct in Wild, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern; SLC = Special Least Concern.

² Commonwealth (Cth) EPBC Act Status: EX = Extinct, EW = Extinct in Wild, CE = Critically Endangered, EN = Endangered, VU = Vulnerable, M = Marine, Mi = Migratory, - not protected under the Act.

11.4.3.10 Matters of State Environmental Significance

Table 11-14 summarises the field verified MSES confirmed in the Survey area (see Map 21 and Map 22 in Appendix A of **Appendix P**).

Table 11-14 Field-Verified MSES Within the Survey Area

MSES	Definition	Survey area
Regulated vegetation	Prescribed REs that are endangered or of concern REs	Endangered or of concern REs (VM Act status) within Category B (Remnant) regulated vegetation areas are recognised as MSES Regulated Vegetation. The prescribed REs that were endangered and of concern within the Survey area include (noting these exclude Grassland REs listed in Schedule 5 of the <i>Vegetation Management Regulation 2012</i>; Qld): • Endangered RE11.3.1 (mid-dense) • Of concern RE11.3.2 (sparse) • Of concern RE11.3.3 (sparse) • Of concern RE11.3.4 (sparse) • Endangered RE11.4.8 (sparse) • Endangered RE11.4.9 (sparse) • Of concern RE11.8.11 (grassland) • Endangered RE11.8.13 (dense) These prescribed REs are shown in Figure 11-2 .
	Prescribed REs that intersect with an area shown as a wetland on the vegetation management wetlands map	RE11.3.27b intersects with field-verified VM Act wetlands within the Survey area (shown in map Figure 11-2).
	An area of essential habitat on the essential habitat map for an animal that is critically	Essential habitat for the following species was verified within the Survey area (shown in map 21 in Appendix A of Appendix P):

MSES	Definition	Survey area
	endangered wildlife, endangered wildlife or vulnerable wildlife or a plant that is critically endangered wildlife, endangered wildlife or vulnerable wildlife AND if the ecosystem is an area of essential habitat on the essential habitat map for an animal that is near threatened wildlife or a plant that is near threatened wildlife	• Australian Painted Snipe • Squatter Pigeon • Koala • Greater Glider • Ornamental Snake
	To the extent the ecosystem is located within a defined distance from the defining banks of a relevant watercourse or relevant drainage feature	The following field-verified REs were verified to be within a defined distance to a defined bank of a watercourses or drainage feature within the Survey area (noting these exclude Grassland REs listed in Schedule 5 of the <i>Vegetation Management Regulation 2012</i>): • RE11.3.1 (mid-dense) • RE11.3.2 (sparse)) • RE11.3.3 (sparse) • RE11.3.4 (sparse) • RE11.3.25 (sparse) • RE11.5.3 (sparse) REs within a defined distance of a defining bank are shown Figure 11-2.
HES wetlands	A wetland— (i) in a wetland protection area; or (ii) of HES shown on the map of Queensland wetland environmental values	One HES wetland was verified within the Survey area shown in Figure 11-3.
Protected Wildlife habitat	A habitat for an animal that is critically endangered wildlife, endangered wildlife or vulnerable wildlife or a SLC animal	The field survey verified MSES wildlife habitat (endangered or vulnerable) within the Survey area, which included Squatter Pigeon, Australian Painted Snipe, Common Greenshank, Sharp-tailed Sandpiper Koala, Greater Glider and Ornamental Snake shown in map 22 in Appendix A of Appendix P. The field survey also verified MSES wildlife habitat (special least concern), which included the Short-beaked Echidna. These species were also considered MNES (other than the Short-beaked Echidna). As offsets cannot be secured under multiple jurisdictions for the same impact, any offset requirements associated with habitat for these species will therefore be addressed under the EPBC Act framework.

MSES	Definition	Survey area
Waterways providing for fish passage	Any part of a waterway providing for passage of fish is a matter of State environmental significance only if the construction, installation or modification of waterway barrier works carried out under an authority will limit the passage of fish along the waterway.	Refer to Section 12.3.12 Chapter 12
Connectivity Areas	Ecosystem contains remnant vegetation; and if the ecosystem contains an area of land that is required for ecosystem functioning (a connectivity area), AND if the administering agency is satisfied, having had regard to criteria in the environmental offsets policy about connectivity areas, that— (a) the connectivity area is of sufficient size or configured in a way that maintains ecosystem functioning; and the prescribed RE will remain despite a threatening process within the meaning of the NC Act.	There is a mapped state biodiversity corridor within the Survey which is analogous with the riparian habitat associated with the Isaac River and Cherwell Creek (map 22 in Appendix A of Appendix P).

11.4.3.11 Environmental Sensitive Areas

Table 11-15 summarises the field verified ESAs confirmed in the Survey area (see Map 23 of **Appendix P**).

Table 11-15 Field Verified ESAs Within the Survey Area

RE	ESA Category	Description	VM Act Class ¹	Biodiversity Status ²
11.3.1	B	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on alluvial plains	EN	EN
11.3.21	B	<i>Dichanthium sericeum</i> and/or <i>Astrebla</i> spp. grassland on alluvial plains. Cracking clay soils	OC	EN
11.4.8	B	<i>Eucalyptus cambageana</i> woodland to open forest with <i>Acacia harpophylla</i> or <i>A. argyrodendron</i> on Cainozoic clay plains	EN	EN
11.4.9	B	<i>Acacia harpophylla</i> shrubby woodland with <i>Terminalia oblongata</i> on Cainozoic clay plains	EN	EN
11.8.13	B	Semi-evergreen vine thicket and microphyll vine forest on Cainozoic igneous rocks	EN	EN

11.5 Potential Risks and Impact Assessment

11.5.1 Overview

Potential Impacts associated with the Project may be direct and indirect. These potential impacts are described in the following sections. Relevant impacts were characterised having regard to their likelihood, intensity, duration, magnitude and extent, to provide a consistent basis for evaluating the nature and significance of potential impacts on ecological values.

No relevant impacts are expected to be unknown, unpredictable or irreversible. This conclusion is supported by the detailed baseline ecological assessments completed for the Survey area, including habitat mapping, RE verification, targeted flora and fauna surveys, and impact assessment undertaken in accordance with relevant Commonwealth and State guidelines.

In addition, impacts are largely associated with the clearing and disturbance of identified habitat within a defined Disturbance area, and can be avoided, minimised and managed through the application of mitigation measures, rehabilitation, and offsetting where required. On this basis, impacts are not considered unknown or unpredictable. While vegetation clearing is permanent at the impact site, and therefore, irreversible at that location in the short to medium term, the affected values are known, the extent of impact has been quantified, offsets have been proposed for significant residual impacts, and the consequences have been assessed through the impact assessment process.

11.5.2 Potential Direct Impacts

Potential direct impacts from the Project consist of:

- vegetation clearing (further detail in section 6.1.1 of **Appendix P**)
- habitat removal and loss of connectivity (further detail in section 6.1.2 of **Appendix P**).

11.5.2.1 Vegetation Clearing

The Project will require progressive vegetation clearing to facilitate open cut mining operations and associated disturbance activities. The Disturbance area for the Project is 2,083.43 ha, which includes a combination of historically cleared, non-remnant vegetation (1,749.23 ha; represents 83.96 %) and remnant vegetation (334.20 ha; represents 16.04 %).

The majority of vegetation within the Disturbance area has been previously cleared and modified through cattle grazing and agricultural use, with remnant vegetation generally restricted to riparian areas, alluvial plains, and scattered patches within the Disturbance area.

Vegetation clearing will occur progressively across the life of the mine (anticipated 15 years) and will be sequenced in line with mine development, haul road construction, and associated disturbance areas.

The Disturbance area used to calculate vegetation clearing impacts incorporates all areas required for mining and associated activities. The final siting of mining infrastructure and activities will aim to minimise impacts to sensitive ecological features where practicable. This allows for some flexibility in the location of mining infrastructure and activities whilst remaining within the Disturbance area. In total, these components represent the full Disturbance area of 2,083.43 ha, which has been used to calculate vegetation clearing impacts across both remnant and non-remnant vegetation communities, as provided in Table 11-16.

Table 11-16 Impacts to Vegetation Communities

Vegetation Community	RE	Regulated Vegetation Category ¹	VM Act Class ²	Extent in Project area (ha)	Extent in Disturbance Area		
					Disturbance area on Project (ha)	Additional disturbance area (ha)	TOTAL
Semi-evergreen vine thicket	11.8.13	B	EN	0	0	0	0
Eucalypt woodlands on lowlands and ranges	11.3.7	B	LC	0	0	0	0
	11.5.12	B	LC	0	0	0	0
Eucalypt woodlands on basalt plains	11.8.5	B	LC	22.06	4.46	0	4.46
	11.4.13	B	LC	8.55	1.83	0	1.83
Wet eucalypt woodlands on alluvial plains and drainage lines	11.3.3	B	OC	57.70	44.17	0	44.17
	11.3.4	B	LC	15.30	0	0	0
	11.3.25	B	LC	98.27	25.44	1.48	26.92
Dry to moist woodlands on sandy plains	11.3.2	B	OC	60.43	33.44	0	33.44
	11.5.3	B	LC	389.87	185.19	0	185.19
	11.5.3b	B	LC	0	0	0	0
	11.5.9b	B	LC	18.89	0	0	0
Brigalow woodland	11.3.1	B	EN	39.20	22.53	0	22.53
	11.4.8	B	EN	1.34	0	0	0
	11.4.9	B	EN	16.38	14.35	0	14.35
Native tussock grassland	11.3.21	B	OC	38.32	0	0	0
	11.8.11	B	OC	0	0	0	0
Ephemeral wetlands	11.3.27 b	B	LC	2.39	1.31	0	1.31
Cleared areas/ exotic grasslands	Non-remnant	X	-	1940.93	1748.18	1.05	1749.23
Total Remnant (ha)				768.70	332.72	1.48	334.20
% Remnant				28.37	15.99	58.50	16.04
Total Non-remnant (ha)				1940.93	1748.18	1.05	1749.23
% Non-remnant				71.63	84.01	41.50	83.96
TOTALS (ha)				2709.63	2080.90	2.53	2083.43

¹Regulated vegetation category: Category B (remnant vegetation), Category C (high-value regrowth) Category R (reef regrowth watercourse vegetation) or Category X (non-remnant).

² VM Act Class: EN = Endangered, OC= Of Concern, LC = Least Concern, NC = No concern at present.

11.5.2.2 Habitat Removal and Loss of Connectivity and Integrity

The Project will result in the progressive removal of flora and fauna habitat across the Disturbance area, which totals approximately 2,083.43 ha. This footprint includes both historically cleared pasture (1,749.23 ha) and remnant vegetation (334.20 ha) confirmed during the survey. In addition to habitat loss, the Project will alter the structure, function and integrity of ecosystems within the Disturbance area through vegetation clearing, fragmentation and modification of ecological processes. The vegetation communities present within the Project area include:

- eucalypt dry woodlands and open forests on sandy plains and basaltic rises
- brigalow and associated acacia woodlands on clay soils
- wet eucalypt woodlands on alluvial plains and drainage lines along Isaac River, Cherwell Creek, and associated tributaries
- wetlands and ephemeral drainage features, including floodplain depressions
- cleared pasture dominated by *Cenchrus ciliaris**

The majority of the Disturbance area comprises low ecological value cleared pasture. However, further clearing of remnant woodlands and riparian vegetation will result in a direct loss of higher value fauna habitat. The removal of these areas will also reduce ecosystem integrity by simplifying vegetation structure, reducing availability of key habitat features (e.g. hollow-bearing trees), and disrupting ecological processes.

Clearing for linear infrastructure (e.g. bridges) is expected to create some areas of fragmentation along riparian corridors associated with the Isaac River and Cherwell Creek that currently function as key movement pathways across the Survey area. While some fauna will be able to disperse into adjacent habitats, the surrounding landscape is already fragmented by historical clearing for grazing and mining, limiting the extent of suitable high-quality refuge areas. Species dependent on large hollow-bearing trees or intact woodland interiors, including those that are threatened (e.g. Greater Glider and Koala) will be affected by fauna habitat loss. This loss of structural complexity and habitat continuity further contributes to a decline in ecosystem integrity.

The Isaac River and Cherwell Creek form important regional ecological linkages, facilitating connectivity between fragmented remnant vegetation patches. These corridors are also recognised as habitat for threatened and migratory species. While mine planning has actively sought to avoid disturbance to the riparian areas of Isaac River and Cherwell Creek in the first instance, some unavoidable clearing will reduce local connectivity for fauna. Secondary linkages through smaller tributaries (e.g. Conrock and J B Gully) and stepping stone habitat will also be impacted, reducing dispersal opportunities for fauna populations. Disturbance to these linkages will degrade ecosystem integrity at a local scale by weakening ecological function, reducing habitat condition, and limiting the capacity of the landscape to support viable and resilient fauna populations. However, at a regional scale, degradation of ecosystem integrity is not expected as habitat within the Disturbance area represents a relatively small component of the broader landscape and connectivity network and does not form part of a continuous linkage to larger, intact remnant vegetation patches or patches retained within protected estates.

11.5.3 Potential Indirect Impacts

Potential indirect impacts associated with the Project include a number of secondary impact pathways, some of which may also be considered facilitated impacts where Project activities create the conditions for those impacts to occur or increase. In particular, increased pest and invasive weed spread, fauna injury or mortality from vehicle strike, and elevated bushfire risk may be facilitated by disturbance, access, vehicle movement and increased human activity associated with the Project.

Potential indirect and facilitated impacts associated with the Project activities include:

- increase in pest and invasive weeds (further detail in section 6.2.1 of **Appendix P**)

- fragmentation and edge effects (further detail in section 6.2.2 of **Appendix P**)
- fauna mortality or injury during vegetation clearing or from vehicle strike (further detail in section 6.2.3 of **Appendix P**)
- erosion and sedimentation (further detail in section 6.2.4 of **Appendix P**)
- hydrological changes to water quality, flooding impacts and impacts to GDEs (further detail in section 6.2.5 of **Appendix P**)
- air quality (further detail in section 6.2.6 of **Appendix P**)
- light impacts (further detail in section 6.2.7 of **Appendix P**)
- noise and vibration impacts (further detail in section 6.2.8 of **Appendix P**)
- bushfire risk (further detail in section 6.2.9 of **Appendix P**)
- influence of climate change (further detail in section 6.2.10 of **Appendix P**).

11.5.3.1 Increase in Pest and Invasive Weeds

Field surveys confirmed the presence of several introduced fauna species within the Survey area, including the Cane Toad*, Domestic Cattle*, Wild Dog*, Feral Cat*, Rabbit*, Feral Pig* and Feral Deer*. These introduced fauna species were not strongly tied to particular habitat types within the Survey area but were recorded across a range of habitats.

Feral Cats* and Wild Dogs* pose a predation risk to threatened fauna, particularly the Koala, Greater Glider and Squatter Pigeon. While Cane Toads* may be taken as incidental prey by the Ornamental Snake.

Mining activities, including vegetation clearing, water management, and the construction of infrastructure, have the potential to create new resources and refuges for pest species (e.g. standing water in dams for Cane Toads* and Feral Pigs* and an increase in refuge). While their populations are already established in the Region, Project disturbance could exacerbate their abundance and distribution without management controls.

Introduced flora species were recorded within the Survey area, including species listed as WoNS and restricted matters under the Biosecurity Act, as well as flora species prioritised in the Isaac Region Biosecurity Plan 2024 - 2027. Weeds were widely distributed across disturbed areas within the Survey area, particularly cleared pastures and road verges, but they also occurred to a lesser extent within remnant and regrowth vegetation areas and riparian zones.

Weed spread is typically facilitated by ground disturbance, grazing pressure, altered fire regimes, and the through the movement of vehicles and equipment. Without appropriate management controls, Project-related disturbance has the potential to increase the spread of weed propagules both within and beyond the Disturbance area.

11.5.3.2 Fragmentation and Edge Effects

Edge effects occur when previously intact remnant vegetation is partially cleared, exposing new habitat boundaries to external disturbances. The Project already supports a highly modified landscape, with extensive clearing for grazing and historical disturbances having created fragmented vegetation patches amongst higher quality riparian habitat linkages. As a result, many vegetation patches within the Survey area are already subject to edge-related pressures. The proposed Project will create new vegetation edges, particularly where vegetation clearing occurs adjacent to intact remnant communities such as the Eucalypt riparian woodlands along the Isaac River and Cherwell Creek, and Brigalow patches associated with gilgai systems.

Ground-dwelling fauna are particularly vulnerable to edge effects, as increased exposure at vegetation boundaries raises predation risk from Feral Cats*, Wild Dogs*, and other pest species. Weed invasion can also intensify along new disturbance margins, particularly in sandy and alluvial areas where invasive species, such as *Parthenium hysterophorus** and *Lantana camara**, are already established.

Edge-related impacts can locally reduce habitat quality, particularly for threatened species dependent on intact interior habitats (e.g. Koalas, Greater Glider and Squatter Pigeon).

11.5.3.3 Erosion and Sedimentation

Soil erosion may occur in areas disturbed by Project related activities. Erosion can also result in the loss of topsoil, the most productive component of the soil profile, which may significantly limit the capacity for natural regeneration of vegetation communities post disturbance, unless the topsoil is appropriately stockpiled for later reuse. Areas most susceptible to erosion include floodplain and riparian environments associated with the Isaac River, Cherwell Creek and Conrock Gully, as well as vegetation communities occurring on erosive sand or silt land zones.

Topsoil resources can be protected by removing topsoil from areas subject to high levels of disturbance and either setting it aside for reuse or directly returning it during rehabilitation. Where topsoil is retained in situ within disturbed areas, erosion and sediment control measures are required to minimise topsoil loss.

If left unmanaged, erosion and sediment mobilisation associated with Project disturbance may result in the progressive loss of topsoil resources, degradation of soil structure and reduced soil fertility within disturbed and adjoining areas. The loss of topsoil may substantially limit the capacity for natural regeneration and compromise rehabilitation outcomes by reducing seed bank viability, soil organic matter and microbial function.

Potential erosion and sedimentation impacts on aquatic ecosystems are described in Section 12.4 of **Chapter 12**.

11.5.3.4 Fauna Mortality or Injury

Fauna inhabiting habitats within the Disturbance area are at risk of injury or mortality during vegetation clearing activities. Individuals that are unable to disperse ahead of active clearing machinery, such as small reptiles, amphibians, and less mobile and arboreal mammals, are particularly vulnerable.

Project activities have the potential to result in indirect impacts to animal breeding places. The loss or degradation of breeding places, such as nests, hollows, burrows or refuge sites, may disrupt breeding behaviour, reduce reproductive success and lead to the abandonment of breeding areas. These impacts are most likely to occur during construction activities and may be more pronounced if works coincide with key breeding periods for fauna species. Additional risks to fauna include entrapment in open trenches, excavations, or water storages during construction and operation. These features can act as inadvertent pitfall traps, particularly for reptiles, small mammals, and amphibians.

While fauna mortality and injury cannot be entirely avoided, the risks are expected to be localised and manageable with appropriate mitigation measures. No populations of conservation significant fauna are considered likely to be restricted to the Disturbance area, and therefore, impacts are unlikely to threaten the persistence of species at a local or regional scale.

Vehicle and machinery movement during construction and operation present an additional risk of fauna injury or mortality. Vehicle strike is most likely to affect species that rely on linear riparian corridors or watercourses for movement, such as the Koala, Greater Glider and Squatter Pigeon, as well as wide-ranging number of least concern macropod species and ground-dwelling birds and reptiles. Roads traversing remnant habitat areas or in close proximity to watercourses and associated riparian woodland pose the greatest risk of fauna collision, particularly during the night or periods of low light.

The Project is not expected to increase traffic volumes on public roads above existing levels, as it represents an extension and replacement of existing mining activities at the Isaac Plains Complex (IPC). Accordingly, no facilitated impacts associated with increased traffic are anticipated.

Mitigation measures include speed limits, driver awareness training, and fauna signage at key crossing points to reduce potential strike incidents.

11.5.3.5 Hydrological Changes

11.5.3.5.1 Discharges of Contaminants to Water and Land

The Project's proposed water management system (refer to **Chapter 8**) will manage runoff, sediment-laden water, and mine-affected water within designated containment and diversion structures to prevent uncontrolled releases to the receiving environment.

Under normal operating conditions, no uncontrolled discharges of mine-affected water are predicted. Controlled releases, where required, are expected to comply with relevant water quality objectives and EA conditions, ensuring that downstream water quality continues to protect environmental values.

The sediment water system has been designed in accordance with the *Best Practice Erosion and Sediment Control Guidelines and Queensland regulatory standards* (IECA, 2008). Overflows from sediment basins may occur during extreme rainfall events, in accordance with the design criteria for sediment basins. Modelling indicates that such overflows will be of low salinity and unlikely to measurably affect downstream water quality (**Chapter 8**).

Chronic, low-level exposure to contaminants and the potential for bioaccumulation within terrestrial ecosystems are not expected. The likelihood of persistent contamination of surface water, or subsequent uptake and bioaccumulation of contaminants within ecological receptors, is considered low.

11.5.3.5.2 Changes to Surface Flows

The diversion of Conrock Gully through the central section of the Disturbance area will modify local hydrology. The Gully's catchment represents approximately 2% of the upstream Isaac River catchment, and its diversion approximately 3 km upstream of the existing confluence is predicted to have a negligible influence on Isaac River flows. While the downstream reach of Conrock Gully will experience reduced local runoff, backwater flooding from the Isaac River will continue providing intermittent surface flows to these areas, including for a 50% annual exceedance probability (AEP) (1 in 2 year) flow event (**Chapter 9**).

One small, palustrine wetland occurs within the Disturbance area adjacent to the Isaac River (Wetland ID2; Table 41 and Map 20 of Appendix A of **Appendix P**). Other verified wetlands in the Survey area occur outside of the Disturbance area and are therefore not expected to be directly affected by changes in rainfall runoff or flow, and ecological function is anticipated to remain, particularly with appropriate management actions to be implemented to reduce the risk habitat degradation of remaining remnant patches.

11.5.3.5.3 Flooding Impacts

Changes to local hydrological conditions associated with the Project have the potential to influence flooding behaviour within the Survey area and downstream environments, which may in turn impact ecological function.

Detailed hydraulic and hydrology modelling for a range of AEP events has been completed for the Project for the operational and closure periods, inclusive of all Project structures and landforms with the potential to alter hydrology and geomorphology, as detailed in **Chapter 9**. The design of infrastructure with the potential to alter hydrology and geomorphology has been undertaken to minimise impacts (e.g. locating the Isaac River levee approximately 100–400 m from the high bank; bridge designs with minimal interference with flows; and a temporary dragline crossing). In addition, hydraulic and hydrology modelling has been completed for five cross sections through the Isaac River and adjoining floodplain upstream, adjacent and downstream of the Project, with the five cross sections representing areas of potential ecological value, containing REs, TECs and GDEs. This modelling has identified:

- The Project will have negligible impact on hydrology and geomorphology (e.g. flood levels, velocity, bed shear stress and stream power) for more frequent flood events (e.g. 10% AEP or 1:10 year flood event)
- The Project will have negligible to minor impact on hydrology and geomorphology for less frequent flood events (e.g. 1% AEP or 1:100 year flood event) during operations.
- Post mining, with the decommissioning and rehabilitation of the crossing infrastructure and the Isaac River levee, and restoration of the associated floodplain, the Project will have negligible impact on hydrology and geomorphology.
- The Project will result in almost no change in the duration for which flood events will occur (less than 1 hour change in duration for all AEP events), as measured at the nominated cross section locations.
- The proposed design of Conrock Gully diversion will be hydraulically and geomorphically stable, with revegetation to a native ecosystem, and will be similar to the existing Gully.
- The final void is located outside the 0.1% AEP (1:1,000) year flood event.

Based on the findings from the flooding assessment (**Chapter 9**) impacts to vegetation in floodplains, riparian habitat and vegetation condition from changes to hydrology, hydraulics and geomorphology are expected to be negligible.

11.5.3.6 Groundwater Dependent Ecosystems

Changes to groundwater quality and quantity have the potential to indirectly affect ecosystems surrounding the Disturbance area, particularly those that are dependent, or partially dependent, on groundwater (i.e. GDEs). Potential impacts may arise where Project activities result in groundwater drawdown or changes to groundwater quality within aquifers that support vegetation or aquatic ecosystems.

The GDE Assessment (**Chapter 10**) determined that riparian vegetation fringing the Isaac River, lower reaches of Cherwell Creek and HES wetland utilises a discontinuous and seasonally variable perched groundwater system that is associated with active alluvial deposits of the natural drainage system. Field data indicates that GDEs rely on this perched groundwater system rather than deeper alluvial aquifer. The perched groundwater system is not subject to drawdown from the Project or other resource projects. As GDEs demonstrate a reliance on the perched groundwater system rather than the deeper alluvial aquifer, groundwater drawdown associated with the Project or other resource projects (i.e. cumulative drawdown) is unlikely to impact GDEs. Therefore, adverse impacts to groundwater-dependent vegetation are not expected.

11.5.3.7 Terrestrial Ecology Impacts Resulting from the Diversion of Conrock Gully

Conrock Gully is not recognised as a State or regional biodiversity corridor. Within the Survey area, much of the gully line and associated floodplain vegetation comprises non-remnant vegetation, fragmented remnant patches and areas of regrowth, reflecting historical clearing and land use practices. In contrast, vegetation associated with Conrock Gully upstream of the Survey area exhibits comparatively greater connectivity, with more continuous remnant vegetation occurring along the drainage line and within adjacent areas to the north and south. The Project will not alter the upstream connectivity of Conrock Gully with surrounding vegetated areas.

The proposed diversion of Conrock Gully will involve temporary isolation of the gully from the Isaac River during construction. While this may result in short-term changes to local surface water flow and soil moisture conditions within the immediate construction footprint, terrestrial impacts upstream of the diversion are expected to be negligible. This is because upstream vegetation communities are not hydrologically dependent on direct connectivity to the Isaac River for persistence, and soil moisture regimes in these areas are primarily driven by local rainfall, overland flow and shallow subsurface

processes rather than backwatering from the Isaac River. Furthermore, with the establishment of the diversion with a rehabilitated native vegetation outcome, the diversion will allow for connectivity.

Given the existing fragmented condition of vegetation within the Survey area and the absence of a formal corridor designation for Conrock Gully, the diversion is not expected to result in a measurable reduction in habitat connectivity at a local or regional scale. Therefore, upstream terrestrial ecosystems are expected to retain their existing structure, function and connectivity during and following construction.

11.5.3.8 Air Quality Impacts

Dust deposition associated with construction and operational activities has the potential to impact vegetation communities within and adjacent to the Disturbance area. Excessive dust on foliage can reduce photosynthesis, respiration, transpiration, and subsequent growth rates (Thompson et al., 1984). In some cases, dust accumulation may also increase the penetration of phytotoxic gases, further reducing plant health (Farner, 1993).

The greatest risk of dust generation will be from vegetation clearing and earthworks, vehicle and machinery movements, and exposed surfaces associated with haul roads, stockpiles, and active mine landforms. Localised dust deposition is expected in areas immediately adjacent to these disturbance zones. During construction, dust may arise from activities such as establishment of access roads, site facilities, and the development of the mine and associated infrastructure.

Dust control measures, including dust suppression on haul roads and stockpiles, progressive rehabilitation of disturbed areas, and erosion and sediment management, will be implemented (see **Chapter 15**). These measures are expected to minimise the risk of long-term ecological impacts from dust deposition. Overall, while some short-term localised effects may occur, the Project is unlikely to result in significant dust-related impacts on surrounding vegetation or fauna habitat.

11.5.3.9 Artificial Light Impacts

Indirect impacts to fauna may arise from the introduction of artificial lighting during both the construction and operational phases of the Project. Artificial light can alter natural light regimes and disrupt the behaviour of fauna, particularly nocturnal and crepuscular species. Fauna may avoid illuminated areas, as artificial light can be perceived as a threat or increase perceived predation risk, potentially resulting in displacement from preferred foraging, sheltering or movement corridors.

Some acclimatisation to artificial lighting is expected to occur over the medium to long term for certain fauna species. Many of the species identified within the Survey area are known to persist in environments subject to existing sources of anthropogenic disturbance, including noise, lighting and general human activity. However, the capacity to habituate varies between species, with light-sensitive taxa generally more vulnerable to disturbance.

Consistent with the DCCEEW National Light Pollution Guidelines for Wildlife (DCCEEW, 2023c) artificial lighting has the potential to affect fauna through changes to movement patterns, feeding behaviour, predator–prey interactions, reproduction and circadian rhythms. In particular, poorly directed or high-intensity lighting may contribute to habitat fragmentation by creating illuminated barriers that restrict fauna movement, or by increasing exposure to predators.

Overall, some level of disturbance to fauna is expected as a result of artificial lighting across the Survey area. Short-term impacts may include disruption to feeding and resting behaviour, which may temporarily affect animal condition and health. It is also possible that fauna species that are particularly sensitive to artificial light may avoid illuminated areas or become locally displaced.

11.5.3.10 Noise and Vibration Impacts

Construction and operational activities associated with the Project have the potential to generate noise and vibration, which may disturb local fauna populations. These disturbances are most relevant during vegetation clearing, establishment of surface infrastructure, and the movement of heavy machinery.

Noise generated during clearing, construction, and vehicle operation can cause temporary displacement of fauna. Many animals will avoid noisy areas as they perceive noise and vibration as a potential threat. For species more tolerant to disturbance, acclimatisation to elevated noise levels is expected over time. Sensitive fauna may avoid areas of higher noise intensity, which can result in changes to foraging, breeding, or sheltering behaviour. However, given the already fragmented and grazed nature of much of the landscape, it is anticipated that the majority of fauna present in the Project area will either adapt to, or move away from, short-term noise disturbance.

Vibration associated with blasting is not expected to cause long-term ecological impacts, though some species may exhibit short-term flight behaviour or avoidance of directly disturbed areas.

11.5.3.11 Bushfire Risk

Accidental ignition sources within the Disturbance area may include the operation of machinery, vehicle accidents or collisions, uncontrolled scheduled burns, hot works, spontaneous combustion of coal, and the incorrect disposal of flammable materials. Such ignition events have the potential to result in uncontrolled bushfires, which could cause significant impacts to vegetation communities and fauna habitat within and adjacent to the Project area.

Notwithstanding these potential risks, the Project is not expected to increase bushfire risk across the surrounding landscape with the implementation of appropriate bushfire mitigation and management measures (**Appendix AJ**).

11.5.3.12 Influence of Climate Change

Future climatic conditions at the site, including increased temperatures, changes in rainfall patterns, more frequent and prolonged drought, and an increase in the frequency and severity of extreme weather events such as heatwaves and intense rainfall, have the potential to interact with Project-related disturbances over time, noting that operations are expected to cease by 2043 followed by the rehabilitation and closure phase. Therefore, medium to long term changes to the climate would occur post operations and during the period when rehabilitation is either in progress or completed. Climate changes may exacerbate existing pressures on terrestrial ecosystems, including habitat fragmentation, edge effects, altered hydrological function, erosion risk and reduced ecosystem resilience.

Climate change may also reduce the availability and function of potential climate refugia and refuges for threatened species and ecological communities. Riparian corridors, drainage lines, groundwater-supported habitats and other relatively sheltered or moisture-retaining areas are likely to become increasingly important under drier conditions and periods of extreme heat. Project related disturbance to these areas could contribute to the loss, fragmentation or drying of potential refugia and may reduce the capacity of these habitats to support threatened species and communities during periods of climatic stress; noting that key areas that may act as refugia, such as watercourse crossings, are proposed to be rehabilitated to a riparian ecosystem post mining. Given the defined Disturbance area, the retention of surrounding habitat and the implementation of mitigation measures such as rehabilitation, a substantial reduction in the availability or function of climate refugia for relevant ecological values is not expected.

Drier conditions and periods of extreme heat may also increase the likelihood, intensity and spread of fire in remnant and regrowth vegetation and may increase the vulnerability of habitat for threatened species and ecological communities. Mining activities may introduce ignition sources and may alter fuel structure or access within the landscape. These changes have the potential to exacerbate fire-related impacts on ecological values if not appropriately managed. With the implementation of fire management measures,

operational controls and standard risk mitigation measures, material increases in fire-related impacts on ecological values are not expected (**Appendix AJ**).

Modelling of the influence of climate change on the Project's water management systems demonstrates no material change in risk associated with water management controls due to climate change during the operational life of the Project (**Chapter 8**).

Modelling of the influence of climate change on hydrology during operations and in the post mining landform demonstrates that there is negligible change in risk during operations and post mining due to the design of infrastructure and the final landform (**Chapter 9**).

Overall, climate change may intensify background environmental pressures at the site and may increase the sensitivity of habitats and species to disturbance. However, Project impacts are confined to a defined Disturbance area, with operations occurring within the short to medium term, followed by rehabilitation in the long-term. Consequently, the Project is not expected to result in a substantial reduction in ecosystem resilience for relevant ecological values beyond the identified and quantified direct impacts. Mitigation measures, rehabilitation and offsets, where required, would further reduce the potential for adverse long-term effects on the resilience of relevant ecological values.

11.5.4 Summary of MNES Impacts

The total extent of each verified MNES TEC and threatened or migratory species habitat within the Project area and Disturbance area is provided in Table 11-17. The Disturbance area includes all areas subject to the Referral for the Project.

11.5.4.1 Impacts to TECs and Threatened Flora Species

Based on the identified habitat, Table 11-17 identifies the following direct impacts to TECs and threatened flora species:

- Brigalow TEC patches were identified as habitat that is critical to the community's survival. There will be 52.72 ha of impact to this habitat within the Disturbance area (Figure 11-4). However, this impact will occur to fragmented patches. Habitat that is critical to the survival of Poplar Box TEC is the best quality patches, and the most intact patches of the ecological community (Class A – Highest condition; DoEE, 2019). The patches within the Survey area were categorised as Category C – Moderate Quality (Figure 11-4, Table 11-11) and hence were not considered habitat that was critical to the community's survival. While no critical habitat for this TEC will be impacted by the Disturbance area, Category C – Moderate Quality TEC will be impacted and a determination of whether this impact is significant has been undertaken in Section 11.7.1.4.
- 15.45 ha of Poplar Box TEC is located in the Disturbance area. There will be no direct impact to the Natural Grassland TEC and SEVT TEC, with these TECs occurring outside of the Disturbance area (Figure 11-4). There will also be no direct impact to threatened flora species habitat (*Dichanthium queenslandicum* and *Dichanthium setosum*) with this habitat occurring outside of the Disturbance area (Figure 11-5).

In order to assess whether any TECs would be subject to indirect impacts, TECs were assessed at the individual patch scale within the Survey area. For each mapped patch of TEC, the assessment quantifies the area subject to direct impact from vegetation clearing and the area subject to indirect impact associated with edge effects and fragmentation (see Table 49 and Map 11 of **Appendix P**). Where the Project does not create a new edge adjacent to patches in the Survey area that are fully retained, and the patch will remain contiguous with surrounding remnant vegetation and existing disturbance already defines the local edge condition, no indirect impact will occur, and therefore, no buffer is applied. On this basis, these patches are not expected to experience a material reduction in condition, connectivity or function as a result of the Project, and its post-impact viability is expected to remain unchanged.

There are three patches that will be partially cleared by the Project; two Brigalow TEC patches and one Poplar Box TEC patch. In order to protect the retained portion of these patches, an indirect impact buffer of 20 - 50 m has been applied to the retained edges of these patches to account for edge effects that may arise from the creation of new boundaries, including increased light penetration, weed invasion, pest access, altered fire behaviour and reduced structural integrity at the patch margin. The selected buffer width is considered appropriate having regard to the scale of disturbance, the creation of a new exposed edge, and the need to conservatively account for localised degradation of vegetation condition adjacent to the Disturbance area.

Despite fragmentation, the retained portions of the partially cleared patches are expected to remain viable post-impact because they retain sufficient area, remain connected to adjacent remnant vegetation, and are of a size and configuration capable of sustaining the defining floristic and structural characteristics of the TEC. The retained edges will be subject to appropriate management to maintain ecological condition (see Section 11.6).

In all cases, the assessment found that no residual indirect impact would occur beyond the direct Disturbance area, and buffer areas and management actions were appropriate to mitigate indirect impacts to retained and partially retained patches

11.5.4.2 Impacts to MNES Threatened and Migratory Species Habitat

Based on the identified habitat, Table 11-17 identifies the following impacts to threatened and migratory species habitat:

- There is no formally defined habitat that is critical to the species survival for the Squatter Pigeon. However, all breeding, foraging and dispersal habitats meet the generalised thresholds for critical habitat (e.g. critical for activities such as foraging, breeding, roosting, or dispersal) and as such these habitat types within the Survey area have been categorised as habitat critical to the species' survival (Figure 11-6). There are 308.48 ha of breeding habitat, 14.58 ha of foraging habitat and 11.09 ha of dispersal habitat within the Disturbance area.
- Breeding habitat for the Australian Painted Snipe is recognised as habitat that is critical to the survival of the species (DSEWPaC, 2013b). Breeding habitat has been verified within the Survey area, within the HES wetland (Figure 11-7). However, this wetland will be avoided by the design of the Disturbance area and as such no impacts are proposed to critical habitat for this species. There is 1.31 ha of foraging and dispersal habitat, comprising poor quality, ephemeral wooded wetlands and farm dams, for the Australian Painted Snipe in the Disturbance area.
- Important habitat for migratory shorebirds is generally recognised where sites support a nationally or internationally important population, defined as areas where an ecologically significant proportion of the population occurs, or where a minimum total abundance of 2,000 waterbirds or 15 migratory shorebird species is regularly recorded. The Common Greenshank and Sharp-tailed Sandpiper have not been recorded within the Survey area and are represented by only isolated records within the Area of Interest and broader Region, suggesting that they occur intermittently and not in significant numbers. On this basis, no important habitat for these species has been identified within the Survey area. Habitat that is critical to the survival of the Common Greenshank is recognised as a mosaic of feeding and roosting habitat (DCCEW, 2024b). While 1.31 ha of foraging and dispersal habitat was verified within the Survey area, these areas largely comprise poor quality, ephemeral wooded wetlands and farm dams (Figure 11-7). Given the limited regional records and absence of evidence that the Survey area supports an ecologically significant proportion of the population, these habitats were not considered to constitute habitat critical to the survival of the Common Greenshank. No critical habitat has been defined for the Sharp-tailed Sandpiper.

- Breeding and foraging habitat for the Koala has been identified as habitat that is critical to the survival of the species (Figure 11-9). There are 66.81 ha of breeding habitat and 251.22 ha of foraging habitat for the Koala that is in the Disturbance area.
- Denning and foraging habitat for the Greater Glider has been identified as habitat that is critical to the survival of the species (Figure 11-10). As all populations of the Greater Glider are considered important (TSSC, 2016d), the population identified within the Survey area was considered an important population. There are 87.26 ha of denning habitat and 230.76 ha of foraging habitat for the Greater Glider in the Disturbance area.
- Important habitat for the Ornamental Snake is identified as gilgai depressions and mounds (DCCEEW, 2023; Figure 11-12)
- Habitat connectivity between gulgais and other suitable habitats is also important. Habitat for this species is considered important if it is habitat where the species has been identified during a survey (DCCEEW, 2023). With one confirmed record of this species within the Survey area, the breeding and foraging habitat within the Survey area was considered important (Figure 11-12). Also, as important habitat for the Ornamental Snake is a surrogate for an important population, it was considered that an important population occurs within the Survey area. There are 75.97 ha of important habitat, comprised of 56.22 ha of breeding and 19.75 ha of foraging habitat, for the Ornamental Snake in the Disturbance area.
- Important habitat for the two migratory species, the Fork-tailed Swift and Oriental Cuckoo has been defined (definitions provided in Table 11-9). However, neither were identified within the Survey area due to a lack of sightings for the Fork-tailed Swift, and limited good quality habitat monsoonal rainforest, vine thicket and wet sclerophyll habitat for the Oriental Cuckoo. Potential foraging and dispersal habitat for these migratory species occurs in the Disturbance area (Figure 11-8).

Further information on the impacts to MNES, including extent within the Survey area, refer to Section 6.4 in **Appendix P**.

11.5.4.3 Consistency with International Obligations

Based on the findings of this impact assessment, the Project is not considered to be inconsistent with Australia's obligations under the Convention on Biological Diversity, the Convention on Conservation of Nature in the South Pacific (Apia Convention), or the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). For further information, refer to section 6.4.4 of **Appendix P**.

Table 11-17 **Extent of MNES**

Type	MNES		Status		Likelihood of Occurrence	Habitat Type	Extent in Project area (ha)	Extent in Disturbance Area		
			QLD ¹	CTH ²				Disturbance area on Project MLs (ha)	Additional disturbance area (ha)	TOTAL
TEC	Brigalow TEC		-	EN	Known to occur	-	68.74	52.72	0	52.72
	Natural Grassland TEC		-	EN	Known to occur	-	38.32	0	0	0
	Poplar Box TEC		-	EN	Known to occur	-	31.55	15.45	0	15.45
	SEVT TEC		-	EN	Known to occur	-	0	0	0	0
Threatened Species	Flora	<i>Dichanthium queenslandicum</i>	VU	EN	Likely to occur	-	38.32	0	0	0
		<i>Dichanthium setosum</i>	LC	VU	May occur	-	38.32	0	0	0
	Birds	Squatter Pigeon	VU	VU	Known to occur	Breeding	668.83	307.00	1.48	308.48
						Foraging	78.66	14.58	0	14.58
						Dispersal	21.20	11.09	0	11.09
		Australian Painted Snipe	SLC	EN, Mi	May occur	Breeding	0	0	0	0
						Foraging and dispersal	15.89	1.31	0	1.31
		Common Greenshank	SLC	EN, Mi	May occur	Foraging and dispersal	15.89	1.31	0	1.31
		Sharp-tailed Sandpiper	SLC	VU, Mi, M	May occur	Foraging and dispersal	15.89	1.31	0	1.31

Type	MNES		Status		Likelihood of Occurrence	Habitat Type	Extent in Project area (ha)	Extent in Disturbance Area		
			QLD ¹	CTH ²				Disturbance area on Project (ha)	Additional disturbance area (ha)	TOTAL
	Mammals	Koala	EN	EN	Known to occur	Breeding	160.61	65.33	1.48	66.81
						Foraging	535.35	251.22	0	251.22
		Greater Glider	EN	EN	Known to occur	Denning	202.04	85.78	1.48	87.26
						Foraging	493.93	230.76	0	230.76
	Reptiles	Ornamental Snake	VU	VU	Likely	Breeding	86.42	56.22	0	56.22
						Foraging	21.09	19.75	0	19.75
						Dispersal	7.12	5.08	0	5.08
Migratory Species		Fork-tailed Swift	SLC	M, Mi	Likely	Foraging and dispersal	768.70	331.24	1.48	332.72
		Oriental Cuckoo	SLC	M, Mi	May occur	Foraging and dispersal	242.59	106.87	1.48	108.35

¹ Queensland (Qld) Status (NC Act): EX = Extinct, EW = Extinct in Wild, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, SLC = Special Least Concern, - not protected.

² Commonwealth (Cth) Status (EPBC Act): EX = Extinct, EW = Extinct in the Wild, CE = Critically Endangered, EN = Endangered, VU = Vulnerable

11.5.5 Summary of MSES Impacts

The total extent of each verified MSES prescribed matter within the Project area and Disturbance area is provided in Table 11-18. The Disturbance area impacts have been split between Disturbance area on Project MLs and Additional disturbance area to differentiate between the impacts subject to the EA application for the Project's MLs (Disturbance area on Project MLs) and the impacts subject to a future amendment of the IDM EA (Additional disturbance area). The total Disturbance area is provided.

The following impacts to MSES were calculated within the Disturbance area on Project MLs:

- Impacts to MSES Regulated vegetation that are prescribed REs comprising 'endangered' or 'of concern' REs, include 26.50 ha of dense and mid-dense REs made up solely of RE11.3.1, 88.23 ha of sparse REs made up of RE11.3.2, RE11.3.3 and RE11.4.9. No grassland REs occur within the Disturbance area on Project MLs.
- Impacts to MSES Regulated vegetation that are prescribed REs that intersect with an area shown as a wetland on the vegetation management wetlands map includes 1.18 ha.
- Impacts to MSES Regulated vegetation that is a prescribed RE that is located within a defined distance from the defining banks of a relevant watercourse or drainage feature include 2.52 ha within dense and mid-dense REs (RE11.3.1), and 11.88 ha within sparse Res (RE11.3.2, 11.3.3, 11.3.25 and 11.5.3) in the Disturbance area on Project MLs.
- A total of 347.55 ha of connectivity areas will be impacted.
- No impacts will occur to HES wetlands.
- 263.39 ha of impacts to MSES Protected Wildlife Habitat that are prescribed REs and are areas of essential habitat on the essential habitat map for an EVNT plant or animal. This comprises essential habitat for Australian Painted Snipe, Squatter Pigeon, Koala, Greater Glider and Ornamental Snake, all of which have been assessed as habitat for MNES (see Table 11-17).
- Most impacts to MSES Protected Wildlife Habitat that is habitat for an endangered wildlife or vulnerable wildlife or SLC animal has been assessed under the MNES impacts in Table 11-17. The exception is the SLC Short-beaked Echidna, which has 331.24 ha of habitat in the Disturbance area on Project MLs.

The following impacts to MSES were calculated within the Additional disturbance area:

- 1.48 ha of impacts to MSES Protected Wildlife Habitat that is habitat for an SLC animal, being the Short-beaked Echidna.

Table 11-18 *Extent of MSES Prescribed Matters*

Prescribed Matters		Structural Category	RE (Status)	BVG	Extent in Project area (ha)	Extent in Disturbance Area		
						Disturbance area on Project MLs (ha)	Additional disturbance area (ha)	TOTAL
Regulated Vegetation	Prescribed REs that are ‘endangered’ or ‘of concern’ REs	Dense/ mid dense	11.3.1 (EN)	25a	39.20	26.50	0	26.50
		Sparse	11.3.2 (OC)	17a	60.43	36.26	0	36.26
			11.3.3 (OC)	16c	57.70	40.17	0	40.17
			11.4.8 (EN)	25a	1.34	0	0	0
			11.4.9 (EN)	25a	16.38	11.80	0	11.80
		Grassland	11.8.11 (OC)	30b	0	0	0	0
	Prescribed REs that intersect with an area shown as a wetland on the vegetation management wetlands map	Sparse	11.3.27b (LC)	34d	1.21	1.18	0	1.18
	Prescribed RE that is located within a defined distance from the defining banks of a relevant watercourse or drainage feature	Dense/ mid dense	11.3.1 (EN)	25a	3.76	2.52	0	2.52
		Sparse	11.3.2 (OC)	17a	0.04	0.05	0	0.05
			11.3.3 (OC)	16c	5.2	4.69	0	4.69
			11.3.25 (LC)	16c	25.62	6.38	0	6.38
	11.5.3 (LC)	17a	1.83	0.77	0	0.77		
Connectivity Areas	Prescribed REs that contains an area of land that is remnant vegetation required for ecosystem functioning (a connectivity area). The Landscape Fragmentation and Connectivity Tool has been processed to determine disturbance to connectivity.				NA	347.55	0	347.55
Wetlands and Watercourses	HES wetlands				0	0	0	0

Prescribed Matters		Structural Category	RE (Status)	BVG	Extent in Project area (ha)	Extent in Disturbance Area			
						Disturbance area on Project MLs (ha)	Additional disturbance area (ha)	TOTAL	
Protected Wildlife Habitat	Prescribed REs that are areas of essential habitat on the essential habitat map for an EVNT plant or animal.				540.50	263.39	0	263.39	
	A habitat for an endangered wildlife or vulnerable wildlife or SLC animal		Squatter Pigeon (VU)	Refer to Table 11-17		Refer to Table 11-17			
			Australian Painted Snipe (EN)	Refer to Table 11-17		Refer to Table 11-17			
			Koala (EN)	Refer to Table 11-17		Refer to Table 11-17			
			Greater Glider (EN)	Refer to Table 11-17		Refer to Table 11-17			
			Ornamental Snake (VU)	Refer to Table 11-17		Refer to Table 11-17			
			Common Greenshank (SLC)	Refer to Table 11-17		Refer to Table 11-17			
			Sharp-tailed Sandpiper (SLC)	Refer to Table 11-17		Refer to Table 11-17			
			Fork-tailed Swift (SLC)	Refer to Table 11-17		Refer to Table 11-17			
			Oriental Cuckoo (SLC)	Refer to Table 11-17		Refer to Table 11-17			
			Short-beaked Echidna (SLC)	2578.13	768.70	331.24	1.48	332.72	12.9

11.5.6 Summary of ESA Impacts

The total extent of field verified ESAs in the Project area and Disturbance area are summarised in Table 11-19.

The Project will result in a total of 78.47 ha of impacts to Category B ESAs, being endangered REs within the Disturbance area on Project MLs. There will be no direct impact to Category B ESAs within the Additional disturbance area.

Table 11-19 Impact Area for Applicable ESAs

ESA Category ¹	RE	VM Act Class ²	Biodiversity Status ³	Extent in Project area (ha)	Extent in Disturbance Area		
					Disturbance area on Project (ha)	Additional disturbance area (ha)	TOTAL
B	11.3.1	EN	EN	94.3	64.12	0	64.12
	11.3.21	OC	EN	38.32	0	0	0
	11.4.8	EN	EN	1.34	0	0	0
	11.4.9	EN	EN	16.38	14.35	0	14.35
	11.8.13	EN	EN	0	0	0	0
Totals				149.02	78.47	0	78.47

11.5.7 Potential Cumulative Impacts

11.5.7.1 Cumulative impacts on MNES and MSES

The landscape surrounding the Project is part of a developed mining and grazing precinct within the northern Bowen Basin, where cumulative disturbance has resulted from multiple existing and proposed mining operations, pastoral activities and associated infrastructure corridors. Despite these pressures in the Region, relatively intact tracts of remnant vegetation remain within the Carborough Range, Dipperu National Park, Denham Range, Burton Range, Kerlong Range, and Cherwell Range, which collectively provide key climate refugia and regional connectivity for flora and fauna.

The Project area predominantly occurs within historically cleared and modified landscapes, with remnant vegetation largely confined to riparian corridors and alluvial plains along the Isaac River and Cherwell Creek. The Project will contribute approximately 2,083 ha of additional disturbance, comprising 334 ha of clearing of remnant vegetation and 1,749 ha of disturbance to non-remnant land.

Cumulative ecological pressures are primarily associated with the progressive loss and fragmentation of Brigalow and Poplar Box woodlands, and riparian corridors. While the Project adds incrementally to these pressures, its proportional contribution is small relative to the extent of comparable vegetation and fauna habitat in the broader Brigalow Belt North bioregion. Large contiguous areas within the nearby ranges and conservation estates continue to maintain regional biodiversity and connectivity.

A cumulative impact assessment was undertaken at the bioregion, subregion and local scales to assess the likely cumulative impact of the Project on MNES and MSES in the context of past, present and reasonably foreseeable future disturbance (see section 6.7.1 and Table 53 of **Appendix P**).

The bioregion scale was defined as the Brigalow Belt North bioregion, the subregion scale as the Northern Bowen Basin subregion, and the local scale as the Area of Interest, defined as a 20 km buffer surrounding

the Survey area. These scales can be seen in Maps 25 and 26 in Appendix A of **Appendix P** which show the pre-clearing ecosystems (PAST), and current ecosystem extents (PRESENT).

To quantify past disturbance, the extent of MNES and MSES was mapped and calculated using pre-clearing Vegetation Management mapping. Current extent was derived from field-verified RE mapping within the Survey area and the current Vegetation Management vegetation mapping outside the Survey area. Reasonably foreseeable future disturbance included the Project Disturbance area and impacts associated with six approved projects located within the vicinity of the Survey area that are either under development or likely to proceed in the foreseeable future. These projects include:

- Peak Downs Coal Mine Continuation, under assessment (EPBC 2022/09350), located 6 km to the south of the Survey area.
- Winchester South Coal Mine, approved in 2019 (EPBC 2019/8460), located 4 km to the south of the Survey area.
- Olive Downs Metallurgical Coal Mine, approved in 2017 (EPBC 2017/7867, 2017/7868, 2017/7869, and 2017/787), located 21 km to the south-east of the Survey area.
- Moranbah South Coal Mine, approved in 2013 (EPBC 2013/6337) but currently on hold, located 5 km to the north-west of the Survey area
- Eagle Downs Coal Mine approved in 2008 (EPBC 2008/3945) but yet to be constructed, located 2 km south of the Survey area.
- Moranbah Solar and BESS (Grupa Cobra), approved in 2024, located 25 km to the northeast of the Survey area

Note that the disturbance associated with IDM, which is operational, is included in the existing (current) disturbance areas, and hence has not been included in the future foreseeable impacts component of the cumulative impact assessment. In addition, the Bowen Gas Project (EPBC 2012/6377) has not been included in the cumulative assessment of future foreseeable impacts, as it comprises discrete clearing across a broad area and the full extent and spatial distribution of potential impacts is not sufficiently defined to enable meaningful comparison.

MNES and MSES with no or low direct impacts that are unlikely to result in a significant impact from the Project (e.g. Natural Grassland TEC, Semi-evergreen Vine-thickets TEC, threatened flora species habitat and HES wetlands) have been omitted from this cumulative impact assessment to ensure the assessment is proportionate and focused on values where meaningful cumulative effects may occur. Therefore, the cumulative assessment concentrates on MNES and MSES for which the Project contributes a measurable impact and where additive or interactive effects with past, present or reasonably foreseeable future disturbance are plausible.

To provide nominal habitat area estimates within the bioregion, subregion and local scales, the corresponding REs for each MNES TEC and species, and MSES species, defined in the relevant TECs conservation advices or the essential habitat database, were applied. For other MSES, mapping was applied as per the MSES mapping methodology (e.g. for defining banks). This approach allowed for consistent comparison of available habitat extent relative to the predicted direct impacts of the foreseeable future impacts.

When considered in a bioregional context, the Project's contribution to cumulative impacts is expected to be very low, due to:

- The Disturbance area being positioned to avoid most remnant vegetation areas and hence occurring mainly within previously cleared and modified areas (as can be seen in Map 26, Appendix A of **Appendix P**).
- The limited extent of remnant vegetation clearing relative to regional availability (as can be seen in Map 26, Appendix A of **Appendix P**).
- The retention of key riparian and vegetated corridors within the Project area (other than infrastructure crossings).

- The implementation of progressive rehabilitation and offset commitments to address any residual losses.

The cumulative impact assessment for the bioregional scale identified that the Project's contribution to cumulative impacts is negligible, ranging from 0.003% – 0.011 % for MNES and 0% - 0.018% for MSES. At the subregion scale, the Project's contribution to cumulative impacts remain very low, ranging from 0.022% - 0.13% for MNES and 0% - 0.305% for MSES.

At the local scale, the Project's contribution to cumulative impacts are proportionally higher than at the bioregional and subregional scales, but still low, ranging from 0.091% - 0.817% for MNES and 0.004% - 1.735% for MSES. This result is because the local-scale assessment is calculated against a substantially smaller area of currently available habitat within the 20 km buffer. However, this contribution remains low in absolute terms and does not materially alter the overall cumulative impact conclusions for MNES and MSES.

Overall, the incremental contribution of the Project is negligible to minor in a bioregional, sub-regional and local context. Therefore, the Project is not expected to materially exacerbate cumulative impacts beyond those already established within the regional landscape, particularly when considered alongside the availability of remaining habitat and the implementation of mitigation and management measures.

11.5.7.2 Cumulative impact on Ecosystem Resilience

The potential cumulative impact of the Project on ecosystem resilience has been considered in the context of existing and reasonably foreseeable disturbance within the surrounding landscape. Ecosystem resilience, in this context, refers to the capacity of ecological communities, habitats and associated species populations to persist, recover and continue to function in the presence of disturbance. Key factors relevant to resilience include the extent and condition of retained habitat, patch size and configuration, connectivity to the broader landscape, regenerative capacity, and exposure to ongoing pressures such as weed invasion, pest animals, altered fire regimes, grazing pressure and hydrological change. At the bioregion, subregion and local scales, the cumulative impact of the Project represents an insignificant proportion of the currently available extent of most ecological values, and therefore, is not expected to materially diminish ecosystem resilience at those broader scales.

A risk-based assessment indicates that the principal pathways by which cumulative impacts may affect ecosystem resilience are through reduction in habitat extent, increased fragmentation, edge effects and the interaction of the Project with other existing stressors in the local landscape. However, the Project has incorporated avoidance and mitigation measures intended to maintain resilience, including minimisation of the disturbance footprint, retention of habitat linkages where practicable, management of weeds and pest animals, fire management, erosion and sediment controls, and progressive rehabilitation. On this basis, the cumulative risk to ecosystem resilience is considered negligible to low at the bioregion, subregion and local scales. Overall, the Project is not expected to result in a cumulative reduction in ecosystem resilience at a scale that would compromise the ongoing function and persistence of ecological values in the broader landscape.

11.6 Mitigation and Management Measures

11.6.1 Measures to Avoid and Minimise Impacts

Consistent with DETSI's impact-mitigation hierarchy, avoidance and minimisation have been the primary focus during the design phase of the Project. Substantial effort was directed toward refining the Project layout, Disturbance area and supporting infrastructure to reduce both direct and indirect impacts to MNES and MSES wherever practicable. Within the Project area, the proponent has sought to reduce the Disturbance area with 'avoidance areas'. The areas avoided and the percentage of the Project area that this represents are provided in:

- Table 11-20 for vegetation communities
- Table 11-21 for MNES
- Table 11-22 for MSES.

As demonstrated in Table 11-20, the majority of avoidance areas comprise remnant vegetation (434.5 ha out of 626.2 ha) and the Project has avoided:

- 434.5 ha of remnant vegetation
- between 50% and 80% of eucalypt woodlands on basalt plains, wet eucalypt woodlands on alluvial plains and drainage lines, and dry to moist woodlands on sandy plains
- all native tussock grassland, SEVT and eucalypt woodlands on lowlands and ranges
- between 35% and 45% of Brigalow woodland and ephemeral wetlands.

As demonstrated in Table 11-21 for MNES, the Project has avoided:

- all Natural Grassland TEC, SEVT TEC and habitat for *Dichanthium queenslandicum* and *Dichanthium setosum*
- approximately 51% (16 ha) of Poplar Box TEC and 23% (16 ha) of Brigalow TEC
- greater than 90% of habitat for Australian Painted Snipe, Common Greenshank and Sharp-tailed Sandpiper.
- greater than 50% of the habitat for Koala, Greater Glider and Squatter Pigeon with avoidance areas between 378 ha and 435 ha
- approximately 30% (34 ha) of Ornamental Snake habitat
- more than 50% of migratory bird species habitat.

As demonstrated in Table 11-22 for MSES, the Project has avoided:

- more than 34% (107 ha) of endangered and of concern REs
- more than 60% (22 ha) of prescribed REs intersecting a watercourse
- more than 55% (436 ha) of Short-beaked Echidna habitat.

Section 6.1 of **Appendix P** has further comparisons of the proportion of the Disturbance area relative to the Survey area, highlighting that vegetation communities, MNES areas and MSES areas in the Disturbance area are a relatively small portion of the Survey area. Findings include:

- Impacts to ephemeral wetlands have been minimised to 1.31 ha, representing only 7.4 % of available wetlands within the Survey area.
- Only 1.31 ha of habitat for threatened wetland birds (Australian Painted Snipe, Sharp-tailed Sandpiper and Common Greenshank) will be impacted, which represents between 4% and 7% of available habitat for each species within the Survey area.
- For most other threatened and migratory species, the Disturbance area is in the range of 9 – 17% of available habitat within the Survey area.

The Project layout and design was progressively refined using detailed ecological field survey results, Queensland Herbarium-certified RE mapping and habitat suitability modelling. These inputs were applied iteratively to inform mine planning and infrastructure placement, with the explicit objective of reducing the spatial extent of disturbance and avoiding areas of higher ecological value. The following measures have been incorporated into the Project design to avoid and minimise impacts on terrestrial ecology:

- Integration with existing operations – the Project has been designed as an extension to IPC, utilising the existing mine industrial area, coal handling and preparation plant, haul roads, water management systems and power infrastructure to minimise the extent of new disturbance.
- Avoidance and minimisation of impacts to high ecological value areas – layout refinement avoided or minimised the following impacts:

- Direct disturbance to riparian vegetation along the Isaac River and Cherwell Creek (other than infrastructure crossings), with buffers maintained to preserve corridor connectivity (Figure 11-2).
- Direct disturbance to the Natural Grassland and Semi-evergreen Vine Thicket TECs (Figure 11-4)
- Direct disturbance to the HES wetland (Figure 11-3).
- Direct disturbance to the field-verified wetland to the north of the Project area (Figure 11-3).
- Minimised impacts to all MNES and MSES by designing the Disturbance area within mostly cleared areas as opposed to remnant vegetation that contains MNES and MSES.
- Minimised impacts on Poplar Box TEC, with only one patch being partially impacted (Figure 11-4).

Implementation of fauna-sensitive design – Infrastructure crossings of watercourses have been minimised with two permanent crossings: one bridge crossing of Isaac River to provide access between the run-of-mine coal pad and existing haul roads at IDM, and one bridge crossing of Cherwell Creek to provide a secondary access route to be utilised intermittently when access to IDM is constrained; and one temporary crossing for the dragline walk route.

- Sequential clearing to be implemented – Vegetation clearing will be undertaken progressively in line with mining sequences to minimise the area of concurrent disturbance.
- Progressive rehabilitation – Rehabilitation will commence as soon as areas become available in accordance with the PRCP schedule. Disturbed areas will be reshaped, top-soiled and revegetated with locally sourced native species to reinstate ecological function and minimise long-term residual impacts.

Habitat fragmentation and patch isolation have been avoided and minimised through the iterative design of the Disturbance area, which has sought to reduce the extent of vegetation clearing, avoid sensitive habitat where practicable, and retain vegetation linkages between retained habitat patches and the broader surrounding landscape. In particular, the Project has, where practicable, avoided severing contiguous areas of remnant vegetation and habitat critical to the survival of listed species and TECs, so that retained patches are not left isolated within the Survey area. Avoidance areas have been configured to maintain connectivity between retained habitat within the Survey area and adjoining remnant vegetation beyond the Project boundary, thereby supporting continued species movement, dispersal and access to foraging, sheltering and breeding resources. While some localised fragmentation will occur where direct impacts cannot be avoided, the Project layout, disturbance limits and patch retention measures have been designed to ensure retained habitat remains connected, or capable of functioning as part of the broader habitat network, rather than persisting as isolated remnants. On this basis, avoidance areas are expected to continue to enable species mobility across the Project area and maintain functional ecological connectivity with habitat in the broader landscape.

Where avoidance was not practicable, impacts were minimised, with further management controls in the form of mitigation measures also proposed in the subsequent sections, and through the implementation of appropriate management plans, as per the following sections.

Table 11-20 Avoidance of Vegetation Communities

Vegetation Community	Extent Project (ha)	in area	Extent Disturbance (ha)	in Area	Avoidance Area (ha)	% Avoidance
Semi-evergreen vine thicket	0		0		0	100%

Vegetation Community	Extent Project (ha)	in area	Extent Disturbance (ha)	in Area	Avoidance Area (ha)	% Avoidance
Eucalypt woodlands on lowlands and ranges	0		0		0	100%
Eucalypt woodlands on basalt plains	30.61		6.29		24.32	79.5%
Wet eucalypt woodlands on alluvial plains and drainage lines	171.27		71.09		100.18	58.5%
Dry to moist woodlands on sandy plains	469.19		218.63		250.56	53.4%
Brigalow woodland	56.92		36.88		20.04	35.2%
Native tussock grassland	38.32		0		38.32	100.0%
Ephemeral wetlands	2.39		1.31		1.08	45.2%
Subtotal - remnant vegetation	768.7		334.2		434.5	56.5%
Cleared areas/ exotic grasslands (Non-remnant)	1940.93		1749.23		191.7	9.9%
Total	2709.63		2083.43		626.2	

Table 11-21 Avoidance of MNES

MNES	Extent in Project Area (ha)	Extent Disturbance Area (ha)	in	Avoidance Area (ha)	% Avoidance
Brigalow TEC	68.74	52.72		16.02	23.3%
Natural Grassland TEC	38.32	0		38.32	100.0%
Poplar Box TEC	31.55	15.45		16.1	51.0%
SEVT TEC	0	0		0	100.0%
<i>Dichanthium queenslandicum</i>	38.32	0		38.32	100.0%
<i>Dichanthium setosum</i>	38.32	0		38.32	100.0%
Squatter Pigeon	768.69	334.15		434.54	56.5%
Australian Painted Snipe	15.89	1.31		14.58	91.8%
Common Greenshank	15.89	1.31		14.58	91.8%
Sharp-tailed Sandpiper	15.89	1.31		14.58	91.8%
Koala	695.96	318.03		377.93	54.3%
Greater Glider	695.97	318.02		377.95	54.3%
Ornamental Snake	114.63	81.05		33.58	29.3%
Fork-tailed Swift	768.7	332.72		435.98	56.7%

MNES	Extent in Project Area (ha)	Extent Disturbance Area (ha)	Avoidance Area (ha)	% Avoidance
Oriental Cuckoo	242.59	108.35	134.24	55.3%

Table 11-22 Avoidance of MSES

MSES	Extent in Project Area (ha)	Extent Disturbance Area	Avoidance Area (ha)	% Avoidance
11.3.1 (EN)	39.2	26.5	12.7	32.4%
11.3.2 (OC)	60.43	36.26	24.17	40.0%
11.3.3 (OC)	57.7	40.17	17.53	30.4%
11.4.8 (EN)	1.34	0	1.34	100.0%
11.4.9 (EN)	16.38	11.8	4.58	28.0%
11.8.11 (OC)	0	0	0	100.0%
Subtotal - Prescribed endangered and of concern REs	175.05	114.73	60.32	34.5%
Prescribed REs that intersect with a wetland	1.21	1.18	0.03	2.5%
Prescribed REs that intersect with a watercourse	36.45	14.41	22.04	60.5%
Short-beaked Echidna (SLC)	768.7	332.72	435.98	56.7%

11.6.2 Retention of Buffer Zones and Habitat Connectivity

The Project design has incorporated avoidance measures that retain areas of native vegetation within the Project area, such that the Disturbance area does not encompass the entire Project area. As a result, discrete patches of remnant and non-remnant vegetation will be retained as buffer zones established between the Disturbance area and retained patches of vegetation.

These buffer zones provide an important function in:

- maintaining habitat connectivity across the landscape
- supporting fauna movement between retained habitat patches
- protecting retained vegetation from edge effects associated with construction and operation (e.g. dust, noise, weed incursion)
- maintaining and enhancing the function of riparian vegetation and wetlands, where present
- contributing to the protection of water quality by reducing sedimentation and runoff into adjacent ecological features.

Where riparian areas or drainage features occur, buffers will assist in maintaining bank stability, filtering surface runoff, and preserving vegetation structure and composition, thereby supporting both aquatic

and terrestrial ecological values. Buffer zones along riparian corridors will include separation between levee structures and the high bank.

The Project design incorporates buffer zones around retained TEC patches (Brigalow and Poplar Box) to minimise indirect impacts (e.g. edge effects, sedimentation and disturbance), thereby avoiding significant indirect impacts. In areas where infrastructure such as the temporary dragline crossing and bridges are proposed across the Isaac River and Cherwell Creek, the defined Disturbance area has been conservatively delineated to allow flexibility in final infrastructure placement. However, the full extent of the Disturbance area at these crossings is likely to be reduced. As a result, adequate buffer zones to adjacent riparian habitats will be retained, supporting the maintenance of water quality, bank stability and habitat function.

Rehabilitation within these buffer zones is not required as vegetation will be retained. Rehabilitation of the diverted Conrock Gully will be undertaken with a riparian vegetation post mining land use in accordance with the PRCP, which will provide a vegetated buffer to surrounding retained vegetation patches and facilitate a movement corridor for fauna. This approach supports habitat connectivity and contributes to maintaining ecological function across the Project area.

The need for and extent of buffer zones has been considered in the context of the Project layout and the distribution of ecological values. While buffer widths may vary depending on infrastructure type, local constraints and habitat type, the retention of vegetation outside the Disturbance area provides a practical and effective mechanism to minimise edge effects and maintain ecological function.

Overall, the retention of vegetation and incorporation of buffer zones within the Project area is expected to contribute to maintaining habitat connectivity and ecological function at the local scale.

11.6.3 Decommissioning and Rehabilitation

The post-mining landform will be shaped and progressively rehabilitated over the 15-year mine life and during the closure period. Rehabilitation will primarily focus on establishing pasture, in accordance with existing land use practices, but will include woodland patches, including riparian habitat at watercourses crossings and along Conrock Gully diversion. This landform design aims to restore ecological function while supporting post-mining land use consistent with the existing land use and the surrounding region.

Progressive rehabilitation will be guided by the PRCP schedule, which describes the milestones for rehabilitation to ensure final landform stability and ecological function of proposed post mining land uses. The PRCP and PRCP schedule are provided in **Appendix AB** and **Appendix AC** respectively.

11.6.4 General Impact Mitigation

Generalised mitigation measures have been proposed to reduce the impacts from the Project and are detailed in Table 11-23. The *Coal Mining Safety and Health Act 1999* (CMSH Act) is relevant to mitigation matters relating to bushfire management (**Appendix AJ**), vehicle speeds and dust suppression which are applicable to the management of impacts to MNES and MSES.

In addition to the generalised mitigation measures (Table 11-23), community- and species-specific mitigation measures have been developed for MNES that are likely to be significantly impacted by the Project. These measures have been tailored to the ecology and known threat profiles of the affected MNES and are informed by relevant statutory and policy guidance, including the SPRAT database and applicable approved conservation advices, recovery plans and threat abatement plans. The MNES species specific mitigation measures are provided in Appendix J of **Appendix P**, based on the mitigation measures presented in this section.

Table 11-23 Project Mitigation Measures

Potential impact	Mitigation Measures	Performance Outcomes
Vegetation Clearing (direct)	- Infrastructure will be sited in accordance with the State and Commonwealth approval conditions. - Areas requiring vegetation removal will be clearly delineated to ensure disturbance to areas being retained is avoided. Limits of clearing are to be delineated using barricading or temporary fencing and signage prior to works commencing. Exclusion areas are to be clearly shown and labelled on all operational and management drawings and plans. GIS shapefiles will be provided to clearing personnel and/or contractors prior to the commencement of clearing operations. - The Environmental Officer (EO) or delegate will routinely inspect the disturbance limit boundaries to ensure that no clearing or disturbance of vegetation or habitat beyond the approved limits has taken place. - Limit clearing at any one time to the minimum area required for safe construction and operations. - Undertake vegetation clearing progressively, sequenced with mine development to reduce open disturbance areas. - Vegetation clearing will be conducted under the guidance of a qualified fauna spotter-catcher. - Salvage felled timber, logs, rocks, and other habitat structures for reuse in rehabilitation areas. - An internal 'Permit to Disturb' system will be used by the EO to ensure that all clearing activities are authorised prior to disturbance. Conditions listed in the Permit to Disturb must be implemented. - Rehabilitation to occur in accordance with the PRCP schedule.	- No clearing outside of approved Disturbance area. - Rehabilitation of disturbed areas in accordance with the PRCP.
Habitat Removal and Loss of Connectivity (direct)	- Permanent water sources for retention such as farm dams outside of the Disturbance area will be clearly delineated and shown and labelled on all operational and management drawings and plans which will be made available to all personnel. - Sequentially clear vegetation towards retained habitat to allow fauna to disperse naturally. - Avoid where possible and within the constraints of the mining schedule, impacting on MNES and MSES habitat during breeding periods through considering the timing of clearing	- Clearing of habitat for MNES and MSES does not occur outside of the approved Disturbance area. - No net loss of habitat for MNES and MSES habitat

Potential impact	Mitigation Measures	Performance Outcomes
	and watercourse / creek disturbance activities to avoid the main breeding season of impacted MNES (i.e. mid dry season to wet season for Squatter Pigeon). • Prior to entry to the site, all site personnel including contractors shall be made aware via site inductions, toolbox talks and site information sheets, of the sensitive environs they will be working in and around and be advised of specific limitations to construction works being undertaken in or adjacent to MNES and MSES habitat. All staff and contractors will be required to report sightings of MNES and MSES fauna in the activity area to the EO immediately. • A standard operating procedure will be developed and implemented for safely managing MNES and MSES fauna identified within the operational mining areas. • Temporary stockpile sites for soil and equipment, access routes, laydown areas and other associated infrastructure will, as far as reasonably practical, be located in cleared areas and will not be situated in areas of MNES and MSES habitat. • Prior to construction activities commencing, signage, including speed limits, will be erected in the vicinity of exclusion areas to warn of the potential presence of MNES and MSES species in the area. • Pre-clearance surveys will be undertaken by a suitably qualified ecologist using approved State and Commonwealth survey guidelines within 48 hours before clearing activities commence. • The pre-clearance survey will be undertaken in order to: ○ Record the location of all hollow bearing trees, log piles and nests using a GPS, with features of tree hollows (diameter, number and whether active/inactive) to be recorded in the Environmental Register; and ○ Relocate all captured non-breeding animals to suitable habitat adjacent to the Disturbance area. • A qualified fauna spotter-catcher will supervise all clearing activities and will conduct a walk-through survey prior to commencement of clearing and prior to clearing works each day to check vegetation and other fauna habitats. • The fauna spotter-catcher will reinspect the area of cleared vegetation immediately after clearing to locate any potentially injured fauna that will then be taken to a wildlife carer or veterinarian.	outside of the approved Disturbance area • No net loss of permanent water sources for the Squatter Pigeon outside of approved Disturbance area.

Potential impact	Mitigation Measures	Performance Outcomes
	- Vegetation clearing will be undertaken progressively and trees will be felled in the direction of the clearance zone to avoid impacts to adjoining retained vegetation and habitat. - Hollow bearing trees will be clearly flagged and surrounding vegetation removed with the hollow bearing tree left standing for at least one night to encourage fauna to relocate on its own accord. Hollow bearing trees will be inspected to determine if hollows are occupied. - If after one night the resident fauna have not moved on, the hollow entrance will be blocked with a towel or similar and the hollow removed by cutting with a chainsaw below the hollow section. The hollow with the animal inside will then be installed in nearby similar and adjoining vegetation to be retained at a similar height and orientation, with the entrance unblocked at dusk. - If the procedure described above is not possible for any reason, hollow-bearing trees will be felled using a tree grab or similar that can remove the tree in a controlled fashion. If possible and safe to do so, hollow trees will be felled at dusk to allow fauna the opportunity to disperse during their normal activity period. These trees will be felled away from hollow openings. The tree will be knocked at the base several times prior to felling to encourage fauna to relocate of their own accord. Once the tree is felled, it will be inspected by the fauna spotter-catcher for any fauna and any injured fauna rescued will be taken to a wildlife carer or veterinarian. - Any fauna that is captured will be relocated into the adjacent habitat at least 200 m from the clearing area if clearing works are yet to be completed. - Where MNES or MSES fauna is identified and delaying the clearing of area is not feasible, a 50 m exclusion zone will be established, and the area must not be disturbed for a minimum of 24 hours while clearing is undertaken around the exclusion zone. After 24 hours, a fauna spotter-catcher may relocate the breeding animal to suitable habitat at least 200 m away from the disturbance area. Where survival of young or eggs is unlikely as a result of the disturbance, these are to be handed over to a previously identified wildlife carer or veterinarian. - Koalas will be managed in accordance with the <i>Nature Conservation (Koala) Conservation Plan 2017 (Qld)</i>, NC Act, and <i>Nature Conservation (Animals) Regulation 2020 (Qld)</i> as follows:	

Potential impact	Mitigation Measures	Performance Outcomes
	○ If a Koala is observed within the clearing area, a 30 m buffer of vegetation around the Koala tree, in addition to a corridor of vegetation to the nearest vegetated area will be retained until the Koala moves out of the Project area on its own accord. ○ No felling of any tree that has the potential to fall on or near the tree the Koala is residing in. ○ Monitoring the Koala's location and its visible stress levels. If the Koala is appearing visibly stressed and agitated, the clearing front will be moved away from the animal. ○ Allowing the Koala to self-relocate of its own volition. ○ Koalas will not to be interfered with unless they have been injured. ● Approval and implementation of a SMP (High-risk of Impacts) under the NC Act prior to clearing to manage interference with animal breeding places that cannot be avoided during clearing works. ● Incorporate coarse woody debris and retained logs into rehabilitated habitat zones.	
Biosecurity risks (Introduced Fauna Species and Invasive Weeds)	To minimise these risks and meet the general biodiversity obligations under the Biosecurity Act, the Project will implement a range of management measures prepared with reference to the <i>Biosecurity – EIS information guidelines</i> (DESI, 2024b), including: ● Weeds will be managed in accordance with the Project's Weed and Pest Management Plan (Appendix A1). The Plan includes the following: ○ A site induction program that provides weed management information to staff, contractors and visitors. ○ Detailed control measures aimed at eradicating where possible or otherwise reducing the extent of weeds in accordance with the Queensland Department of Primary Industry (DPI) guidelines and the requirements of the Biosecurity Act. ○ Weed washdown procedures for all vehicles brought to site that will be traveling beyond the site office carpark. ○ Targeted weed control measures within the Project area. ○ Undertake routine monitoring to verify control effectiveness and detect new weed and pest incursions. ● Pest animals will be managed in accordance with the Weed and Pest Management Plan. The Plan includes requirements for: ○ Appropriate waste management and waste disposal.	● No new weed species are established in areas of MNES or MSES habitat areas based on baseline data. ● Spread of weeds does not occur as in areas of retained MNES and MSES habitat compared to baseline habitat quality surveys. ● No new pest animal species are established in areas of MNES or MSES habitat in comparison to baseline data. ● Reduction in pest animal numbers in areas of habitat for MNES and MSES below baseline levels.

Potential impact	Mitigation Measures	Performance Outcomes
	○ A reporting framework to ensure sightings of pest animals are recorded. ○ Site inductions to include information of pest animals including control requirements, importance of appropriate waste management and reporting requirements when pest animals are observed within the site during construction and operation activities. ○ Control of pest animals. ● Pest management actions outlined in the Weed and Pest Management Plan will primarily focus on those pest animals identified within the Survey area and include Cane Toads, Feral Cats, Wild Dogs, Feral Pigs, Feral Deer and European Rabbits. ● Pest management includes a range of best management practice actions including shooting, trapping, fencing and baiting in and will be undertaken in accordance with site safety and health requirements, and DPI guidelines and the requirements of the Biosecurity Act and as permitted under the SHMS.	
Fragmentation and Edge Effects	● Areas of MNES habitat to be retained adjacent to the Disturbance area will be clearly delineated and shown and labelled on all operational and management drawings and plans. GIS shapefiles will be provided to clearing personnel and/or contractors prior to the commencement of clearing operations. ● Site access is only to occur along designated site access tracks. No unauthorised access is permitted. ● Prior to entry to the site, all site personnel including contractors shall be made aware via site inductions, toolbox talks and site information sheets, of the sensitive environs they will be working in and around and be advised of specific limitations to construction and/or operational works being undertaken in or adjacent to MNES and MSES habitat. ● Implementation of dust suppression techniques in accordance with the Dust Management Plan (Chapter 15) and the CSMH Act. ● Maintenance of existing fences to prevent unauthorised vehicle or stock access into retained vegetation. ● Maintenance of existing water management infrastructure and erosion and sediment control devices. ● Pest animals and weeds will be managed in accordance with the Project's Weed and Pest Management Plan (Appendix A1).	● Maintain habitat quality scores within the retained MNES and MSES habitat in relation to baseline habitat quality scores. ● Rehabilitation of disturbed areas will be rehabilitated in accordance with the PRCP schedule.

Potential impact	Mitigation Measures	Performance Outcomes
Erosion and Sedimentation	- Implement erosion and sediment control measures in accordance with Best Practice Erosion and Sediment Control (IECA, 2008) as per the Erosion and Sediment Control Plan (ESCP) (Appendix AD). - Install sediment fences, diversion drains and sediment dams prior to ground disturbance. - Stage earthworks to minimise the extent of exposed soils at any one time. - Stabilise disturbed areas as soon as practicable using mulching, erosion control matting or revegetation. - Inspect erosion and sediment controls regularly and following rainfall events and maintain or repair as required. - Avoid disturbance of soils during wet weather where practicable.	Erosion and sediment controls implemented in accordance with best practice.
Fauna Mortality or Injury	- All staff and contractors will be required to report sightings of MNES and MSES fauna to the EO. - Prior to construction, signage, including speed limits, will be erected to warn of the potential presence of threatened fauna in the area. - A standard operating procedure will be developed and implemented for safely managing MNES and MSES fauna identified within the operational mining areas. - Posters will be developed and displayed in meeting areas that reminds staff and contractors about the MNES and MSES present in the Project area. - Where exclusion fencing is required, consideration shall be given to fauna movement, current land uses and worker safety requirements. - Environmental awareness training will be provided to all workers as part of site induction and will include specific topics on MNES and MSES, risks and protective measures, and identification of the MNES. - Pre-clearance surveys will be undertaken within 48 hours prior to clearing activities to assess the presence of MNES and MSES within the disturbance area to be cleared. - At least one qualified fauna spotter-catcher will be present during clearing activities. - Where tree hollows that are suspected as being used by Greater Gliders are identified from within the Disturbance area, they are to be salvaged to the greatest extent possible and relocated within retained vegetation. As far as practical, the site of the relocation is to be within retained vegetation and replicate the height and orientation of the original breeding or nesting structure. Sections of hollow branch or log will be secured in the new location	- Ensure vehicle speed limits are enforced. - Ensure conditions of high-risk SMP are adhered to. - No mortality or injury to MNES or MSES as a result of Project activities (e.g. from clearing activities, vehicle strikes etc).

Potential impact	Mitigation Measures	Performance Outcomes
	by mechanical means deemed appropriate by the fauna spotter-catcher (e.g. bolts, metal bands). Relocation is to be undertaken under the supervision of a fauna spotter-catcher. - Selected trees and/or logs will be salvaged and reused as fauna habitat to enhance retained vegetation habitat values (e.g. within the Conrock Gully diversion). Trees and other habitat features to be salvaged will be identified and flagged by the fauna spotter-catcher during the walk-through survey and/or clearance activities. - If an occupied tree hollow cannot be relocated the breeding habitat should be replaced nearby and in retained vegetation (but at least 200 m away from the Disturbance area) in undisturbed habitat, with an artificial nesting structure at a ratio of 1:1 using current best practice nest box design. - In accordance with the SHMS, speed limits of 60 km/hr will be set and enforced on all internal roads including haul roads. - Vehicles must abide by vehicle speed limits and access to any restricted areas or exclusion zones must be limited to critical site-specific activities to minimise threats to MNES and MSES fauna. - All injured fauna encountered during the construction and operation of the activity will be taken to a wildlife carer/facility or veterinarian. - Where injured fauna is encountered, and it is unsafe to handle the animals, the following should be undertaken: - The location of the injured animal will be identified so it can be located again. - The species of animal will be identified if possible and its sex and approximate size determined. - The type of injury sustained will be identified if possible. - The EO shall immediately contact Queensland's DETSI and report the animal and arrange for its capture and transportation to a wildlife carer or veterinarian. - Where possible, avoid additional barriers to fauna movement such as fencing or continuous bunds. - Approval and implementation of a SMP (High-risk of Impacts) under the NC Act prior to clearing to manage interference with animal breeding places that cannot be avoided during clearing works.	

Potential impact	Mitigation Measures	Performance Outcomes
	- Daily trench inspections, escape ramps, and covering or backfilling of trenches to reduce the risk of fauna entrapment. - Remove roadkill promptly to avoid attracting predators.	
Hydrological Changes	- Site stormwater management will be undertaken in accordance with the Fitzroy Regional Receiving Environment Monitoring Program (FRREMP), Water Management Plan (WMP) and an Erosion and Sediment Control Plan (Appendix AD) - The site specific WMP, FRREMP and ESCP will be implemented by suitably qualified persons. - Required management plans will be implemented with the aim of minimising alterations to receiving environment water quality, minimising mobilisation of sediments and minimising erosion related disturbances to the current hydrological regime. - The maintenance and cleaning of any vehicles, plant or equipment must not be carried out in areas from where contaminants can be released into any receiving waters. - Spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable to minimise the release of wastes, contaminants or materials to any stormwater drainage system or receiving waters. - Construct Conrock Gully diversion in accordance with its Functional Design Report for a long term geomorphically stable structure (Appendix D of Appendix J). - Progressively rehabilitate disturbed riparian areas in accordance with the PRCP schedule (Appendix AC). - Avoid placement of spoil or stockpiles within mapped waterways or wetland buffer zones.	- Water quality, as a result of the Project, does not exceed the receiving waters trigger levels listed in the EA. - Water quality monitoring is undertaken in accordance with the FRREMP
Air Quality	- Dust suppression will include the following actions: - Staging vegetation clearing to minimise areas of disturbed and bare ground. - Progressively rehabilitating disturbed areas. - Removal and dumping of overburden as soon as reasonably practical following blasting activities. - Keeping blasting requirements to an operational minimum through efficient blast design and mine planning. - Regular watering of haul roads and access tracks. - Dust suppression spraying of stockpiles. - Limiting grading and/or dozing in high dust generating areas.	- Dust deposition does not exceed 120 milligrams (mg) per square metre (m²) per day, averaged over one month when measured at any sensitive receptor. - Dust is monitored in accordance with the EA. - Dust is managed in accordance with the

Potential impact	Mitigation Measures	Performance Outcomes
	○ Limiting overburden drilling. ○ Enforcing speed limits in accordance with the requirements of the SHMS and CSMH Act.	Project's dust management plan.
Artificial Light	• Lights will be directed to the open cut pit to minimise light spill. • The use of low wattage lighting with spill guards. • Lighting will be kept to an operational minimum that ensures a safe working environment. • Implement lighting controls and monitoring in accordance with relevant DCCEEW light impact guidelines (DCCEEW, 2023c).	• Artificial lighting associated with the Project does not result in measurable adverse effects on the behaviour, movement, breeding success or habitat use of native fauna
Noise and Vibration	• Regularly maintaining and servicing all plant equipment to minimise machinery noise. • All engine covers will be kept closed while equipment is operating. • Blasting will only occur during EA prescribed day periods. • Manage noise and vibration levels in accordance with regulatory limits.	• When measured, noise and vibration levels at sensitive receptors do not exceed criteria set out in the EA.
Bushfire Risk	• Fire management for coal mining operations in Queensland is governed by the CSMH Act and Regulation, with the Regulation prescribing management of fires for coal mines. • Section 37 of the CSMH Regulation prescribes that the Project's SHMS must include standard operating procedures for action to be taken when a fire is discovered at the mine. • Buffers will be maintained around potential ignition sources such as plant and machinery, haul roads and infrastructure areas. • Prior to site entry, all relevant site personnel, including contractors, will be made aware of fire safety and risks as a component of the Project's site induction. • Fuel loads will be minimised and managed through the weed control measures outlined in the Weed and Pest Management Plan (Appendix AI). • Implement a Bushfire Management Plan (Appendix AJ) consistent with relevant fire authority requirements. • Maintain firebreaks and asset protection zones around infrastructure and high-risk areas. • Restrict hot works during periods of high fire danger and implement permit systems where required. • Ensure firefighting equipment is readily available on-site and personnel are trained in its use in accordance with the Project's emergency response plan (Appendix AJ).	• No uncontrolled fires within the Project area resulting from Project related activities.

Potential impact	Mitigation Measures	Performance Outcomes
	• Dispose of flammable waste materials appropriately and prohibit uncontrolled ignition sources on-site. • Suspend high-risk activities during extreme fire weather conditions where practicable. • Ensure machinery is properly maintained to reduce the risk of fire.	

11.6.5 Management and Monitoring Plans

11.6.5.1 Overview

Environmental management and monitoring plans will be prepared for the Project to ensure the effective implementation of mitigation measures during the construction, operational, and rehabilitation phases. These plans will provide the framework for compliance with approval conditions and continuous environmental performance improvement through the life of the Project. All environmental management and monitoring plans will be developed by an appropriately qualified person and implemented in accordance with their requirements, objectives and specifications.

The following plans will guide environmental management for the Project, particularly as it relates to impacts to terrestrial ecology:

- Weed and Pest Management Plan (**Appendix AI**)
- MNES Significant Species Management Plan (**Appendix AH**)
- High-risk SMP
- GDE Monitoring and Management Plan (GDEMMP) (**Appendix AF**), complemented by the GDE Habitat Quality Monitoring Plan (**Appendix AG**)
- Offset Area Management Plan (**Appendix R**) and Offset Delivery Plan (**Appendix S**)
- Bushfire Management Plan, as a part of the Emergency Response Plan (**Appendix AJ**)
- ESCP (**Appendix AD**)
- PRCP and PRCP schedule (**Appendix AB** and **Appendix AC**).

An overview of the Weed and Pest Management Plan, MNES Species Management Plan and the SMP are provided below. An overview of the GDE Monitoring and Management Plan and GDE Habitat Quality Monitoring Plan is provided in Section 10.9.3.4 of **Chapter 10**. The Offset Area Management Plan and Offset Delivery Plan are described in **Chapter 13**. An overview of the ESCP is provided in Section 8.7.10 of **Chapter 8**. An overview of the Bushfire Management Plan is provided in Section 19.9.5.2 of **Chapter 19**.

11.6.5.2 Weed and Pest Management Plan

The Weed and Pest Management Plan is provided in **Appendix AI**. The Weed and Pest Management Plan provides a framework for preventing the introduction, spread, and establishment of invasive flora and fauna within the Project area, including the Disturbance area, access roads, rehabilitation areas, and adjacent lands.

In accordance with the ToR and the *EIS Guideline – Biosecurity* (DESI, 2026a), the Weed and Pest Management Plan includes:

- Measurable objectives for determining the success of risk management measures.
- Monitoring actions, and a schedule for implementing them.
- Corrective actions if monitoring finds that risk management measures are not succeeding or have failed.

The Plan's measures and strategies align with relevant Commonwealth, State and local biosecurity strategies, plans and priorities including:

- *Australian Pest Animal Strategy 2017–2027*.
- *Australian Weeds Strategy 2017–2027*.
- *National Established Weed Priorities Framework (Weeds Working Group of the Environment and Invasives Committee, 2023)*.
- Biosecurity surveillance or prevention measures authorised under Queensland's Biosecurity Act.
- Nationally significant pest animals, weeds and diseases under the Commonwealth Biosecurity Act 2015 framework.

- Local government and regional biosecurity plans, specifically the Isaac Regional Council Biosecurity Plan 2024–2027.

The Plan includes but is not limited to:

- A site induction program that provides weed management information to staff, contractors and visitors.
- Detailed control measures aimed at eradicating where possible or otherwise reducing the extent of weeds in accordance with the Queensland DPI guidelines and the requirements of the Biosecurity Act.
- Weed washdown procedures for all vehicles brought to site that will be traveling beyond the site office carpark.
- Targeted weed control measures within the Project area.
- Undertaking routine monitoring to verify control effectiveness and detect new weed and pest incursions.
- Appropriate waste management and waste disposal.
- A reporting framework to ensure sightings of pest animals are recorded.
- Site inductions to include information of pest animals including control requirements, importance of appropriate waste management and reporting requirements when pest animals are observed within the site during construction and operation activities.
- Control of pest animals.

Monitoring and review components of the Plan include:

- Regular inspections of haul roads, infrastructure areas, overburden areas, rehabilitation zones, and soil stockpiles.
- Weed mapping and density recording using GIS to inform adaptive management.
- Annual review of Plan effectiveness, with updates following new incursions or changes to legislation or policy.
- Trigger thresholds (e.g. increases in infestation extent or density) to initiate corrective management actions.

The Weed and Pest Management Plan will be reviewed by State and Commonwealth regulatory agencies as part of the Project's EIS.

11.6.5.3 MNES Species Management Plan

The MNES Species Management Plan is provided in **Appendix AH**. The MNES Species Management Plan provides a framework for avoiding, minimising, and managing potential impacts to protected and threatened flora and fauna species recognised as MNES within the Project Area, including the Disturbance area, access roads, rehabilitation areas, and adjacent habitats.

In accordance with the ToR and the *EIS Guideline – Terrestrial Ecology* (DETSI, 2026), the MNES Species Management Plan includes:

- Measurable objectives for assessing the effectiveness of avoidance and mitigation measures.
- Monitoring actions and an implementation schedule.
- Corrective actions to be implemented where monitoring indicates that management measures are not effective or have failed.

The Plan aligns with relevant Commonwealth legislation, policies, and guidelines, including:

- The EPBC Act.
- Relevant recovery plans, conservation advices, and threatened species guidelines.
- Conditions of approval arising from the EIS process.

The objectives of the MNES Species Management Plan include:

- Avoiding and minimising impacts to MNES threatened species and their habitats.
- Managing construction and operational activities to reduce the risk of injury, mortality, or habitat degradation.
- Ensuring compliance with relevant legislative requirements and approval conditions.

Management measures proposed within the Plan relate to limiting and avoiding loss of MNES and/or habitat for MNES, prevention of habitat degradation and a decline in habitat values, minimising risk of weed introduction and spread, reducing habitat degradation by pest animals, minimising impact of dust deposition on MNES habitat, minimising noise and vibration impacts, minimising light impacts, minimising degradation of habitat from bushfire, minimising alteration of habitat resulting from changes to hydrology and water quality, and minimising potential for mortality or injury of MNES.

The MNES Species Management Plan includes, but is not limited to the following actions:

- Provision of species-specific measures to protect and mitigate impacts on MNES threatened flora and fauna species during construction and operations, consistent with the EPBC Act.
- Implementation of protocols for pre-clearance surveys, use of a fauna spotter-catcher, habitat feature salvage (e.g. hollows, logs) and monitoring to support population persistence and resilience.
- Definition of trigger thresholds and adaptive management responses.
- Maintenance of detailed records of fauna interactions, relocations, injuries, mortalities, and monitoring outcomes to meet regulatory reporting requirements and inform continual improvement of management measures.
- Refinement of disturbance boundaries and establishment of clearly marked exclusion zones around sensitive habitats prior to commencement of works.
- Timing of vegetation clearing to avoid key breeding, nesting, or flowering periods where practicable.
- Progressive vegetation clearing, with a fauna spotter-catcher present during clearing activities.
- Implementation of speed limits, lighting controls, and noise management measures to minimise disturbance to fauna.
- Management of artificial water points, trenches, and excavations to prevent fauna entrapment.
- Delivery of workforce awareness and training programs through site inductions and toolbox talks to ensure compliance with species management requirements.

The monitoring and review components of the MNES Species Management Plan include:

- Monitoring of known and potential habitat areas adjacent to disturbance zones.
- Recording and reporting of fauna encounters, injuries, and mortalities.
- Post-clearing inspections to verify the effectiveness of mitigation measures.
- Review and update of the Plan where monitoring identifies exceedances, new species records, or changes to regulatory requirements.

DCCEEW are the administering authority of the MNES Species Management Plan.

11.6.5.4 High-risk Species Management Program

An SMP (High-risk of Impacts) is required under Section 335 of the *Nature Conservation (Animals) Regulation 2020* (Qld) where breeding places of protected fauna are to be tampered with. The purpose of this SMP (High-risk of Impacts) is to address requirements under Section 335 (3)(c) of the *Nature Conservation (Animals) Regulation 2020* (Qld), which specifies that a person must not tamper with a protected animal's breeding place unless the removal or tampering is part of an approved Species Management Program for the animal.

The SMP (High-risk of Impacts) will provide targeted, species-specific measures to avoid, minimise, and manage potential impacts on high-risk and sensitive flora and fauna species within the Project area during construction and operation. The SMP (High-risk of Impacts) will apply to the threatened species known to occur within the Project area, that is, the Squatter Pigeon and Greater Glider, as well as least concern fauna species that have breeding places within the Survey area.

The SMP (High-risk of Impacts) will be developed in accordance with the *Information sheet—Species Management Program requirements for tampering with a protected animal breeding place* (DES, 2020c).

The objectives of the SMP (High-risk of Impacts) will be to:

- Avoid and minimise impacts on animal breeding places.
- Ensure compliance with legislative requirements.
- Maintain population viability and habitat function for fauna species, including those of conservation significance.

Management measures will include, but are not limited to the following actions:

- Implementation of pre-clearance surveys and clearing supervision by experienced and permitted fauna spotter-catcher endorsed under a DETSI Rehabilitation Permit (spotter-catcher).
- Use of staged and progressive clearing methods.
- Targeted habitat feature identification, retention, and salvage, including tree hollows, logs, and refugia.
- Species-specific clearing protocols, handling, relocation, and release procedures.
- Implementation of temporal restrictions on works in sensitive areas during key breeding or dispersal periods where practicable.
- Enhanced controls on vehicle speed, lighting, and noise in areas of high-risk species habitat.
- Management of artificial water points, trenches, and excavations to prevent fauna entrapment.

DETSI are the administering authority of the SMP (High-risk of Impacts).

11.7 Significant Impacts Assessments and Offsets

11.7.1 MNES Significant Impact Assessment

11.7.1.1 Overview

In accordance with the *MNES Significant Impact Guidelines 1.1* (DEWHA, 2013), an assessment has been undertaken for each MNES known to, likely to or which may occur within the Project area.

The assessment evaluated potential impacts to MNES values following the implementation of all reasonable avoidance and mitigation measures, as outlined in Section 11.6 and any community- or species specific management actions proposed in Appendix J of **Appendix P**. Where the assessment determined that significant residual impacts are likely to remain, these values have been identified as requiring offsets under the EPBC Act.

Below is a determination on whether a significant impact is likely for each MNES recognised as known to, likely to or may occur within the Project area, based on the relevant significant impact criteria for the conservation status of the ecological community or species.

For those TECs and species for which it has been determined that an assessment in accordance with the significant impact guidelines is required, the assessment includes a description of the potential impacts to each threatened community or species, a description of the statutory requirements considered in the assessment, any specific management actions required to manage potential threats, and an assessment of the likelihood of significant impacts. The assessments consider habitat critical to the survival of the species, and important habitat and populations.

The results of the significant impact assessments indicate that the Project is likely to result in significant impacts on several MNES, primarily due to direct impacts from vegetation clearing, habitat removal and loss of connectivity.

11.7.1.2 Brigalow TEC

Fragmented patches of the Brigalow TEC were verified within the Survey area during field surveys. Approximately 52.72 ha of Brigalow TEC (Figure 11-4) is expected to be cleared as part of the Project, representing 41.40 % of the TEC within the Survey area. All patches of Brigalow TEC were identified as habitat critical to the survival of the ecological community.

The retained patches will retain existing connectivity. The proposed vegetation clearing may increase the edge effects on affected Brigalow TEC patches that occur adjacent to the Disturbance area. However, the Project is not expected to generate conditions likely to cause additional weed incursion in most of the remaining Brigalow TEC, with monitoring and maintenance of weeds to occur in accordance with the Project's Weed and Pest Management Plan (**Appendix AI**).

Based on the known threats to the Brigalow TEC (as outlined in the Conservation Advice for the TEC (DoE, 2013a)), potential indirect impacts associated with the Project may include bushfire, pest plants including weed invasion, pest animals, lack of knowledge, overgrazing by native fauna and climate change. Appropriate avoidance, mitigation and management measures have been developed to address these threats, which are considered effective in reducing the likelihood and severity of indirect impacts to the ecological community.

The community-specific management measures are outlined in Table 59 of Appendix J of **Appendix P**. This table includes the timing of the proposed mitigation measures, the predicted effectiveness, proposed monitoring and adaptive management, and the relevant statutory references.

Threats to the Brigalow TEC are well documented, and the actions required to support its recovery can be implemented through established regulatory and management frameworks. Each jurisdiction in which the ecological community occurs has relevant legislation, policies, programs and guidance materials to inform its protection and management. The current Conservation Advice provides comprehensive direction, including detailed guidance for environmental impact assessment, land and conservation management, and the prioritisation of research, threat mitigation and recovery initiatives.

Conservation, recovery and threat abatement plans relevant to the Brigalow TEC have been considered in the development of management actions for this TEC, and the assessment of significance of impacts. The following community specific documents have been relied upon in the development of the management actions and the assessment of significance of impacts:

- The Approved Conservation Advice for the Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community (DoE, 2013a).
- The Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community SPRAT profile (DoE, 2026a) provides information on past, current and emerging threats, including but not limited to vegetation clearing, fire, pest plants, pest animals, and lack of knowledge.
- The SPRAT profile for this species indicates a Recovery Plan is not required as the approved Conservation Advice is an effective, efficient, and responsive document to guide the implementation of priority management actions, mitigate key threats, and support the recovery of this EPBC Act listed Endangered ecological community (DoE, 2026a).
- The threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads (DSEWPac, 2011c) has been identified as being relevant to the managing threats to the Brigalow TEC.
- The following Strategies have also listed relevant actions to recover Australia's threatened plants, animals and ecological communities:
 - *Australia's Strategy for Nature 2019–2030 (Commonwealth of Australia, 2019).*

- *Threatened Species Strategy 2021–2031 (Commonwealth of Australia, 2021).*
- *Australian Weeds Strategy 2017–2027 (Commonwealth of Australia, 2017b).*
- *Australian Pest Animal Strategy 2017–2027 (Commonwealth of Australia, 2017a).*
- *DPI’s Biosecurity Website (DPI, 2023).*

Table 11-24 provides an assessment against the significant impact criteria in the *MNES Significant Impact Guidelines 1.1* (DEWHA, 2013) and determines whether the Project is likely to have a significant impact on the Brigalow TEC.

The Project has considered design, mitigation and rehabilitation measures to manage impacts to this TEC and due to the extent of clearing proposed and the already fragmented nature of the Brigalow TEC within the region, the Project was considered likely to result in a significant impact to this ecological community and will require offsets in accordance with EPBC Act requirements.

Table 11-24 Assessment of Significance of Impacts to the Brigalow TEC

Brigalow TEC	
Criteria	Response
Reduce the extent of an ecological community	Likely The Brigalow TEC in the Disturbance area comprised fragmented patches totalling 52.72 ha (Figure 11-4). This 52.72 ha of Brigalow TEC is expected to be cleared as a result of the Project. The proposed clearing will result in the permanent loss of Brigalow TEC within the Project area, and therefore, will reduce the local extent of this endangered ecological community.
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	Unlikely Brigalow TEC within the Project area occurs as fragmented patches within a landscape as a result of historical clearing and ongoing land use pressures (fragmented patches shown in Figure 11-4). Six patches of Brigalow TEC will be fully impacted by the Project (Patches 9 -12 and 16-17), while two patches will be partially impacted (Patch 15 and 18 in Figure 11-4). The proposed clearing of 52.72 ha of Brigalow TEC will result in the loss of a portion of the TEC within the Survey area, however it will not fragment the impacted patches into two or more portions. The remaining 14 patches in the Survey area will not be directly or indirectly impacted and will remain viable during and post mining impacts (see Section 11.5.2 and 11.5.4). These remaining patches, including partially impacted patches, will retain existing connectivity with the remaining remnant and regrowth vegetation in the Survey area. The proposed clearing will result in a loss of Brigalow TEC. However, clearing will not fragment retained patches into two or more portions. Hence, it was considered unlikely the Project will fragment the ecological community.
Adversely affect habitat critical to the survival of an ecological community	Likely The <i>Conservation Advice for the Brigalow TEC</i> (DoE, 2013a) defines all patches meeting the key diagnostic characteristics and condition thresholds as habitat critical to the survival of the ecological community. This means, all verified patches of Brigalow TEC within the Survey area are considered habitat critical to survival of the TEC (as shown in Figure 11-4). Based on the Conservation Advice, other patches of Brigalow within the Survey area that do not meet the key diagnostic criteria, or condition thresholds may also provide

Brigalow TEC	
	habitat critical to the survival of the Brigalow TEC due to its supporting biodiversity, wildlife corridors and habitat values. The permanent removal of 52.72 ha of Brigalow TEC will directly impact habitat critical to the survival of this ecological community. As a result, 52.72 ha of habitat critical to the community's survival will be directly impacted.
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	Unlikely Management measures will be applied to retained patches of Brigalow TEC to prevent indirect impacts associated with threats known to the TEC, as described in Section 11.6, with TEC specific measures outlined in Table 59 of Appendix J of Appendix P. Given these management measures which are specific to the ecology of the TEC and based on regulatory advice, the Project is not predicted to cause indirect impacts that will modify or destroy abiotic factors necessary for the survival of the Brigalow TEC. In addition, impact mitigation for the Project (as described in Section 11.6.2) includes measures for controlling impacts to abiotic factors including but not limited to erosion and sedimentation, hydrological changes and air quality measures. The Brigalow TEC in the Survey area has not been identified as a GDE (Appendix N), and therefore, modifications to groundwater levels are unlikely to affect the TEC's survival. Further monitoring of GDE presence and health, including groundwater usage by the TECs will be completed as part of the GDEMMP (Appendix AF). As detailed in Section 11.5.3.5, the Project will result in negligible to minor changes to hydrology, hydraulics and geomorphology (i.e. flood behaviour), and hence would have negligible impacts on retained Brigalow TEC patches. Accordingly, the Project is not expected to modify or destroy abiotic factors necessary for the community's survival.
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	Unlikely Eight fragmented patches of Brigalow TEC will be fully or partially impacted by the Project. The remaining 17 patches in the Survey area will not be directly impacted and will remain viable during and post mining impacts. These remaining patches will retain existing connectivity with the remaining remnant and regrowth vegetation in the Survey area. Edge effects to remaining patches of the TEC are likely to be negligible considering the patches area already subject to established introduced groundcover species and weed species listed as restricted matters under the Biosecurity Act and/or WoNS. Edge effects to remaining patches of the Brigalow TEC will also be managed through the implementation of a Weed and Pest Management Plan (Appendix AI) to minimise the risk of further degradation as a result of a change in species composition. Remaining partially impacted patches will continue to retain connectivity with the remaining remnant and regrowth vegetation in the Survey area. Through the implementation of these management measures, it is considered unlikely the Project will substantially change the retained Brigalow TEC patches as a result of edge effects. Bushfire prevention and management measures, as described in Section 11.6, will also be implemented in accordance with the Bushfire Management Plan (Appendix AJ), which will protect the functionally important species of the TEC. Hence, it is unlikely the retained TEC patches in the Survey area will experience a decline or loss of the functionally important species.
Cause a substantial reduction in the quality or integrity of	Unlikely Eight fragmented patches of Brigalow TEC will be fully or partially impacted by the Project. The remaining 17 patches in the Survey area will not be directly impacted and

Brigalow TEC	
an occurrence of an ecological community, including, but not limited to: assisting invasive species, that are harmful to the listed ecological community, to become established, or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community,	will remain viable during and post mining impacts. These remaining patches will retain existing connectivity with the remaining remnant and regrowth vegetation in the Survey area. Edge effects to remaining patches of the TEC are likely to be negligible considering the patches area already subject to established introduced groundcover species and weed species listed as restricted matters under the Biosecurity Act and/or WoNS. The Project is unlikely to increase the threat of invasive species in the landscape, particularly given the management measures proposed to reduce the risk of weed invasion in the retained patches (Appendix AI). The Project is unlikely to result in the mobilisation of pollutants into this TEC either within or adjacent to the Disturbance area. The Project is also not likely to use fertilisers on-site or cause regular mobilisation of herbicides that may impact the TEC. Erosion and sedimentation controls including the placement of sediment dams have been incorporated to reduce the risk of erosion and sedimentation, as outlined in Section 11.6. Accordingly, the Project is unlikely to cause a substantial reduction in the quality or integrity of the retained Brigalow TEC.
Interfere with the recovery of an ecological community	Likely There is no recovery plan for this ecological community. However, threats include clearing, fire, weed invasion and pests (TSSC, 2013). The Project will result in the clearing of 52.72 ha of Brigalow TEC which will result in a reduction in extent of the TEC which is likely to interfere within the recovery of the ecological community at the local scale.
Assessment Outcome	The Project is likely to result in a significant impact on 52.72 ha of the Brigalow TEC. This conclusion is based on the reduction in the extent of the ecological community, adverse impacts to 52.72 ha of habitat critical to the survival of the ecological community, and the potential to interfere with the recovery of the ecological community.

11.7.1.3 Natural Grasslands TEC

The Disturbance area has been designed to avoid direct impacts to this TEC (Figure 11-4).

Key threats to the Natural Grasslands TEC include vegetation clearing, grazing pressure, weed invasion, and altered fire regimes (TSSC, 2009). The Project does not propose vegetation clearing within the verified patch of Natural Grassland TEC and is unlikely to increase grazing pressure. While the proposed disturbance may marginally increase edge effects on the retained patch, the Project is not expected to create conditions conducive to increased weed incursion. Weed monitoring and control will be undertaken in accordance with the Project's Weed and Pest Management Plan (**Appendix AI**).

While the Project will not alter current fire regimes, the implementation of the Bushfire Management Plan (**Appendix AJ**) will reduce bushfire hazard risk, effectively reducing the frequency and intensity of fires if they occur.

Table 61 of Appendix J of **Appendix P** provides an assessment against the significant impact criteria in the *MNES Significant Impact Guidelines 1.1* (DEWHA, 2013) and determines whether the Project is likely to have a significant impact on this ecological community. The Project has considered design, mitigation and rehabilitation measures to manage direct and indirect impacts to this TEC, and due to the avoidance measures implemented (i.e. nil disturbance), the Project was considered **unlikely to result in a significant impact** to this ecological community.

11.7.1.4 Poplar Box Woodland on Alluvial Plains TEC

Two patches of Poplar Box TEC (both Category C) were verified within the Survey area, occupying 39.44 ha. One patch of this TEC is expected to be partially cleared as a result of the Project (Patch 26 in Figure 11-4) resulting in direct impacts to 15.45 ha of the TEC (Table 49 within **Appendix P**).

The remaining area of partially cleared TEC within Patch 26 will retain existing connectivity. The proposed vegetation clearing may increase the edge effects on the affected TEC patch. However, a buffer area of approximately 50 m has been applied between proposed infrastructure within the Disturbance area and the retained patch, and the Project is not expected to generate conditions likely to cause additional weed incursion in the other remaining patch of TEC, with monitoring and maintenance of weeds to occur in accordance with the Project's Weed and Pest Management Plan (**Appendix AI**).

The fully retained patch 27 is approximately 2 km from the Disturbance area, and as such is unlikely to be directly or indirectly impacted by the Project (Table 49 within **Appendix P**).

Based on the known threats to the Poplar Box TEC (as outlined in the Conservation Advice for the TEC (DoEE, 2019)), potential indirect impacts associated with the Project may include weed invasion, particularly invasive grasses, inappropriate fire regimes, inappropriate grazing (including unmanaged goats and rabbits), dieback, chemical impact and spray drift, hydrological changes including altered groundwater levels), salinisation, nutrient enrichment, invasive fauna and climate change.

Appropriate avoidance, mitigation and management measures have been developed to address these threats, which are considered effective in reducing the likelihood and severity of indirect impacts to the ecological community. The community-specific management measures are outlined below and in Table 62 of Appendix J within **Appendix P**.

The Project has been designed to avoid and mitigate impacts to the Poplar Box TEC, where practicable. The proposed avoidance and mitigation measures specifically for each of the threats known to the Poplar Box TEC are provided in Table 62 in Appendix J or **Appendix P**. This table also includes the timing of the proposed mitigation measures, the predicted effectiveness, proposed monitoring and adaptive management, and the relevant statutory reference.

Conservation, recovery and threat abatement plans relevant to the Poplar Box TEC have been considered in the impact assessment of the TEC, the development of avoidance, mitigation and management measures, and the assessment of significance of impacts. The following community specific documents have been relied upon in the development of avoidance, mitigation and management measures, and the assessment of significance of impacts:

- The Conservation Advice (including listing advice) for the Poplar Box Grassy Woodland on Alluvial Plains (DoEE, 2019).
- The Poplar Box Grassy Woodland on Alluvial Plains ecological community SPRAT profile (DoE, 2026c) provides information about the relevant regulatory considerations and links to information available in relation to its listing under the EPBC Act and provides the community's distribution.
- The SPRAT profile (DoE, 2026c) for this species indicates a Recovery Plan is not required as the approved Conservation Advice is an effective, efficient, and responsive document to guide the implementation of priority management actions, mitigate key threats, and support the recovery of this EPBC Act listed Endangered ecological community
- No threat abatement plans have been identified as being relevant for this ecological community within the SPRAT profile (DoE, 2026c), however the Conservation Advice lists the following threat abatement plans as relevant to the community:
 - *Threat abatement plan for competition and land degradation by unmanaged goats (DEWHA, 2008c);*
 - *Threat abatement plan for competition and land degradation by rabbits (DEWHA, 2008a);*

- *Threat abatement plan for disease in natural ecosystems caused by Phytophthora cinnamomi (DoEE, 2018b);*
- *Threat abatement plan for predation by European red fox (DEWHA, 2008d);*
- *Threat abatement plan for predation by feral cats (DoE, 2015a);*
- *Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads (DSEWPaC, 2011c);*
- *Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (DoEE, 2017); and*
- *Threat abatement plan to reduce the impacts on northern Australia's biodiversity by the five listed grasses (DSEWPaC, 2012b).*
- The following Strategies have also listed relevant actions to recover Australia's threatened plants, animals and ecological communities:
 - *Australia's Strategy for Nature 2019–2030 (Commonwealth of Australia, 2019).*
 - *Threatened Species Strategy 2021–2031 (Commonwealth of Australia, 2021).*
 - *Australian Weeds Strategy 2017–2027 (Commonwealth of Australia, 2017b).*
 - *Australian Pest Animal Strategy 2017–2027 (Commonwealth of Australia, 2017a).*
 - *DPI's Biosecurity Website (DPI, 2023).*

Table 11-25 provides an assessment against the significant impact criteria in the *MNES Significant Impact Guidelines 1.1* (DEWHA, 2013) and determines whether the Project is likely to have a significant impact on the Poplar Box TEC.

The Project has considered design, mitigation and rehabilitation measures to manage impacts to this threatened ecological community, and due to the extent of clearing proposed and the already reduced and fragmented distribution of the Poplar Box TEC within the region, the Project was considered **likely to result in a significant impact** to this ecological community and will require offsets in accordance with EPBC Act requirements.

Table 11-25 Assessment of Significance of Impacts to the Poplar Box TEC

Poplar Box TEC	
Criteria	Response
Reduce the extent of an ecological community	Likely Two patches of Poplar Box TEC (both Category C – moderate quality) were verified within the Survey area, occupying 39.44 ha. One patch of this TEC (Patch 26 in Figure 11-4) is expected to be partially cleared as a result of the Project, resulting in direct impacts to 15.45 ha of the TEC (Table 49 in Appendix P; Figure 11-4). The other remaining patch of this TEC (Patch 27 in Figure 11-4) will not be directly or indirectly impacted as a result of the Project with it being approximately 2 km from the Disturbance area. This clearing of 15.45 ha of TEC represents a permanent loss of this endangered ecological community which will directly reduce its local extent. Accordingly, the Project will result in a reduction in the extent of the ecological community.
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	Unlikely The Poplar Box TEC within the Survey area occurs within a broader landscape that has been modified by historical agricultural and mining land uses, with remaining patches varying in size, condition and connectivity. One Category C – moderate quality patch of this TEC (Patch 26 in Figure 11-4) is expected to be partially cleared as a result of the Project, resulting in direct impacts to 15.45 ha of the TEC (Table 49 in Appendix P; Figure 11-4). The other remaining patch of this TEC (Patch

Poplar Box TEC	
	27 in Figure 11-4) will not be directly or indirectly impacted as a result of the Project with it being approximately 2 km from the Disturbance area. The proposed clearing of 15.45 ha of TEC will result in the loss of a portion of the TEC within the Survey area. However, it will not fragment the impacted patch (Patch 26) into two or more portions. Hence, it was considered unlikely the Project will fragment the ecological community.
Adversely affect habitat critical to the survival of an ecological community	Unlikely The Conservation Advice for the Poplar Box on Alluvial Plains TEC (DoEE, 2019) identifies areas critical to the survival of the ecological community as the best quality, most intact patches of the ecological community (Class A – Highest condition; DoEE, 2019). The patch to be cleared (Patch 26 in Figure 11-4) within the Disturbance area is Class C - Moderate Condition, and therefore, is not considered habitat critical to survival of the TEC. Hence, the Project is not expected to adversely impact habitat critical to the survival of an ecological community.
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	Unlikely Management measures will be applied to retained areas of the Poplar Box TEC (both the retained portion of Patch 26 and the fully retained Patch 27; Figure 11-4) to prevent indirect impacts associated with threats known to the species as described in Section 11.6 with TEC specific measures outlined in Table 62 in Appendix J of Appendix P. Given these management measures, the Project is not predicted to cause indirect impacts that will modify or destroy abiotic factors necessary for the survival of the Poplar Box TEC. In addition, generalised impact mitigation for the Project (as described in Section 11.6.4) includes measures for controlling erosion and sedimentation, hydrological changes and air quality impacts, which will mitigate impacts to abiotic factors. The GDE assessment concluded that, as GDEs demonstrate a reliance on the perched groundwater system rather than the deeper alluvial aquifer, groundwater drawdown associated with the Project or other resource projects (i.e. cumulative drawdown) is unlikely to impact GDEs (Appendix N). Further monitoring of GDE presence and health, including groundwater usage by the TEC will be completed as part of the GDEMMP (Appendix AF) and GDE Habitat Quality Monitoring Program (Appendix AG). As detailed in Section 11.5.3.5, the Project will result in negligible to minor changes to hydrology, hydraulics and geomorphology (i.e. flood behaviour), and hence would have negligible impacts on retained Poplar Box TEC patches. Accordingly, the Project is not expected to modify or destroy abiotic factors necessary for the community's survival.
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular	Unlikely One patch of this TEC (Patch 26 in Figure 11-4) is expected to be partially cleared as a result of the Project, resulting in direct impacts to 15.45 ha of the TEC (Figure 11-4). The remaining portion of Patch 26 will retain existing connectivity with the remaining remnant and regrowth vegetation in the Survey area. The other remaining patch of this TEC (Patch 27 in Figure 11-4) will not be directly or indirectly impacted as a result of the Project with it being approximately 2 km from the Disturbance area. Edge effects to the remaining portion of Patch 26 and the fully retained Patch 27 of the TEC are likely to be negligible considering the patches are already subject to established introduced groundcover species and weed species listed as restricted matters under the

Poplar Box TEC	
burning or flora or fauna harvesting	Biosecurity Act. and/or WoNS. A sufficient buffer area to Patch 26 has also been applied at approximately 50 m to reduce edge effects into the retained portion of the patch Edge effects to remaining patches of the Poplar Box TEC will be managed through the implementation of a Weed and Pest Management Plan (Appendix AI) to minimise the risk of further degradation as a result of a change in species composition, as detailed in Table 62 within Appendix J of Appendix P. Through the implementation of buffer areas and management measures, it is considered unlikely the Project will substantially change the retained Poplar Box TEC patches as a result of edge effects. Bushfire prevention and management measures as detailed in Table 62 within be Appendix J of Appendix P will also implemented in accordance with the Bushfire Management Plan (Appendix AJ), which will protect the functionally important species of the TEC. Hence, it is unlikely the retained TEC patches in the Survey area will experience a decline or loss of the functionally important species.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: assisting invasive species, that are harmful to the listed ecological community, to become established, or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community,	Unlikely One patch of this TEC (Patch 26 in Figure 11-4). is expected to be partially cleared as a result of the Project, resulting in direct impacts to 15.45 ha of the TEC (Figure 11-4). The remaining portion of Patch 26 will retain existing connectivity with the remaining remnant and regrowth vegetation in the Survey area. The other remaining patch of this TEC (Patch 27 in Figure 11-4) will not be directly or indirectly impacted as a result of the Project with it being approximately 2 km from the Disturbance area. Edge effects to remaining patches of the TEC are likely to be negligible considering the patches area already subject to established introduced groundcover species and weed species listed as restricted matters under the Biosecurity Act. and/or WoNS, buffer areas have been applied and management measures to be implemented. The Project is unlikely to increase the threat of invasive species in the landscape, particularly given the management measures proposed to reduce the risk of weed invasion in the retained patches (as described in Table 62 within Appendix J of Appendix P). The Project is unlikely to result in the mobilisation of pollutants into this TEC either within or adjacent to the Disturbance area. The Project is also not likely to use fertilisers on-site or cause regular mobilisation of herbicides that may impact the TEC. Erosion and sedimentation controls including the placement of sediment dams have been incorporated to reduce the risk of these, as outlined in Section 11.6.4. Accordingly, the Project is unlikely to cause a substantial reduction in the quality or integrity of the Poplar Box TEC.
Interfere with the recovery of an ecological community	Likely The Poplar Box TEC is listed as endangered and has experienced substantial historical decline, with recovery constrained by ongoing land-use pressures and limited availability of suitable alluvial habitats. The permanent loss of 15.45 ha of Poplar Box TEC associated with the Project will further reduce opportunities for natural recovery and landscape-scale restoration. Therefore, the Project is considered likely to interfere with the recovery of this ecological community.

Poplar Box TEC	
Assessment Outcome	The Project is considered likely to result in a significant impact on 15.45 ha of the Poplar Box TEC. This conclusion is based on the reduction in the extent of the ecological community and the potential to interfere with the recovery of the ecological community.

11.7.1.5 Semi-evergreen Vine Thickets TEC

Two patches of Semi-evergreen Vine-thicket TEC were confirmed within the Survey area (Figure 11-4). Although these patches lacked a fully developed ecologically dominant layer typical of higher-condition vine thicket remnants, they exhibited characteristic structural and floristic attributes of the TEC, including dense vine-dominated understorey, appropriate canopy composition and marginal exotic species cover. On this basis, the patches were considered representative of the Semi-evergreen Vine Thicket TEC.

The patches occupies 13.17 ha in the Survey area but did not coincide with the Project area. The Disturbance area has also been designed to avoid direct impacts to this TEC.

Key threats to the Semi-evergreen Vine-thicket TEC include vegetation clearing, fire, weeds, grazing by domestic stock, native herbivores and other vertebrate pests and coastal development (McDonald, 2010).

The Project does not propose vegetation clearing within the verified patch of Semi-evergreen Vine-thicket TEC, is unlikely to increase grazing pressure and is not considered coastal development. The Project will not alter current fire regimes. However, the implementation of the Bushfire Management Plan will reduce bushfire hazard risk, effectively reducing the frequency and intensity of fires if they occur (**Appendix AJ**).

While the proposed disturbance may marginally increase edge effects on the retained patch, the Project is not expected to create conditions conducive to increased weed incursion. Weed monitoring and control will be undertaken in accordance with the Project's Weed and Pest Management Plan (**Appendix AI**).

On the basis of these avoidance and management measures, additional community-specific mitigation measures for the Semi-evergreen Vine-thickets TEC were not considered necessary.

Table 64 of Appendix J of **Appendix P** provides an assessment against the significant impact criteria in the *MNES Significant Impact Guidelines 1.1* (DEWHA, 2013) and determines whether the Project is likely to have a significant impact on this ecological community.

The Project has considered design, mitigation and rehabilitation measures to manage impacts to this threatened ecological community, and due to the avoidance measures and no anticipated impacts, the Project was considered **unlikely to result in a significant impact** to this ecological community.

11.7.1.6 *Dichanthium queenslandicum*, King Bluegrass

Dichanthium queenslandicum was not recorded during targeted field surveys within the Project area despite extensive survey effort, including random meander surveys within suitable habitat during both wet and dry season survey events, vegetation community assessments and habitat suitability assessments undertaken during the species' flowering period following wet season rainfall. The species has also not been recorded historically within the Project area. Historical records do occur within the Area of Interest (20 km buffer), including approximately 5 km south of the Project area in 2013 (AECOM, 2024) and to the west of the Project area in 2012 (WildNet records; Figure 11-5), indicating the species does occur within the broader locality, at least historically.

Suitable habitat for *Dichanthium queenslandicum* within the Project area is restricted to the native tussock grassland communities occurring on black cracking clay soils. These habitat areas are limited in extent and form part of a fragmented grassland landscape that has been extensively modified by historical agricultural and mining activities.

One large patch of suitable habitat for the species was verified within the Survey area (Figure 11-5). The ecological community occupies approximately 38.33 ha within the Project area and 200.72 ha within the Survey area. The Disturbance area has been designed to avoid direct impacts to this species habitat.

The main identified threats to *Dichanthium queenslandicum* are loss of habitat through agricultural and mining activities, road construction and other infrastructure developments. Cultivation and crop production remains an ongoing and immediate threat to natural grassland communities in which this species occurs, as does grazing, and invasion from weeds such as *Parthenium hysterophorus** and *Parkinsonia aculeata** (DSEWPac, 2013a).

The Project does not propose vegetation clearing within the verified patch of habitat for the species, is unlikely to increase grazing pressure and is not a cultivation or crop production development. While the proposed disturbance may marginally increase edge effects on the retained patch, the Project is not expected to create conditions conducive to increased weed incursion. Weed monitoring and control will be undertaken in accordance with the Project's Weed and Pest Management Plan (**Appendix AI**).

On the basis of these avoidance and management measures, additional species-specific mitigation measures for *Dichanthium queenslandicum* were not considered necessary.

Table 65 of Appendix J of **Appendix P** provides an assessment against the significant impact criteria in the *MNES Significant Impact Guidelines 1.1* (DoE, 2013b) and determines whether the Project is likely to have a significant impact on this threatened species.

Habitat critical to the survival of the species has not been formally defined. However, suitable habitat within the Project area is considered likely to support values important for the species' long-term persistence, genetic diversity and potential recovery. Design and mitigation measures have been considered and given the absence of confirmed populations within the Project area, the limited extent of suitable habitat present, and the avoidance of direct impacts to the species verified habitat, the Project was considered **unlikely to result in a significant residual impact** to *Dichanthium queenslandicum*.

11.7.1.7 Australian Painted Snipe

The Australian Painted Snipe was not detected within the Survey area. However, it has been recorded nearby: a sighting south of Cherwell Creek at a dam associated with J B Gully by DPM Envirosiences in 2017 (DPM Envirosiences, 2018a) and another record by BirdLife Australia in 2018. Within the Area of Interest (20 km buffer), the species has been recorded, with records available within the Atlas of Living Australia database (records shown in inset of Figure 11-7). These records indicate that the species has occupied wetland habitats in the local vicinity on occasion, at least prior to 2018.

While this species breeds in Australia, most of the verified habitat present within the Survey area is of insufficient quality and extent to support breeding individuals. Furthermore, given the limited number of local records, the species is considered unlikely to rely on the Survey area for breeding purposes. Most of the habitat is considered to function primarily as occasional foraging or dispersal habitat rather than as an important breeding area for the species. The HES wetland in the southeastern corner of the Survey area, but not within the Disturbance area, is of higher quality and may be capable of supporting breeding for this species (Figure 11-7).

No breeding habitat, and approximately 1.31 ha of foraging and dispersal habitat for the Australian Painted Snipe will be directly impacted as part of the Project. The foraging and dispersal habitat proposed to be impacted includes farm dams or poor quality, small, fragmented wooded wetlands.

Threats known to the species include loss and degradation of habitat and predation by Feral Cats* and European Foxes* (DoE, 2026g). The loss of habitat proposed is minor, with no breeding habitat proposed to the impacted, and 1.31 ha of foraging and dispersal habitat that may be used by the species on occasion. This loss of habitat is unlikely to further fragment or degrade high quality breeding and foraging

habitat that the species relies on to survive. In addition, the higher quality HES wetland within the southeastern area of the Survey area has been avoided by design of the Disturbance area.

The Project has the potential to provide opportunities for vertebrate pest to increase. However, management measures associated with reducing this risk, include a Weed and Pest Management Plan, maintaining a clean, rubbish-free environment to discourage scavenging and reduce the potential for colonisation by introduced fauna, storing domestic waste in appropriate receptacles and locations, and coordinating pest management with surrounding stakeholders, have been incorporated into the generalised mitigation measures (Section 11.6.4).

Table 11-26 provides an assessment against the significant impact criteria in the *MNES Significant Impact Guidelines 1.1* (DoE, 2013b) and determines whether the Project is likely to have a significant impact on this threatened species.

The Project was considered **unlikely to result in a significant residual impact** to the Australian Painted Snipe due to the avoidance and management measures proposed, and the lack of an important population and critical habitat for the species in the Project area.

Table 11-26 Assessment of Significance of Impacts to the Australian Painted Snipe

Australian Painted Snipe	
Criteria	Response
Lead to a long-term decrease in the size of a population	Unlikely The Australian Painted Snipe is widely but sparsely distributed across Australia and is highly mobile, responding opportunistically to rainfall-driven wetland formation. The Project will remove 1.31 ha of foraging and dispersal habitat for the species, which represents a very small proportion of habitat available within the Survey area (11.5 ha of breeding habitat and 19.65 ha of foraging and dispersal habitat; representing 4.2 % of total habitat to be impacted; Figure 11-7). The Project will not directly impact any breeding habitat for the species. The verified habitat to be cleared consists of farm dams, and small fragmented wooded wetlands that are intermittent and temporary in nature. These poor quality wetlands and dams are widely replicated across the region following rainfall events. The verified foraging and dispersal habitat may provide foraging and dispersal opportunities for the species on occasion. However, it is unlikely to be suitable for breeding due to the lack of suitable vegetative groundcover and disturbance from livestock and pest species. Furthermore, given the limited number of local records, the species is considered unlikely to rely on the Survey area for breeding purposes. Most of the habitat was considered to function primarily as occasional foraging or dispersal habitat rather than as an important breeding area for the species. The HES wetland in the southeastern corner of the Survey area is of higher quality and may be capable of supporting breeding for this species (Figure 11-7). This breeding habitat has been avoided by design of the Disturbance area and is located some 2 km from the Disturbance area. Accordingly, the loss of a minor extent of poor quality foraging and dispersal habitat for the species is unlikely to lead to a long-term decrease in the size of the local or regional population.
Reduce the area of occupancy of the species	Unlikely The proposed clearing of 1.31 ha of the species foraging and dispersal habitat represents a negligible proportion of the species' overall area of occupancy at the local, regional and national scales.

Australian Painted Snipe	
	The Australian Painted Snipe is capable of dispersing over large distances to exploit suitable wetland habitat as it becomes available. As habitat connectivity will be maintained and alternative wetlands remain widespread across the landscape, the Project is unlikely to reduce the area of occupancy of the species.
Fragment an existing population into two or more populations	Unlikely The Project will not introduce physical barriers that would restrict movement between wetland habitats within or surrounding the Project area. The Australian Painted Snipe regularly moves between habitat patches in response to seasonal and episodic rainfall events. Given the species' high mobility and the absence of movement barriers, fragmentation of populations is not anticipated as a result of the Project.
Adversely affect habitat critical to the survival of a species	Unlikely Habitat critical to the survival of the Australian Painted Snipe primarily comprises breeding wetlands characterised by shallow water, exposed mudflats, vegetated margins and sheltered nesting sites, often on small islands (DSEWPac, 2013b). The verified foraging and dispersal habitat within the Survey area would not constitute habitat critical to the survival of the species. However, the verified breeding habitat in the southeastern corner of the Survey area would constitute habitat critical to the survival of the species with it potentially capable of supporting breeding individuals (Figure 11-7). While this is the case, no breeding of this species is known to occur within this wetland. This breeding habitat has been avoided by design of the Disturbance area and is located some 2 km from the Disturbance area. Therefore, the Project avoids impacts to habitat critical to the survival of the species. Accordingly, the Project is unlikely to adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of a population	Unlikely Although breeding habitat for the species occurs within HES wetland in the southeastern corner of the Survey area (Figure 11-7), its limited extent and intermittent nature indicate it is unlikely to support regular or sustained breeding for the species. Also, no breeding of this species is known to occur within this wetland. No impacts to breeding habitat are proposed as part of the Project, and the breeding habitat is some 2 km from the proposed Disturbance area, making indirect impacts unlikely. As a result, the Project was considered unlikely to disrupt the breeding cycle of a population of Australian Painted Snipe.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely While a small area of intermittent foraging and dispersal habitat will be removed (1.31 ha), the scale of habitat loss is minor relative to the availability of similar or better-quality ephemeral wetlands across the surrounding region. The Project will not isolate remaining habitat or reduce overall habitat quality to a degree that would be likely to cause population decline. Threats known to the species include loss and degradation of habitat and predation by Feral Cats* and European Foxes* (DoE, 2026g). The Project will implement management measures to minimise the risk of weed invasion, including the implementation of the Weed and Pest Management Plan (Appendix A1) In addition, generalised impact mitigation for the Project (as described in Section 11.6.4) includes measures for controlling erosion and sedimentation, hydrological changes and air quality impacts, which will mitigate impacts to abiotic factors for this species habitat.

Australian Painted Snipe	
	Given the avoidance of direct impacts on breeding habitat, minimisation of direct impacts on foraging and dispersal habitat and the implementation of appropriate management controls to mitigate indirect effects, the Project is unlikely to decrease the availability or quality of habitat to an extent that would result in a decline of the species.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Unlikely Predation by Feral Cats* and Foxes* is recognised as a potential threat to the Australian Painted Snipe (DSEWPaC, 2013b). The Project has the potential to provide opportunities for vertebrate pest to increase. However, management measures associated with reducing this risk, include maintaining a clean, rubbish-free environment to discourage scavenging and reduce the potential for colonisation by introduced fauna, storing domestic waste in appropriate receptacles and locations, and coordinating pest management with surrounding stakeholders, have been incorporated into the generalised mitigation measures (Section 11.6.4). In addition, monitoring and management of pests, including corrective actions, will be implemented in accordance with the site Weed and Pest Management Plan (Appendix A1). Therefore, the Project is unlikely to increase feral predator abundance or create new pathways for predator incursion beyond existing background levels.
Introduce disease that may cause the species to decline, or	Unlikely Disease is not recognised as a key threatening process for the Australian Painted Snipe (DSEWPaC, 2013b). The Project does not involve activities that would introduce disease vectors or increase disease transmission risk. Accordingly, the Project is unlikely to introduce disease or cause the species to decline through disease-related impacts.
Interfere with the recovery of the species	Unlikely Recovery of the Australian Painted Snipe is primarily dependent on the protection of higher-quality breeding wetlands and the maintenance of landscape-scale wetland availability. As the Project will not impact the HES wetland system, which was verified as breeding habitat for the species, and will only remove a small extent (1.31 ha) of fragmented and poor quality foraging and dispersal habitat, the Project is unlikely to interfere with recovery processes for the species.
Assessment Outcome	The Project is unlikely to result in a significant residual impact on the species , with the Project not likely to meet any of the significant impact criteria

11.7.1.8 Common Greenshank

The Common Greenshank was not recorded during targeted field surveys within the Survey area despite extensive survey effort, including bird plot surveys, area searches surrounding wetlands, camera trapping and habitat suitability assessments.

Foraging and dispersal habitat for the Common Greenshank within the Survey area is limited to a small number of ephemeral wetland features verified as RE11.3.27b, including the HES wetland in the south-eastern corner of the Survey area (but not in the Disturbance area), marshy habitat surrounding a farm dam in the central western portion of the Project area, and scattered ephemeral wetlands and gilgai depressions adjacent to the Isaac River and Cherwell Creek. These habitat areas are generally in poor ecological condition and are likely to provide only short-term foraging opportunities following rainfall events.

As the species does not breed within Australia, no breeding habitat was verified within the Survey area. A total of 31.15 ha of foraging and dispersal habitat was verified within the Survey area (habitat shown in Figure 11-7).

Approximately 1.31 ha of foraging and dispersal habitat for the Common Greenshank will be directly impacted as part of the Project. Habitat critical to the survival of the species has been formally defined as a mosaic of feeding and roosting habitat (DCCEEW, 2024b).

While fragmented foraging and dispersal habitats occur within the Survey area, these are generally of low quality, comprising farm dams and small, intermittent wooded wetlands. The species has only been recorded in the Area of Interest on two occasions historically (1978 and 1999; records shown in Map 14, **Appendix A**). This suggests that the foraging and dispersal habitat verified within the Survey area is not used regularly by the species, if at all.

Also, the wetland habitats are not recognised as nationally or internationally important, and do not support an ecologically significant proportion of the species population (1,100 individuals [1% of the population] and 110 individuals [0.1% of the population]) to be considered critical habitat. Hence, it was considered unlikely that the foraging and dispersal habitat within the Survey area would be considered critical habitat for this species.

Threats to the Common Greenshank include habitat loss, pollution, and disturbance at feeding and roosting sites, largely outside Australia (DCCEEW, 2024b).

The loss of habitat proposed is minor, with no breeding habitat proposed to be impacted, and 1.31 ha of foraging and dispersal habitat that may be used by the species on occasion. This loss of habitat is unlikely to further fragment or degrade high quality breeding and foraging habitat that the species relies on to survive. In addition, the higher quality wetland within the southeastern area of the Survey area has been avoided by design of the Disturbance area.

The Project proposes management measures to reduce the risk of contaminant release, including implementation of erosion and sediment controls, appropriate storage and handling of fuels and chemicals, spill response procedures, and water quality monitoring in accordance with the Project's relevant management plans (see Section 11.6).

Disturbance at key feeding and roosting sites is considered unlikely with the species recorded only one two occasions historically (1978 and 1999; records shown in inset in Figure 11-7). Hence, the verified habitat is unlikely to support key feeding and roosting sites for the species.

Table 67 of Appendix J of **Appendix P** provides an assessment against the significant impact criteria in the *MNES Significant Impact Guidelines 1.1* (DoE, 2013b) and determines whether the Project is likely to have a significant impact on this threatened species.

The Project was considered **unlikely to result in a significant residual impact** to the Common Greenshank due to the avoidance and management measures proposed, and the lack of an important population and critical habitat for the species in the Survey area and Project area.

11.7.1.9 Koala

Large tracts of high-quality breeding habitat along the Isaac River and Cherwell Creek for the Koala has been avoided by design of the Disturbance area. After considering these avoidance measures, approximately 66.81 ha of breeding habitat and 251.22 ha of foraging habitat will be cleared as a result of the Project, comprising a total of 318.03 ha of habitat identified as critical to the species' survival (Figure 11-9).

The National Recovery Plan for the Koala states the threats to Koalas include land use change, climate change, disease, dogs and vehicles (DAWE, 2022b). Based on the known threats to the species, potential

indirect impacts associated with the Project may include climate change, disease, Wild Dogs* and vehicle strikes.

The Project has been designed to avoid and mitigate impacts to the Koala and its habitat where practicable. The proposed avoidance and mitigation measures are described in Section 11.6, with these specifically linked to the threats known to the Koala habitat in Table 68 of Appendix J of **Appendix P**. This table also includes the timing of the proposed mitigation measures, the predicted effectiveness, proposed monitoring and adaptive management, and the relevant statutory reference.

Conservation information relevant to the Koala has been considered in this assessment as follows:

- The Conservation Advice for *Phascolarctos cinereus* (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory (DAWE, 2022a) outlines the reasons for the conservation assessment of the species with regard to the 2022 uplisting of the species and provides information about the Koala, including information in relation to its distribution, biology/ecology, threats and conservation and management actions.
- The *Phascolarctos cinereus* (combined populations of Qld, NSW and the ACT) — Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) SPRAT profile (DoE, 2026e) provides information about the relevant regulatory considerations and links to information available in relation to its listing under the EPBC Act and provides the species distribution.
- The National Recovery Plan for the Koala *Phascolarctos cinereus* (combined populations of Queensland, New South Wales and the Australian Capital Territory; DAWE, 2022b).considers habitat critical to the survival of a species to be the area that the species relies on to halt decline and promote the recovery of the species that can be unambiguously identified. Habitat that is critical to the survival of the Koala has been described in Table 11-9.
- The SPRAT profile lists the threat abatement plan for predation by feral cats (DoE, 2015a) as relevant to the species.
- The following Strategies have also listed relevant actions to recover Australia’s threatened plants, animals and ecological communities:
 - *Australia’s Strategy for Nature 2019–2030 (Commonwealth of Australia, 2019).*
 - *Threatened Species Strategy 2021–2031 (Commonwealth of Australia, 2021).*
 - *Australian Weeds Strategy 2017–2027 (Commonwealth of Australia, 2017b).*
 - *Australian Pest Animal Strategy 2017–2027 (Commonwealth of Australia, 2017a).*
 - *DPI’s Biosecurity Website (DPI, 2023).*

Table 11-27 provides an assessment against the significant impact criteria in the *MNES Significant Impact Guidelines 1.1* (DoE, 2013b) and determines whether the Project is likely to have a significant impact on this threatened species.

Although design and mitigation measures have been considered to reduce and manage impacts to this species, the extent of clearing proposed and the confirmed presence of Koalas within the Project area indicate that **the Project is likely to result in a significant residual impact on Koala habitat** and will require offsets in accordance with EPBC Act requirements.

Table 11-27 Assessment of Significance of Impacts to the Koala

Koala	
Criteria	Response
Lead to a long-term decrease in the size of a population	Unlikely An important population is defined as those that are valued for cultural, social and economic reasons. In Queensland, priority areas are identified as southeast Queensland (TSSC, 2022). Important populations have been defined as State-level important

Koala	
	populations, genetically important populations, climate sensitive populations, and other important populations (TSSC, 2022). One Koala was observed within the Project area during targeted surveys, and historically within the surrounding landscape, with breeding and foraging habitat concentrated along the Isaac River, Cherwell Creek and associated riparian corridors (Figure 11-9). These habitats support foraging, sheltering and dispersal and form part of a broader but increasingly fragmented regional habitat network (Youngentob et al., 2021). The local Koala population meets the following definitions of an important population: • Is considered a genetically important population being a population north of the Clarence River in NSW. The local Koala population does not meet the following definitions of an important population: • Does not meet State-level important population status being outside of the priority areas in Queensland which are identified as southeast Queensland where densities of Koalas are greater than in central Queensland. • Is not considered a climate sensitive population which is defined as those on the western edge of the species range. • The local population would not be considered a source population due to the fragmented landscape in which it is located. As a result, the local population, while not within a priority area, would be considered important genetically. Breeding and foraging habitat for the species has been mapped throughout the Survey area due to the presence of locally important Koala trees or ancillary habitat trees (as defined in Youngentob et al., 2021). However, these habitat areas are degraded due to being isolated and patchy, with habitat for the species fragmented throughout the region. The impact of historical clearing and agriculture is notable throughout the Survey area. Due to this impact, the habitat within the Survey area is not considered unique or important for refuge given its degraded nature. The Project will result in a loss of 66.81 ha of breeding habitat and 251.22 ha of foraging habitat for the Koala. While the Project may disturb Koala individuals if present within the Disturbance area during clearing works, it is anticipated that this would have a short-term impact on their movements only. Interaction with Koalas will be mitigated by implementing the following measures: • Implementing staged clearing so Koalas can disperse on their own accord prior to clearing. • Having a permitted and experienced fauna spotter-catcher undertake pre-clearance surveys within Koala habitat areas to identify presence prior to clearing and supervise clearing works and manage interactions with fauna. • Koalas will be managed in accordance with the <i>Nature Conservation (Koala) Conservation Plan 2017 (Qld)</i>, NC Act, and <i>Nature Conservation (Animals) Regulation 2020 (Qld)</i> as follows: ○ If a Koala is observed within the clearing area, a 30 m buffer of vegetation around the Koala tree, in addition to a corridor of vegetation to the nearest vegetated area will be retained until the Koala moves out of the Project area on its own accord. ○ No felling of any tree that has the potential to fall on or near the tree the Koala is residing in.

Koala	
	- Monitoring the Koala's location and its visible stress levels. If the Koala is appearing visibly stressed and agitated, the clearing front will be moved away from the animal. - Allowing the Koala to self-relocate of its own volition. - Koalas will not to be interfered with unless they have been injured. - Invasive species that are harmful to the species (e.g. Wild Dogs*) will be managed within the easement under a Construction Biosecurity Management Plan. This plan will reduce the risk of predation on Koalas within the easement area. The permanent clearing of 318.03 ha of Koala habitat (consisting of breeding and foraging habitat) within the Disturbance area was considered unlikely to lead to a long term decrease in the size of a population of the species. Connectivity within the Isaac River and Cherwell Creek riparian corridors, where the species has been mostly recorded (Figure 11-9), will be retained, enabling individuals to disperse and self-relocate to the broader landscape. In addition, management measures to be implemented during clearing will reduce the risk of injury and disturbance to individuals within the Disturbance area.
Reduce the area of occupancy of the species	Likely The Koala is found throughout eastern mainland Australia. The species occurs in both urban and rural landscapes and is tolerant of disturbance but is at risk of habitat loss from vegetation clearing. Remnant vegetation within the Survey area provides breeding and foraging habitat for this species. Most of the higher quality Koala habitat within the Survey area forms part of a linear riparian and drainage-line network that facilitates movement between habitat patches. The Project has mostly avoided direct impacts to breeding habitat associated with the Isaac River and Cherwell Creek. The clearing of 318.03 ha of breeding and foraging habitat associated with the Project however will reduce patch size adjacent to these corridors. This habitat loss is likely to reduce the area of occupancy of the species.
Fragment an existing population into two or more populations	Unlikely The Koala is considered highly mobile and known to disperse large distances including across cleared or modified areas. The Project area is surrounded by extensive, albeit fragmented habitat for this species, which will not be impacted by the Project. The riparian habitat of the Isaac River and Cherwell Creek currently provide continuous canopy connectivity that facilitates movement between habitat patches and supports gene flow within the local population. Clearing associated with the Project has largely avoided the riparian corridors of the Isaac River and Cherwell Creek, retaining connectivity of habitat for the species. Where riparian habitat is impacted (e.g. bridge crossings) the species is capable of dispersing through these areas. As a result, it was considered unlikely the Project would fragment the population into two or more populations.
Adversely affect habitat critical to the survival of a species	Likely Habitat critical for the survival of Koalas includes inland Eucalypt forests and woodlands that provide core foraging, shelter and breeding resources (DAWE, 2022b). The verified breeding and foraging habitat within the Survey area meets the definition of habitat critical to survival of the species. The Project will permanently clear 318.03 ha of critical habitat (as shown in Figure 11-9).

Koala	
	The scale and location of this clearing adjacent to connectivity corridors (riparian corridors associated with Isaac River and Cherwell Creek) will materially reduce the availability and integrity of habitat critical to the species' survival at the local scale.
Disrupt the breeding cycle of a population	Unlikely The factors that govern Koala dispersal, breeding and home-ranges include the social relationships between individuals, the size, density, and reproductive health of the population, and the proximity and connection to neighbouring populations (AMBS, 2012). These factors also depend on availability of preferred tree species, tree size, terrain, soil, and the many components of successful water balancing (Moore & Foley, 2005). These factors vary from region to region and from individual to individual, thereby resulting in different patterns of dispersal and home-range features in different areas. Koalas are seasonal breeders, with peak breeding occurring during the warmer months. Koalas can locate each other even at very low population densities as long as connectivity throughout the region is maintained (Moore & Foley, 2005). The removal of breeding and shelter trees within the Disturbance area will reduce the availability of breeding habitat at a local scale. However, substantial areas of breeding habitat along the Isaac River and Cherwell Creek riparian corridors will be retained, maintaining landscape connectivity and access to suitable habitat. Given the retention of key habitat corridors and implementation of mitigation measures to minimise disturbance, the Project is unlikely to disrupt the breeding cycle of the population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely The Project will permanently remove a substantial area of breeding and foraging habitat for the Koala, which includes locally important food trees and ancillary habitat trees required by the species to survive. This will reduce habitat availability, increase isolation of retained habitat patches and may decrease overall habitat quality through edge effects and increased exposure to disturbance. However, the removal of this extent of habitat is not considered likely to result in a decline of the species at the population scale. Habitat connectivity will be retained along the Isaac River and Cherwell Creek riparian corridors, which support movement and dispersal throughout the broader region. These corridors contain substantial areas of remnant vegetation and represent key habitat linkages within the landscape. Retained habitat within the Survey Area is unlikely to be indirectly impacted as a result of the Project, with management measures described in section 11.6 and Table 11-23 implemented to minimise key threats to the species. General impact mitigation measures (refer to Section 11.6.4) will also manage erosion and sedimentation, hydrological changes and air quality impacts, thereby reducing risks to abiotic factors that support Koala habitat. Some areas of verified Koala habitat in the Survey area has been identified as a GDE (Appendix N). The GDE Assessment (Appendix N) determined that, as GDEs demonstrate a reliance on the perched groundwater system rather than the deeper alluvial aquifer, groundwater drawdown associated with the Project or other resource projects (i.e. cumulative drawdown) is unlikely to impact GDEs. Hence, the retained Koala habitat is unlikely to experience a decline in health as a result of changes to groundwater levels. Further monitoring of GDE presence and health, including groundwater usage by the species habitat will be completed as part of the GDEMMP (Appendix AF) and the GDE Habitat Quality Monitoring Program (Appendix AG).

Koala	
	As detailed in Section 11.5.3.5 the Project will result in negligible to minor changes to hydrology, hydraulics and geomorphology (i.e. flood behaviour), and hence would have negligible impacts on retained species habitat. Through avoidance and minimisation of impacts to high-quality habitat along the riparian corridors of Isaac River and Cherwell Creek, retention of landscape connectivity, and the implementation of management measures to reduce the risk of indirect impacts, the Project is not considered likely to modify, destroy, isolate or decrease habitat availability or quality to the extent that the Koala population is likely to decline.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Unlikely The Recovery Plan for this species defines the threats for the species, with the invasive pest species, Wild Dogs*, defined as a threat to the species (DAWE, 2022b). Clearing and disturbance associated with the Project may increase the susceptibility of retained habitat to weed invasion and facilitate increased access by feral predators. While mitigation measures and weed hygiene protocols will be implemented, the increased fragmentation and disturbance may indirectly elevate these risks within remaining Koala habitat. The Project has the potential to provide opportunities for pest species to increase. However, management measures associated with reducing this risk have been incorporated in Table 68 within Appendix J of Appendix P and include maintaining a clean, rubbish-free environment to discourage scavenging and reduce the potential for colonisation by introduced fauna, storing domestic waste in appropriate receptacles and locations, and coordinating pest management with surrounding stakeholders. In addition, monitoring and management of pests, including corrective actions, will be implemented in accordance with the site Weed and Pest Management Plan (Appendix AI). Therefore, the Project is unlikely to increase feral predator abundance or create new pathways for predator incursion beyond existing background levels.
Introduce disease that may cause the species to decline	Unlikely Two diseases are known to affect Koalas: Chlamydia and Koala Retro Virus. Chlamydia can become evident as a result of stress, such as from habitat reduction, while the cause of Koala Retro Virus is unknown but is potentially prevented by managing mortality from other causes, maintaining large population sizes and minimising inbreeding (Vitali et al., 2023). These diseases are likely to be present in the population in the Survey area. The proposed Project is unlikely to cause the introduction of these diseases or other diseases to the population. The Project will result in vegetation clearing and habitat loss which may increase stress on Koalas through displacement, altered movement patterns and increased exposure to threats during construction activities. Elevated stress levels can suppress immune function, potentially increasing susceptibility to disease or trigger the expression of latent infections such as Chlamydia. However, avoidance and minimisation measures have reduced clearing within high quality breeding habitat along the Isaac River and Cherwell Creek, thereby maintaining connectivity of habitat and reducing fragmentation-related stress. Management measures will also be implemented to minimise indirect impacts, and risks of direct injury or mortality during clearing will be mitigated through staged clearing, pre-clearance surveys and the presence of fauna spotter-catchers.

Koala	
	These measures are expected to substantially reduce stress-related impacts associated with habitat disturbance. Accordingly, the Project is unlikely to introduce disease or exacerbate existing disease processes to an extent that would contribute to a population decline.
Interfere with the recovery of the species	Likely The National Recovery Plan for the Koala states the threats to Koalas include land use change, climate change, disease, dogs and vehicles (DAWE, 2022b). Core objectives of the Recovery Plan include stabilising and increasing the area of occupancy and population size of Koalas, and maintaining or improving metapopulation processes, including population connectivity and overall ecosystem health. Habitat within the Project area forms part of a fragmented landscape that supports Koalas at the local and regional scale. The Project will result in the clearing of 318.03 ha of Koala habitat within this landscape, contributing to further habitat loss and fragmentation. While management measures will be implemented to reduce direct mortality and manage interactions with Koalas during construction and operation, the permanent loss of habitat may reduce carrying capacity and further constrain movement between habitat patches. Given the Recovery Plan's emphasis on protecting and expanding habitat and improving landscape connectivity, the Project has the potential to act counter to recovery objectives at a local scale. Accordingly, the Project is likely to interfere with the recovery of the Koala, particularly through its contribution to cumulative habitat loss within an already fragmented landscape.
Assessment Outcome	The Project is likely to result in a significant residual impact on 66.81 ha of breeding habitat and 251.22 ha of foraging habitat for the species . This conclusion is based on the reduction in the area of occupancy of the species, adverse impacts to 318.03 ha of habitat critical to the survival of the species, and the potential to interfere with the recovery of the species.

11.7.1.10 Greater Glider (Southern and Central)

The Greater Glider has been recorded extensively within the Survey area, confirming the importance of the area for the species. Field surveys undertaken in 2024 and 2025 recorded the species on 31 occasions, with detections concentrated within mature eucalypt forest supporting a high density of hollow-bearing trees, particularly along the Isaac River and Cherwell Creek corridors (Figure 11-10). Previous targeted surveys also confirm long-term persistence of the species within the Project area, with eight records in 2018 (DPM Envirosciences, 2018b) and 47 records in 2020 (EcoSM, 2020), likewise concentrated within riparian habitats. Collectively, these data demonstrate the presence of a persistent local population occupying core habitat within the Project footprint.

Large tracts of high-quality breeding habitat along the Isaac River and Cherwell Creek for the Greater Glider has been avoided by design of the Disturbance area. After considering these avoidance measures, approximately 87.26 ha of breeding habitat and 230.76 ha of foraging habitat will be cleared as a result of the Project, comprising a total of 318.02 ha of habitat identified as critical to the species' survival (Figure 11-10).

Habitat critical to the survival of the Greater Glider is broadly defined as large contiguous areas of eucalypt forest containing mature hollow-bearing trees and a diverse range of preferred food species, as well as smaller connected patches that facilitate dispersal (TSSC, 2016d). Within the Disturbance area there is a total of 318.02 ha of critical habitat for the Greater Glider that will be directly impacted by the Project. Also, with all populations of the Greater Glider considered important (TSSC, 2016d), the population verified within the Survey area has been identified as an important population.

Known threats to the Greater Glider include habitat loss, habitat fragmentation, timber harvesting, barbed wire fencing, climate change, hyper-predation by owls, competition from the Sulphur-crested Cockatoo, and predation by introduced species including feral cats and foxes (DCCEEW, 2022b).

The Project has been designed to avoid and mitigate impacts to the Greater Glider and its habitat where practicable. The proposed avoidance and mitigation measures are described in Section 11.6, with these specifically linked to the threats known to the Greater Glider habitat in Table 70 in Appendix J of **Appendix P**. This table also includes the timing of the proposed mitigation measures, the predicted effectiveness, proposed monitoring and adaptive management, and the relevant statutory reference.

Conservation information relevant to the Greater Glider has been considered in this assessment as follows:

- The Conservation Advice for *Petauroides volans* (greater glider (southern and central)) (DCCEEW, 2022b) outlines the reasons for the conservation assessment of the species with regard to the 2022 uplisting of the species and provides information about the Greater Glider, including information in relation to its distribution, biology/ecology, threats and conservation and management actions.
- The *Petauroides volans* — Greater Glider (southern and central) SPRAT profile (DoE, 2026d) provides information about the relevant regulatory considerations and links to information available in relation to its listing under the EPBC Act and provides the species distribution.
- The SPRAT profile indicates there is no adopted or made Recovery Plan for this species; however, a Recovery Plan is required. Stopping decline and supporting recovery is complex, due to the requirement for a high level of planning to abate the threats, a high level of support by key stakeholders, a high level of prioritisation and a highly adaptive management process. Existing mechanisms were considered not adequate to address these needs.
- The SPRAT profile lists the threat abatement plan for predation by feral cats (DoE, 2015a) as relevant to the species.
- The following Strategies have also listed relevant actions to recover Australia’s threatened plants, animals and ecological communities:
 - *Australia’s Strategy for Nature 2019–2030 (Commonwealth of Australia, 2019).*
 - *Threatened Species Strategy 2021–2031 (Commonwealth of Australia, 2021).*
 - *Australian Weeds Strategy 2017–2027 (Commonwealth of Australia, 2017b).*
 - *Australian Pest Animal Strategy 2017–2027 (Commonwealth of Australia, 2017a).*
 - *DPI’s Biosecurity Website (DPI, 2023).*

Table 11-28 provides an assessment against the significant impact criteria in the *MNES Significant Impact Guidelines 1.1* (DoE, 2013b) and determines whether the Project is likely to have a significant impact on this threatened species.

Although design and mitigation measures have been considered in managing impacts, the confirmed presence of a substantial local population and the scale of clearing proposed within critical habitat indicate that the Project is **likely to result in a significant residual impact** to the Greater Glider and will require offsets in accordance with EPBC Act requirements.

Table 11-28 Assessment of Significance of Impacts to the Greater Glider

Greater Glider	
Criteria	Response
Lead to a long-term decrease in the size of a population	Unlikely Important populations of Greater Gliders are considered to be all known populations of the species. A large population of Greater Glider was recorded within the Isaac River within the Project area during field surveys and previous studies (records shown in

Greater Glider	
	Figure 11-10), and as a result, the population would be considered an important population. The Survey area provides denning habitat for the species due to the presence of primary trees with an average tree size of <50cm DBH and some denning hollows available (Eyre et al., 2022). Habitat quality declines with increasing distance from the Isaac River and Cherwell Creek, where vegetation becomes more fragmented due to historical clearing and agricultural activities. These more fragmented areas are likely to provide supplementary foraging habitat, particularly where connected to denning habitat. The Project will permanently clear 318.02 ha (87.26 ha of breeding habitat and 230.76 ha of foraging habitat) of Greater Glider habitat (comprising breeding and foraging habitat) within the Disturbance Area. However, large tracts of higher-quality breeding habitat along the Isaac River and Cherwell Creek riparian corridors have been avoided. Connectivity within these corridors, where the species has most frequently been recorded (Figure 11-10), will be retained, enabling individuals to disperse and relocate within the broader landscape. Linear infrastructure that crosses the riparian habitat of the Isaac River and Cherwell Creek (e.g. bridges and dragline crossings) is not likely to impact on connectivity of habitat for the Greater Glider, particularly given the species ability to glide up to 100 m. In areas where infrastructure such as the dragline crossing and bridges are proposed across the Isaac River and Cherwell Creek, the defined Disturbance area has been conservatively delineated to allow flexibility in final infrastructure placement. However, the full extent of the Disturbance area at these crossings will not be impacted. As a result, after final placement, adequate buffer zones to adjacent riparian habitats will be retained, supporting the maintenance of habitat connectivity for the species. Management measures to be implemented during clearing, including staged clearing and fauna management protocols, will reduce the risk of injury and disturbance to individuals within the Disturbance area. Given the retention of key denning habitat and landscape connectivity, and the broader availability of habitat in the region, the Project is not considered likely to result in a long-term decrease in the size of this important population.
Reduce the area of occupancy of the species	Unlikely The Greater Glider is found throughout eastern mainland Australia, where it requires remnant vegetation comprising suitable large eucalypt species with large hollows (>10cm) for denning. Most of the higher quality Greater Glider habitat within the Survey area forms part of a linear riparian and drainage-line network that facilitates movement between habitat patches. Clearing has mostly avoided direct impacts to breeding habitat associated with the Isaac River and Cherwell Creek. All individuals of the Greater Glider were recorded within the Isaac River and Cherwell Creek riparian corridors during targeted surveys (Figure 11-10). The Disturbance area has largely avoided these corridors, with only minor clearing required to support infrastructure crossings at the Isaac River and Cherwell Creek. Although the Project will clear 318.02 ha of breeding and foraging habitat, the majority of this clearing occurs within more fragmented habitat areas where the species was not recorded during targeted surveys. Accordingly, it was considered unlikely the Project would reduce the area of occupancy of the species.

Greater Glider	
Fragment an existing population into two or more populations	Unlikely The riparian habitat of the Isaac River and Cherwell Creek currently provide continuous canopy connectivity that facilitates movement between habitat patches and supports gene flow within the local population. Clearing associated with the Project has largely avoided the riparian corridors of the Isaac River and Cherwell Creek, retaining connectivity of habitat for the species. Linear infrastructure that crosses the riparian habitat of the Isaac River and Cherwell Creek (e.g. bridge and dragline crossings) is not likely to impact on connectivity of habitat for the Greater Glider, particularly given the species ability to glide up to 100 m. In areas where infrastructure such as the dragline crossing and bridges are proposed across the Isaac River and Cherwell Creek, the defined Disturbance area has been conservatively delineated to allow flexibility in final infrastructure placement. However, the full extent of the Disturbance area at these crossings will not be impacted. As a result, after final placement, adequate buffer zones to adjacent riparian habitats will be retained, supporting the maintenance of habitat connectivity for the species. As a result, it was considered unlikely the Project would fragment the population into two or more populations.
Adversely affect habitat critical to the survival of a species	Likely Habitat critical to the survival of the Greater Glider is broadly defined as large contiguous areas of eucalypt forest containing mature hollow-bearing trees and a diverse range of preferred food species, as well as smaller connected patches that facilitate dispersal (TSSC, 2016d). Within the Disturbance area there is a total of 318.02 ha of critical habitat for the Greater Glider. The scale and location of this clearing adjacent to connectivity corridors (riparian corridors associated with Isaac River and Cherwell Creek) will materially reduce the availability and integrity of habitat critical to the species' survival at the local scale.
Disrupt the breeding cycle of a population	Unlikely Greater Gliders are exclusively arboreal and rely on large tree hollows for breeding and rearing young. Hollow-bearing trees are abundant within the riparian corridors within and surrounding the Project area. The removal of breeding and shelter trees within the Disturbance area will reduce the availability of breeding habitat at a local scale. However, substantial areas of breeding habitat along the Isaac River and Cherwell Creek riparian corridors will be retained, maintaining landscape connectivity and access to suitable habitat. Given the retention of key habitat corridors and implementation of mitigation measures to minimise disturbance, the Project is unlikely to disrupt the breeding cycle of the population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely The Project will permanently remove a substantial area of breeding and foraging habitat for the Greater Glider, which will include hollow-bearing trees required by the species for key life stages. This clearance will reduce habitat availability, increase isolation of retained habitat patches and may decrease overall habitat quality through edge effects and increased exposure to disturbance. However, the removal of this extent of habitat is not considered likely to result in a decline of the species at the population scale.

Greater Glider	
	Linear infrastructure that crosses the riparian habitat of the Isaac River and Cherwell Creek (e.g. bridge and dragline crossings) is not likely to impact on connectivity of habitat for the Greater Glider, particularly given the species ability to glide up to 100 m. In areas where infrastructure such as the dragline crossing and bridges are proposed across the Isaac River and Cherwell Creek, the defined Disturbance area has been conservatively delineated to allow flexibility in final infrastructure placement. However, the full extent of the Disturbance area at these crossings will not be impacted. As a result, after final placement, adequate buffer zones to adjacent riparian habitats will be retained, supporting the maintenance of habitat connectivity for the species. Hence, habitat connectivity will be retained along the Isaac River and Cherwell Creek riparian corridors, which supports movement and dispersal throughout the broader region. These corridors contain substantial areas of remnant vegetation and represent key habitat linkages within the landscape. Retained habitat within the Survey Area is unlikely to be indirectly impacted as a result of the Project, with management measures described in Table 70 within Appendix J of Appendix P implemented to minimise key threats to the species. General impact mitigation measures (refer to Section 11.6.4) will also manage erosion and sedimentation, hydrological changes and air quality impacts, thereby reducing risks to abiotic factors that support Greater Glider habitat. Some areas of verified Greater Glider habitat in the Survey area has been identified as a GDE (Appendix N), and therefore, modifications to groundwater levels may affect the quality of the species' habitat. The GDE assessment (Appendix N) concluded that there will be negligible impacts to GDEs as a result of groundwater drawdown and hence the retained habitat is unlikely to undergo substantial alteration as a result of modifications to groundwater levels. Further monitoring of GDE presence and health, including groundwater usage by the species habitat will be completed as part of the GDEMMP (Appendix AF) and the GDE Habitat Quality Monitoring Program (Appendix AG). As detailed in Section 11.5.3.5, the Project will result in negligible to minor changes to hydrology, hydraulics and geomorphology (i.e. flood behaviour), and hence would have negligible impacts on retained species habitat. Through avoidance and minimisation of impacts to high-quality habitat along the riparian corridors of Isaac River and Cherwell Creek, retention of landscape connectivity, and the implementation of management measures to reduce the risk of indirect impacts, the Project is not considered likely to modify, destroy, isolate or decrease habitat availability or quality to the extent that the Greater Glider population is likely to decline.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Unlikely There is no recovery plan for this species. However, the threats from invasive species such as Feral Cats* and Foxes* have been defined as a threat to the species (TSSC, 2016d). Clearing and disturbance associated with the Project may increase the susceptibility of retained habitat to weed invasion and facilitate increased access by feral predators. While mitigation measures and weed hygiene protocols will be implemented, the increased fragmentation and disturbance may indirectly elevate these risks within remaining Greater Glider habitat. The Project has the potential to provide opportunities for pest species to increase, However, management measures have been proposed to reduce this risk and include maintaining a clean, rubbish-free environment to discourage scavenging and reduce the potential for colonisation by introduced fauna, storing domestic waste in appropriate

Greater Glider	
	receptacles and locations, and coordinating pest management with surrounding stakeholders. In addition, monitoring and management of pests, including corrective actions, will be implemented in accordance with the site Weed and Pest Management Plan (Appendix AI). Therefore, the Project is unlikely to increase feral predator abundance or create new pathways for predator incursion beyond existing background levels.
Introduce disease that may cause the species to decline, or	Unlikely The only reported disease for the Greater Glider is Chlamydia (Bodetti et al., 2003) but it is not recognised as a key threatening process for the species. Chlamydia can become evident as a result of stress, such as from habitat reduction but it appears not to be debilitating for the species (Bodetti et al., 2003). Management measures will also be implemented to minimise indirect impacts, and risks of direct injury or mortality during clearing will be mitigated through staged clearing, pre-clearance surveys and the presence of fauna spotter-catchers. These measures are expected to substantially reduce stress-related impacts associated with habitat disturbance. Accordingly, the Project is unlikely to introduce disease or exacerbate existing disease processes to an extent that would contribute to a population decline.
Interfere with the recovery of the species	Likely There is no recovery plan for this species. However, the threats include habitat loss, habitat fragmentation, timber harvesting, barbed wire fencing, climate change, hyper-predation by owls, competition from the Sulphur-crested Cockatoo, and predation by introduced species including Feral Cats* and Foxes* (TSSC, 2016d). Recovery objectives focus on protecting mature forest, retaining hollow-bearing trees, maintaining landscape connectivity and reducing invasive species threats. The Project will permanently remove critical habitat, and further fragment habitat within an already modified regional landscape. These outcomes are inconsistent with recovery objectives and are likely to hinder long-term population stabilisation and recovery.
Assessment Outcome	The Project is likely to result in a significant residual impact on 87.26 ha of breeding habitat and 230.76 ha of foraging habitat for the species. This conclusion is based on adverse impacts to 318.02 ha of habitat critical to the survival of the species, and the potential to interfere with the recovery of the species.

11.7.1.11 *Dichanthium setosum*, Bluegrass

Dichanthium setosum was not recorded during targeted field surveys within the Project area, despite random meander surveys undertaken throughout suitable native tussock grassland habitat during the species' flowering period. No historical records are known from within the Project area. However, records occur within the broader locality, including approximately 45 km south of the Project area at Saraji East Mining Lease (AECOM, 2024) and a further record 5 km to the west based on WildNet data (Map 8, Appendix A within **Appendix P**). These records indicate the species occurs within the broader regional landscape.

Suitable habitat for *Dichanthium setosum* within the Project area is restricted to the native tussock grassland communities occurring on black cracking clay soils. These habitat areas are limited in extent and form part of a fragmented grassland landscape that has been extensively modified by historical agricultural and mining activities.

One large patch of suitable habitat for the species was verified within the Survey area (Figure 11-5). The ecological community occupies approximately 38.33 ha within the Project area and 200.72 ha within the Survey area. The Disturbance area has been designed to avoid direct impacts to this species habitat.

The main identified threats to *Dichanthium setosum* are heavy grazing by domestic stock, loss of habitat through clearing for pasture improvement and cropping, frequent fires, especially regular burning for agricultural purposes, invasion by introduced grasses, such as *Hyparrhenia hirta* (Coolatai Grass)*, *Phyla canescens* (Lippia)* and *Eragrostis curvula* (African Lovegrass)*; and road widening (DEWHA, 2008).

The Project does not propose vegetation clearing within the verified patch of habitat for the species, is unlikely to increase grazing pressure and is not a cultivation or crop production development nor includes road widening. While the proposed disturbance may marginally increase edge effects on the retained patch, the Project is not expected to create conditions conducive to increased weed incursion. Weed monitoring and control will be undertaken in accordance with the Project's Weed and Pest Management Plan (**Appendix AI**). The Project will also implement appropriate bushfire management through its Bushfire Management Plan (**Appendix AJ**).

On the basis of these avoidance and management measures, additional species-specific mitigation measures for *Dichanthium setosum* were not considered necessary.

Table 72 of Appendix J of **Appendix P** provides an assessment against the significant impact criteria in the *MNES Significant Impact Guidelines 1.1* (DoE, 2013b) and determines whether the Project is likely to have a significant impact on this threatened species.

Design and mitigation measures have been considered and given the absence of confirmed populations within the Project area, the limited extent of suitable habitat present, and the avoidance of direct impacts to the species verified habitat, the Project was considered **unlikely to result in a significant residual impact** to *Dichanthium setosum*.

11.7.1.12 Squatter Pigeon

The Squatter Pigeon was recorded multiple times within the Project area during dry and wet season surveys, with 37 observations recorded primarily in association with riparian corridors, farm dams and water troughs. Historical records also confirm the species' presence within the Project area and surrounding landscape. Vegetation communities within the Project area provide breeding, foraging and dispersal habitat for the species, particularly along the Isaac River, Cherwell Creek and Conrock Gully, although habitat in the central portions of the Project area has been substantially reduced due to historical agricultural clearing.

Approximately 308.48 ha of breeding habitat, 14.58 ha of foraging habitat, and 11.09 ha of dispersal habitat will be cleared as part of the Project. Habitat critical to the survival of the species occurs within these areas, particularly along riparian corridors and around semi-permanent waterbodies where grassy woodland habitats support essential breeding and foraging resources (Figure 11-6).

Known threats to the Squatter Pigeon include habitat loss and fragmentation, degradation of habitat by overgrazing and invasive weeds such as Buffel Grass, and pest animals (TSSC, 2015b).

The Project has been designed to avoid and mitigate impacts to the Squatter Pigeon and its habitat where practicable. The proposed avoidance and mitigation measures are described in Section 11.6, with these specifically linked to the threats known to the Squatter Pigeon habitat in Table 73 in Appendix J of **Appendix P**. This table also includes the timing of the proposed mitigation measures, the predicted effectiveness, proposed monitoring and adaptive management, and the relevant statutory reference.

Conservation information relevant to the Squatter Pigeon has been considered in this assessment as follows:

- The Conservation Advice *Geophaps scripta scripta* squatter pigeon (southern) (TSSC, 2015b) includes information in relation to its distribution, biology/ecology, threats and conservation and management actions.
- The *Geophaps scripta scripta* — Squatter Pigeon (southern) SPRAT profile (DoE, 2026c) provides information about the relevant regulatory considerations and links to information available in relation to its listing under the EPBC Act and provides the species distribution.
- The SPRAT profile (DoE, 2026c) indicates there is no adopted or made Recovery Plan for this species and no recovery plan is required as the approved Conservation Advice is an effective, efficient, and responsive document to guide the implementation of priority management actions, mitigate key threats, and support the recovery of this EPBC Act listed species
- The SPRAT profile (DoE, 2026c) lists the following threat abatement plans as relevant to the species:
 - *Threat abatement plan for predation by feral cats* (DoE, 2015a);
 - *Threat abatement plan for competition and land degradation by rabbits* (DEWHA, 2008a);
 - *Threat abatement plan for predation by European red fox* (DEWHA, 2008d).
- The following Strategies have also listed relevant actions to recover Australia’s threatened plants, animals and ecological communities:
 - *Australia’s Strategy for Nature 2019–2030* (Commonwealth of Australia, 2019).
 - *Threatened Species Strategy 2021–2031* (Commonwealth of Australia, 2021).
 - *Australian Weeds Strategy 2017–2027* (Commonwealth of Australia, 2017b).
 - *Australian Pest Animal Strategy 2017–2027* (Commonwealth of Australia, 2017a).
 - *DPI’s Biosecurity Website* (DPI, 2023).

Table 11-29 provides an assessment against the significant impact criteria in the *MNES Significant Impact Guidelines 1.1* (DoE, 2013b) and determines whether the Project is likely to have a significant impact on this threatened species.

Although design and mitigation measures have been considered, the confirmed presence of the species within the Project area, the reliance of breeding habitat on proximity to water, and the scale of clearing proposed within habitats supporting key life-cycle stages indicate that the Project is **likely to result in a significant residual impact** to the Squatter Pigeon and will require offsets in accordance with EPBC Act requirements.

Table 11-29 Assessment of Significance of Impacts to the Squatter Pigeon

Squatter Pigeon	
Criteria	Response
Lead to a long-term decrease in the size of an important population of the species	Unlikely Squatter Pigeons inhabit open forests and sparse woodlands with a native grass understorey, which they rely on for foraging. Their habitat suitability varies with proximity to water sources. The Squatter Pigeon was recorded multiple times within the Project area and adjacent areas during field surveys (Figure 11-6), with 37 observations recorded across dry and wet season survey events, primarily associated with riparian corridors, farm dams and water troughs. Historical records also confirm the presence of the species within the Project area and surrounding landscape. An important population for the Squatter Pigeon is defined as the southern boundary of its known distribution (southern Queensland; Squatter Pigeon Workshop, 2011). The population within the Survey area, due to its location, would not be considered an important population for the Squatter Pigeon. As a result, the Project will not lead to a long-term decrease in the size of an important population of the species.

Squatter Pigeon	
Reduce the area of occupancy of an important population	Unlikely An important population for the species does not occur within the Project area, based on the important population definition provided by the Squatter Pigeon Workshop (2011). Hence, the Project will not reduce the area of occupancy of an important population.
Fragment an existing important population into two or more populations	Unlikely The local population of Squatter Pigeon is not considered to be an important population. Hence, the Project is not expected to fragment an existing important population into two or more populations.
Adversely affect habitat critical to the survival of a species	Likely Although habitat critical to the survival of this species has not been formally defined, the habitat within the Project area could potentially be considered critical. This is due to its utilisation for key life stages including foraging, breeding, roosting, and dispersal. Much of the surrounding region has already been cleared for agriculture, contributing to significant habitat loss and fragmentation, an identified key threat to the species (TSSC, 2015b). Given this context, the breeding, foraging and dispersal habitats within the Disturbance area may be critical to the species' ongoing survival in the region. The Survey area contains breeding, foraging and dispersal habitat for the species, particularly within riparian corridors along the Isaac River, Cherwell Creek and Conrock Gully, and within wet and dry eucalypt woodland communities (Figure 11-6). Approximately 308.48 ha of breeding habitat, 14.58 ha of foraging habitat and 11.09 ha of dispersal habitat will be cleared as a result of the Project. This represents a substantial reduction in habitat that is critical to the species survival. As a result, given the confirmed presence of the species and the scale of habitat loss proposed, the Project is likely to adversely affect habitat critical to the survival of a species.
Disrupt the breeding cycle of an important population	Unlikely Squatter Pigeons require suitable open forest habitat with an abundance of tussocking native grasses, in close proximity to a water source in order to breed. This breeding habitat is near watercourses and wetlands within the Survey area. The Conservation Advice for the species defines important populations for this species to include those in relatively small, isolated and sparsely distributed sub-populations to the south of the Carnarvon Ranges in central Queensland, due to the contraction of the southern boundary of the species distribution (TSSC, 2015b). The population within the Project area therefore is not considered an important population for the species. The Project is therefore likely to disrupt breeding activity for the local population through direct habitat loss and increased disturbance.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely The Project will permanently remove a substantial area of breeding, foraging and dispersal habitat for the Squatter Pigeon. This will reduce habitat availability, increase isolation of retained habitat patches and may decrease overall habitat quality through edge effects and increased exposure to disturbance. However, the removal of this extent of habitat is not considered likely to result in a decline of the species at the population scale. Habitat connectivity will be retained along the Isaac River and Cherwell Creek riparian corridors, which support movement and dispersal throughout the broader region. These corridors contain substantial areas of remnant vegetation and represent key habitat linkages within the landscape.

Squatter Pigeon	
	Retained habitat within the Survey Area is unlikely to be indirectly impacted as a result of the Project, with management measures described in Table 73 within Appendix J of Appendix P implemented to minimise key threats to the species. General impact mitigation measures (refer to Section 11.6.4) will also manage erosion and sedimentation, hydrological changes and air quality impacts, thereby reducing risks to abiotic factors that support Squatter Pigeon habitat. Some areas of verified Squatter Pigeon habitat in the Survey area has been identified as a GDE (Appendix N). The GDE Assessment (Appendix N) determined that, as GDEs demonstrate a reliance on the perched groundwater system rather than the deeper alluvial aquifer, groundwater drawdown associated with the Project or other resource projects (i.e. cumulative drawdown) is unlikely to impact GDEs. Hence the retained Squatter Pigeon habitat is unlikely to experience a decline in health as a result of changes to groundwater levels. Further monitoring of GDE presence and health, including groundwater usage by the species habitat will be completed as part of the GDEMMP (Appendix AF) and GDE Habitat Quality Monitoring Program Appendix AG). As detailed in Section 11.5.3.5, the Project will result in negligible to minor changes to hydrology, hydraulics and geomorphology (i.e. flood behaviour), and hence would have negligible impacts on retained species habitat. Through avoidance and minimisation of impacts to high-quality habitat along the riparian corridors of Isaac River and Cherwell Creek, retention of landscape connectivity, and the implementation of management measures to reduce the risk of indirect impacts, the Project is not considered likely to modify, destroy, isolate or decrease habitat availability or quality to the extent that the Squatter Pigeon population is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Unlikely Invasive species recognised as a key threat to the species include <i>Cenchrus ciliaris</i>* and pest animals (TSSC, 2015b). Vegetation clearing and the creation of new access corridors may increase predator access to retained habitat and reduce refuge availability for the species. Disturbance may also facilitate weed establishment, further degrading habitat quality. These indirect effects are likely to exacerbate existing threats to the species. Clearing and disturbance associated with the Project may increase the susceptibility of retained habitat to weed invasion and facilitate increased access by feral predators. While mitigation measures and weed hygiene protocols will be implemented, the increased fragmentation and disturbance may indirectly elevate these risks within remaining Squatter Pigeon habitat. The Project has the potential to provide opportunities for pest species to increase. However, management measures associated with reducing this risk have been incorporated in Table 73 in Appendix J of Appendix P and include maintaining a clean, rubbish-free environment to discourage scavenging and reduce the potential for colonisation by introduced fauna, storing domestic waste in appropriate receptacles and locations, and coordinating pest management with surrounding stakeholders. In addition, monitoring and management of pests, including corrective actions, will be implemented in accordance with the site Weed and Pest Management Plan (Appendix AI). Therefore, the Project is unlikely to increase feral predator abundance or create new pathways for predator incursion beyond existing background levels.

Squatter Pigeon	
Introduce disease that may cause the species to decline	Unlikely There are no known diseases for this species.
Interfere substantially with the recovery of the species	Unlikely There is no recovery plan for this species. However, the threats include habitat loss and fragmentation, degradation of habitat by overgrazing and invasive weeds such as Buffel Grass, and pest animals (TSSC, 2015b). Priority conservation and management actions include the identification of sub-populations of high conservation priority, development of conservation agreements and control of feral herbivores (TSSC, 2015b). The Project is unlikely to interfere with these recovery objectives, and hence will not substantially hinder long-term population stabilisation and recovery.
Assessment Outcome	The Project is likely to result in a significant residual impact on 308.48 ha of breeding habitat, 14.58 ha of foraging habitat, and 11.09 ha of dispersal habitat for the species. This conclusion is based on adverse impacts to 334.15 ha of habitat critical to the survival of the species.

11.7.1.13 Sharp-tailed Sandpiper

The Sharp-tailed Sandpiper was not recorded during targeted field surveys within the Project area despite extensive survey effort. Historical records occur within the Area of Interest, including a record north of the Project area prior to 2018 (Figure 11-7), indicating historical use of wetland habitats in the broader locality.

Foraging and dispersal habitat within the Project area is limited to a small number of ephemeral wetland features verified as RE 11.3.27b, including a HES wetland in the south-eastern corner of the Project area, marshy habitat surrounding a farm dam in the central western portion of the Project area, and scattered ephemeral wooded wetlands and gilgai depressions adjacent to the Isaac River and Cherwell Creek. These habitat areas are generally in poor ecological condition and are likely to provide only short-term foraging opportunities following rainfall events.

As the species does not breed within Australia, no breeding habitat was verified within the Survey area. A total of 31.15 ha of foraging and dispersal habitat was verified within the Survey area (habitat shown in Figure 11-7). While fragmented foraging and dispersal habitats occur within the Survey area, these are generally of low quality, comprising farm dams and small, intermittent wooded wetlands.

Approximately 1.31 ha of foraging habitat for the Sharp-tailed Sandpiper will be cleared as part of the Project. Habitat critical to the survival of the species has not been formally defined for the Sharp-tailed Sandpiper.

Important habitat for migratory shorebirds under the EPBC Act includes wetlands recognised as nationally or internationally important. Wetland habitat is considered internationally important if it regularly supports 1% of the population (an ecologically significant proportion; 850 individuals for the Sharp-tailed Sandpiper; BirdLife Australia, 2020) or a total abundance of at least 20,000 waterbirds. Wetland habitat is considered nationally important if it regularly supports 0.1% of the flyway population of a single migratory shorebird species (85 individuals for the Sharp-tailed Sandpiper), or 2,000 migratory shorebirds, or 15 migratory shorebird species (BirdLife Australia, 2020). All wetlands meeting these thresholds are considered important habitat for the species.

The wetland habitat available within the Survey area would not support an ecologically significant proportion of the population (≥ 850 individuals nationally or ≥ 85 individuals regionally), and hence important habitat for the species does not occur within the Survey area.

Threats to the Sharp-tailed Sandpiper include increasing frequency and severity of drought which is expected to be amplified by climate change, pollution from domestic, industrial and aquaculture discharges, oil and pesticides; hunting; and incidental drowning in fishing nets and traps (DCCEEW, 2024a).

The Project is unlikely to increase the severity of drought and does not involve hunting or fishing. The Project proposes management measures to reduce the risk of contaminant release, including implementation of erosion and sediment controls, appropriate storage and handling of fuels and chemicals, spill response procedures, and water quality monitoring in accordance with the Project's relevant management plans.

On the basis of these avoidance and management measures, additional species-specific mitigation measures for the Sharp-tailed Sandpiper were not considered necessary.

Table 75 of Appendix J of **Appendix P** provides an assessment against the significant impact criteria in the *MNES Significant Impact Guidelines 1.1* (DoE, 2013b) and determines whether the Project is likely to have a significant impact on this threatened species.

Design and mitigation measures have been considered, with no known substantial local population and the scale of minor clearing proposed, it was considered **unlikely the Project would result in a significant residual impact** to Sharp-tailed Sandpiper.

11.7.1.14 Ornamental Snake

The Ornamental Snake was not recorded during targeted surveys within the Project area. However, the species was previously recorded within the Project area in 2020, and multiple records occur within the surrounding landscape, including at nearby mining developments (Figure 11-12). Breeding, foraging and dispersal habitat has been verified within the Project area, primarily within fragmented Brigalow and Coolabah communities associated with gilgai systems along Conrock Gully and adjacent to ephemeral wetlands and the Isaac River. Habitat connectivity within the Project area is highly fragmented, limiting dispersal opportunities and population viability.

Approximately 56.22 ha of breeding habitat, 19.75 ha of foraging, and 5.08 ha of dispersal habitat will be directly impacted as part of the Project.

Important habitat for the species has been identified as gilgai depressions and mounds and associated connected clay soil systems. Suitable habitat for the Ornamental Snake is considered important if it is habitat where the species has been identified during a survey, near the limit of the species' known range, large patches of contiguous, suitable habitat and viable landscape corridors (necessary for the purposes of breeding, dispersal or maintaining the genetic diversity of the species over successive generations) or a habitat type where the species is identified during a survey, but which was previously thought not to support the species.

With the Ornamental Snake being recorded on one occasion within the Survey area, important habitat was considered to occur within breeding and foraging habitat areas within the Survey area (Figure 11-12). The area of important habitat within the Disturbance area is 75.97 ha, comprising 56.22 ha of breeding and 19.75 ha of foraging habitat.

The Commonwealth considers that an occurrence of important habitat for the Ornamental Snake is a surrogate for an 'important population' of the species. Hence, an important population occurs within the Survey area.

Known threats to the Ornamental Snake include land clearing and habitat degradation, destruction of wetland habitat by Feral Pigs* and potentially poisoning from Cane Toads* (DoE, 2014a).

The Project has been designed to avoid and mitigate impacts to the Ornamental Snake and its habitat where practicable. The proposed avoidance and mitigation measures are described in Section 11.6, with these specifically linked to the threats known to the Ornamental Snake habitat in Table 76 in Appendix J

of **Appendix P**. This table also includes the timing of the proposed mitigation measures, the predicted effectiveness, proposed monitoring and adaptive management, and the relevant statutory reference.

Conservation information relevant to the Ornamental Snake has been considered in this assessment as follows:

- The Approved Conservation Advice for *Denisonia maculata* (Ornamental Snake; DoE, 2014a) includes information in relation to its distribution, biology/ecology, threats and conservation and management actions.
- The *Denisonia maculata* — Ornamental Snake SPRAT profile (DoE, 2026b) provides information about the relevant regulatory considerations and links to information available in relation to its listing under the EPBC Act and provides the species distribution.
- The SPRAT profile (DoE, 2026b) indicates there is no adopted or made Recovery Plan for this species as the approved Conservation Advice is an effective, efficient, and responsive document to guide the implementation of priority management actions, mitigate key threats, and support the recovery of this EPBC Act listed species.
- The SPRAT profile (DoE, 2026b) lists there are no threat abatement plans relevant to the species (DoE, 2026b).
- The following Strategies have also listed relevant actions to recover Australia’s threatened plants, animals and ecological communities:
 - *Australia’s Strategy for Nature 2019–2030 (Commonwealth of Australia, 2019).*
 - *Threatened Species Strategy 2021–2031 (Commonwealth of Australia, 2021).*
 - *Australian Weeds Strategy 2017–2027 (Commonwealth of Australia, 2017b).*
 - *Australian Pest Animal Strategy 2017–2027 (Commonwealth of Australia, 2017a).*
 - *DPI’s Biosecurity Website (DPI, 2023).*

Table 11-30 provides an assessment against the significant impact criteria in the *MNES Significant Impact Guidelines 1.1* (DoE, 2013b) and determines whether the Project is likely to have a significant impact on this threatened species.

Although design and mitigation measures have been considered, the scale of clearing proposed within important habitat and the fragmented nature of remaining suitable habitat indicates that the Project **would likely to result in a significant residual impact** to the Ornamental Snake and will require offsets in accordance with EPBC Act requirements.

Table 11-30 Assessment of Significance of Impacts to Ornamental Snake

Ornamental Snake	
Criteria	Response
Lead to a long-term decrease in the size of an important population of the species	Likely The Ornamental Snake prefers habitat that is close to its prey, which are frogs. Therefore, it generally prefers moist woodlands and open forests, particularly with gilgais or near wetlands. It is found in habitat with deep cracking clay soils, particularly in Brigalow communities. Areas of Brigalow on clay based or loamy land zones (i.e. land zone 4 and 5) within the Project area provide suitable habitat for this species. Areas of Brigalow and Coolabah vegetation occurring on clay-based land zones within the Project area provide suitable breeding and foraging habitat for this species, including vegetation communities consistent with RE11.3.3, 11.4.8 and 11.4.9 (Figure 11-12). Habitat critical to the species’ survival has not been formally defined. However, important habitat includes gilgai depressions and mounds, and habitat connectivity between gilgais and other suitable habitats is important (DCCEE, 2023b). Also, as

Ornamental Snake	
	detection rates for the Ornamental Snake are typically low and population data remain limited, important habitat is considered a reliable surrogate for important populations. Breeding and foraging habitat for this species is considered important if it is habitat where the species has been identified during a survey; near the limit of the species' known range; large patches of contiguous, suitable habitat and viable landscape corridors (necessary for the purposes of breeding, dispersal or maintaining the genetic diversity of the species over successive generations); or habitat type where the species is identified during a survey but was previously thought not to support the species (DCCEEW, 2023b). This species was not recorded within the Project area during field surveys conducted by Trend Environmental. However, the species has been recorded historically in the Project area (record by EcoSM in 2020 shown in Figure 11-12). As some of the verified habitat within the Survey area was considered important and with habitat being a surrogate for important populations, the population present would also be considered important. Approximately 56.22 ha of breeding habitat, 19.75 ha of foraging habitat, and 5.08 ha of dispersal habitat will be cleared as part of the Project, of which 75.97 ha of this habitat was considered important habitat for the species. The Department's draft threshold for a high likelihood of significant impact to the Ornamental Snake is ≥ 2 ha of important habitat (DCCEEW, 2023b). Given 75.97 ha of important habitat will be cleared as a result of the Project, it was considered likely the Project will have a significant impact on the Ornamental Snake and potentially lead to a long-term decrease in the size of an important population of the species.
Reduce the area of occupancy of an important population	Unlikely The Ornamental Snake has previously been recorded within the Project area (EcoSM, 2020), and therefore, the habitat adjacent to the species record would be considered important. With habitat being a surrogate for important populations, the population present would also be considered important. The removal of approximately 75.97 ha of important habitat will likely result in a minor reduction in the area of occupancy of this important population. This reduction is minor in the context of already fragmented habitat within the Survey area. The extent of impact is unlikely to constrain population persistence or impede movement, with individuals likely to disperse into adjacent suitable habitat within the Survey Area.
Fragment an existing important population into two or more populations	Unlikely Given the confirmed record within the Survey area in 2020 by EcoSM, and the presence of verified habitat within the Project area is considered important. Accordingly, the local population is considered an important population. Habitat for the species within the Project Area is already highly fragmented due to historical vegetation clearing and land use change. Remaining habitat is largely confined to small, disconnected patches associated with gilgai-bearing clay plains, wetlands and drainage features. The Project will result in a minor additional loss of these already fragmented gilgai habitats. However, it will not introduce new linear barriers or isolate retained habitat patches in a manner that would prevent dispersal between remaining habitat areas. Connectivity among retained patches will be maintained, and movement pathways will remain available within the broader landscape. Accordingly, the Project is unlikely to fragment the existing important population into two or more populations.

Ornamental Snake	
Adversely affect habitat critical to the survival of a species	Likely Habitat critical to the species' survival has not been formally defined. However, important habitat includes gilgai depressions and mounds, and habitat connectivity between gilgais and other suitable habitats is important (DCCEEW, 2023b). Also, as detection rates for the Ornamental Snake are typically low and population data remain limited, important habitat is considered a reliable surrogate for important populations. Breeding and foraging habitat for this species is considered important if it is habitat where the species has been identified during a survey; near the limit of the species' known range; large patches of contiguous, suitable habitat and viable landscape corridors (necessary for the purposes of breeding, dispersal or maintaining the genetic diversity of the species over successive generations); or habitat type where the species is identified during a survey but was previously thought not to support the species (DCCEEW, 2023b). This species was not recorded within the Project area during field surveys conducted by Trend Environmental. However, the species has been recorded historically in the Project area (record by EcoSM in 2020 shown in Figure 11-12). As some of the verified habitat within the Survey area was considered important and with habitat being a surrogate for important populations, the population present would also be considered important. Approximately 56.22 ha of breeding habitat, 19.75 ha of foraging habitat, and 5.08 ha of dispersal habitat will be cleared as part of the Project, of which 75.97 ha of this habitat was considered important habitat for the species. The clearing of 75.97 ha of important habitat is likely to adversely affect the important habitat for the species.
Disrupt the breeding cycle of an important population	Unlikely Breeding habitat for the Ornamental Snake occurs within Brigalow and Coolabah communities associated with gilgai formations and wetlands. These habitats occur within the Project area and will be partially removed by the proposed clearing. The Project will result in a minor additional loss of these already fragmented gilgai habitats. However, substantial areas of breeding habitat for the species occurs within the Survey area which will be retained, maintaining landscape connectivity and access to suitable habitat. Given the retention of connectivity with other habitats and the implementation of mitigation measures to minimise indirect disturbance, the Project is unlikely to disrupt the breeding cycle of the population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely The Project will permanently remove breeding and foraging habitat for the Ornamental Snake, which includes gilgai microhabitat required by the species to survive. This disturbance will reduce habitat availability, increase isolation of retained habitat patches and may decrease overall habitat quality through edge effects and increased exposure to disturbance. However, the removal of this extent of habitat is not considered likely to result in a decline of the species at the population scale. Habitat connectivity will be retained within the Survey area, which support movement and dispersal of the species. Retained habitat within the Survey Area is unlikely to be indirectly impacted as a result of the Project, with management measures described in Section 11.6, implemented to minimise key threats to the species. General impact mitigation measures (refer to section 11.6.4) will also manage erosion and sedimentation, hydrological changes and

Ornamental Snake	
	air quality impacts, thereby reducing risks to abiotic factors that support Ornamental Snake habitat. Some areas of verified Ornamental Snake habitat in the Survey area has been identified as a GDE (Appendix N). The GDE Assessment (Appendix N) determined that, as GDEs demonstrate a reliance on the perched groundwater system rather than the deeper alluvial aquifer, groundwater drawdown associated with the Project or other resource projects (i.e. cumulative drawdown) is unlikely to impact GDEs. Hence the retained Ornamental Snake habitat is unlikely to experience a decline in health as a result of changes to groundwater levels. Further monitoring of GDE presence and health, including groundwater usage by the species habitat will be completed as part of the GDEMMP (Appendix AF) and GDE Habitat Quality Monitoring Program (Appendix AG). As detailed in Section 11.5.3.5, the Project will result in negligible to minor changes to hydrology, hydraulics and geomorphology (i.e. flood behaviour), and hence would have negligible impacts on retained species habitat. Through avoidance and minimisation of impacts to the species habitat, retention of landscape connectivity, and the implementation of management measures to reduce the risk of indirect impacts, the Project is not considered likely to modify, destroy, isolate or decrease habitat availability or quality to the extent that the Ornamental Snake population is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Unlikely Feral Pigs* and Cane Toads* are recognised as key threats to this species (DoE, 2014a). The Project has the potential to provide opportunities for pest species to increase. However, management measures associated with reducing this risk have been incorporated in Table 76 in Appendix J of Appendix P and include maintaining a clean, rubbish-free environment to discourage scavenging and reduce the potential for colonisation by introduced fauna, storing domestic waste in appropriate receptacles and locations, and coordinating pest management with surrounding stakeholders. In addition, monitoring and management of pests, including corrective actions, will be implemented in accordance with the site Weed and Pest Management Plan (Appendix AI). Therefore, the Project is unlikely to increase feral predator abundance or create new pathways for predator incursion beyond existing background levels.
Introduce disease that may cause the species to decline	Unlikely There are no known diseases for this species.
Interfere substantially with the recovery of the species	Unlikely There is no recovery plan for this species. However, the threats include land clearing and habitat degradation, destruction of wetland habitat by Feral Pigs* and potentially poisoning from Cane Toads* (DoE, 2014a). The Project will result in the permanent removal of important habitat and will further fragment habitat within an already modified regional landscape. These impacts are not consistent with general recovery objectives for the species, given the small population size and the existing level of habitat fragmentation within the Survey Area, the extent of clearing is unlikely to significantly hinder long-term population stabilisation or recovery to the species. Overall, the Project is unlikely to exacerbate existing threats to a degree that would substantially interfere with the species' capacity to recover at a regional scale.

Ornamental Snake	
Assessment Outcome	The Project is likely to result in a significant residual impact on 75.97 ha of important habitat for the species . This conclusion is based on adverse impacts to important habitat

11.7.1.15 Fork-tailed Swift

The Project will disturb approximately 332.72 ha of foraging and dispersal habitat for the Fork-tailed Swift (Figure 11-8). There is no recovery plan for this species, and no significant threats to this species has been listed. Potential threats include habitat destruction and predation by feral animals, but due to the wide home range of the species, the potential impacts are thought to be negligible (BirdLife Australia, 2019).

Table 11-31 provides an assessment against the significant impact criteria in the *MNES Significant Impact Guidelines 1.1* (DoE, 2013b) and determines whether the Project is likely to have a significant impact on this migratory species.

The Project was considered **unlikely to result in a significant residual impact** to the Fork-tailed Swift due to the avoidance and management measures proposed, and the lack of an important population and critical habitat for the species in the Project area.

Table 11-31 Assessment of Significance of Impacts to the Fork-tailed Swift

Fork-tailed Swift	
Criteria	Response
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Unlikely The Fork-tailed Swift is a migratory bird species, that is a non-breeding visitor to Australia. The species is almost exclusively aerial. Its habitat is widespread, occurring over inland plains, and in coastal areas and it also frequently inhabits urban environments. Therefore, the species has a very large home range, utilising timbered and sparse habitats for foraging over. This species was not observed within the Project area during field surveys. However, given the species widespread distribution, it could not be discounted that the remnant REs within the Project area provide suitable foraging and dispersal habitat for the species and provides dispersal opportunities for the species throughout the landscape (Figure 11-8). There is no approved Conservation Advice for this species, and no listed critical habitat or important populations for the species. Given this species is migratory, both its breeding ground overseas, and its foraging grounds within Australia are likely to be important places for this species. As the species has a large home range, and the Project area provides highly fragmentated habitat, it is unlikely that the habitat would be considered important habitat for the species. All remnant and high-value regrowth vegetation within the Project area provides suitable foraging and dispersal habitat for the Fork-tailed Swift. A total of approximately 769.10 ha of suitable habitat occurs within the Project area, with 2,578.07 ha mapped across the wider Survey area. The Project will disturb approximately 332.72 ha of this foraging and dispersal habitat. Given the species' highly aerial ecology, extensive mobility, and use of broad landscapes for foraging, this level of disturbance is unlikely to hinder movement, reduce habitat connectivity, or isolate habitat patches in a manner that would affect the species foraging ability.

Fork-tailed Swift	
	The Project area is surrounded by extensive additional suitable habitat that will not be impacted by the Project. Potential indirect impacts, such as edge effects, weed incursion, altered fire regimes or changes in grazing pressure, have been considered. The Project is not expected to increase grazing pressure and will implement management measures to minimise the risk of weed invasion and inappropriate fire, including the implementation of the Weed and Pest Management Plan (Appendix AI) and Bushfire Management Plan (Appendix AJ). The disturbance footprint has also been designed to avoid encroachment into verified habitat, thereby limiting edge-related degradation. Some areas of verified Fork-tailed Swift habitat in the Survey area has been identified as a GDE (Appendix N). The GDE Assessment (Appendix N) determined that, as GDEs demonstrate a reliance on the perched groundwater system rather than the deeper alluvial aquifer, groundwater drawdown associated with the Project or other resource projects (i.e. cumulative drawdown) is unlikely to impact GDEs. Hence the retained Fork-tailed Swift habitat is unlikely to experience a decline in health as a result of changes to groundwater levels. Further monitoring of GDE presence and health, including groundwater usage by the species habitat will be completed as part of the GDEMMP (Appendix AF) and GDE Habitat Quality Monitoring Program (Appendix AG). As detailed in Section 11.5.3.5, the Project will result in negligible to minor changes to hydrology, hydraulics and geomorphology (i.e. flood behaviour), and hence would have negligible impacts on retained species habitat. In addition, generalised impact mitigation for the Project (as described in Section 11.6.4) includes measures for controlling erosion and sedimentation, hydrological changes and air quality impacts, which will mitigate impacts to abiotic factors for this species habitat. Given the implementation of appropriate management controls to mitigate indirect effects, the Project is unlikely to destroy or isolate an area of important habitat for a migratory species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	Unlikely There is no recovery plan for this species, and no significant threats to this species has been listed. Potential threats include habitat destruction and predation by feral animals, but due to the wide home range of the species, the potential impacts are thought to be negligible (BirdLife Australia, 2019). With no invasive species posing a significant threat to the species, the Project is unlikely to results in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, particularly in the context of the proposed Weed and Pest Management Plan (Appendix AI) and general mitigation measures to be implemented (as described in Section 11.6.4) which includes measures for controlling erosion and sedimentation, hydrological changes and air quality impacts, which will mitigate impacts to abiotic factors for this species habitat.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the	Unlikely 1,000 birds represent an internationally ecologically significant proportion of Fork-tailed Swift, while 100 birds represent a nationally ecologically significant proportion (Commonwealth of Australia, 2015). Given the absence of confirmed records within the Project area, the fragmented nature of vegetation present, the widespread availability of alternative habitat across the surrounding region, and the species' highly aerial lifestyle, the Project is

Fork-tailed Swift	
population of a migratory species	unlikely to seriously disrupt feeding, migration or resting behaviour of an ecologically significant proportion of the population.
Assessment Outcome	The Project is unlikely to result in a significant residual impact on the species , with the Project not likely to meet any of the significant impact criteria.

11.7.1.16 Oriental Cuckoo

The species was recorded audibly within the Survey area during targeted field surveys. A total of 932.27 ha of foraging and dispersal habitat for the Oriental Cuckoo was verified within the Survey area. Approximately 108.35 ha of foraging and dispersal habitat for the Oriental Cuckoo will be disturbed by the Project (Figure 11-8).

There is no recovery plan or conservation advice published for the Oriental Cuckoo, and no key threats have been identified for the species within its Australian non-breeding range.

On the basis of these avoidance and management measures, additional species-specific mitigation measures for the Oriental Cuckoo were not considered necessary.

Table 11-32 provides an assessment against the significant impact criteria in the *MNES Significant Impact Guidelines 1.1* (DoE, 2013b) and determines whether the Project is likely to have a significant impact on this migratory species.

The Project was considered **unlikely to result in a significant residual impact** to the Oriental Cuckoo due to the avoidance and management measures proposed, and the lack of an important population and critical habitat for the species in the Project area.

Table 11-32 Assessment of Significance of Impacts to the Oriental Cuckoo

Oriental Cuckoo	
Criteria	Response
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Unlikely The Oriental Cuckoo is an insectivorous, brood-laying parasitic bird species. It breeds from Siberia to the Himalayas, across Southeast Asia, southern China, Korea, Japan and Taiwan, overwintering in the Malay Peninsula, Indonesia, the Philippines, New Guinea, the Solomon Islands and northern and eastern Australia. In Australia it occurs mostly on northern and eastern coasts and is widespread on tablelands and eastern slopes of the Great Divide from near Cooktown to the NSW border (Higgins, 1999). The species was audibly confirmed during wet season surveys within riparian habitat associated with the Isaac River in the Survey area (record shown in Figure 11-8). The species has also been recorded south of the Project area in 2023 based on Atlas of Living Australia records. Suitable foraging and dispersal habitat has been verified within wet woodlands and riparian vegetation in the Project area Habitat critical to the survival of the species has not been formally defined. Important habitat has been defined as non-breeding habitat only, including monsoonal rainforest, vine thickets, wet sclerophyll forest and open Casuarina, Acacia or Eucalyptus woodlands, frequently along habitat edges (Commonwealth of Australia, 2015). As the species has been confirmed within the Project area, the verified riparian and woodland habitats may be considered important habitat for the species. While this is the case, the Project area would not support an

Oriental Cuckoo	
	ecologically significant proportion of the population (10,000 individuals representing 1% of the population or 1,000 individuals representing 0.1% of the population). Foraging and dispersal habitat for the Oriental Cuckoo occurs primarily within riparian corridors and remnant wet woodland vegetation in the Project area, with connectivity pathways largely restricted to watercourses due to historical clearing for agriculture and mining. While habitat connectivity is fragmented at a regional scale, suitable habitat remains available both within and surrounding the Project area. Approximately 108.35 ha of foraging and dispersal habitat for the Oriental Cuckoo will be disturbed by the Project. Given the highly mobile nature of the species, the availability of extensive suitable habitat in the surrounding landscape, and the avoidance of most habitat for the species within the Survey area (i.e. riparian corridors associated with the Isaac River and Cherwell Creek), the Project is unlikely to substantially modify, destroy or isolate an area of important habitat for the Oriental Cuckoo or disrupt habitat connectivity. Potential indirect impacts, such as edge effects, weed incursion, altered fire regimes or changes in grazing pressure, have been considered. The Project is not expected to increase grazing pressure and will implement management measures to minimise the risk of weed invasion and inappropriate fire, including the implementation of the Weed and Pest Management Plan (Appendix AI) and Bushfire Management Plan (Appendix AJ). The disturbance footprint has also been designed to avoid encroachment into verified habitat, thereby limiting edge-related degradation. Some areas of verified Oriental Cuckoo habitat in the Survey area has been identified as a GDE (Appendix N). The GDE Assessment (Appendix N) determined that, as GDEs demonstrate a reliance on the perched groundwater system rather than the deeper alluvial aquifer, groundwater drawdown associated with the Project or other resource projects (i.e. cumulative drawdown) is unlikely to impact GDEs. Hence the retained Oriental Cuckoo habitat is unlikely to experience a decline in health as a result of changes to groundwater levels Further monitoring of GDE presence and health, including groundwater usage by the species habitat will be completed as part of the GDEMMP (Appendix AF) and GDE Habitat Quality Monitoring Program (Appendix AG). As detailed in Section 11.5.3.5, the Project will result in negligible to minor changes to hydrology, hydraulics and geomorphology (i.e. flood behaviour), and hence would have negligible impacts on retained species habitat. In addition, generalised impact mitigation for the Project (as described in Section 11.6.4) includes measures for controlling erosion and sedimentation, hydrological changes and air quality impacts, which will mitigate impacts to abiotic factors for this species habitat. Given the implementation of appropriate management controls to mitigate indirect effects, the Project is unlikely to destroy or isolate an area of important habitat for a migratory species.
Result in an invasive species that is harmful to the migratory species becoming established in	Unlikely

Oriental Cuckoo	
an area of important habitat for the migratory species	No recovery plan or conservation advice has been published for the Oriental Cuckoo, and no key threats have been identified for the species within its Australian non-breeding range. With no invasive species posing a significant threat to the species, the Project is unlikely to result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, particularly in the context of the Weed and Pest Management Plan (Appendix AI) and general mitigation measures to be implemented (as described in Section 11.6.4) which includes measures for controlling erosion and sedimentation, hydrological changes and air quality impacts, which will mitigate impacts to abiotic factors for this species habitat.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	Unlikely Important habitat for the species is described as monsoonal rainforest, vine thickets, wet sclerophyll forest or open casuarina, acacia or eucalyptus woodlands. 10,000 birds represent an internationally ecologically significant proportion of Oriental Cuckoo, while 1,000 birds represents a nationally ecologically significant proportion (Commonwealth of Australia, 2015). While the species was recorded within the Project area during wet season surveys, only one individual was detected, and the Project area does not support large aggregations of the species. Given the availability of extensive suitable habitat in the surrounding landscape, and the highly mobile behaviour of the species during migration and foraging, the Project is unlikely to seriously disrupt the lifecycle of an ecologically significant proportion of the Oriental Cuckoo population.
Assessment Outcome	The Project is unlikely to result in a significant residual impact on the species , with the Project not likely to meet any of the significant impact criteria

11.7.2 MSES Significant Residual Impact Assessment

In accordance with the Queensland Environmental Offsets Policy (EPP/2015/1658), *Queensland Environmental Offsets Policy – Significant Residual Impact Guideline* (DEHP, 2014a) and the Queensland environmental offsets framework, an SRI assessment has been undertaken for all MSES known to, likely to or which may occur within the Survey area, unless the matter has already been assessed under the MNES significant impact assessment (e.g. a species for which protected wildlife habitat occurs within the Survey area; as per those listed in Section 11.7.1). This approach avoids duplication of impact assessments and eventual offset conditions between jurisdictions. Table 11-33, Table 11-34 and Table 11-35 contain the SRI assessment for MSES, including the criteria for determining whether there is a SRI and whether the matter is already assessed as MNES.

For the MSES SRI Assessment, impact areas have been quantified for the Disturbance area on Project MLs only, as this disturbance is subject to approval of the EA for the Project's mining leases. However, there are no impacts to MSES (that are not also MNES) in the Additional disturbance area, other than 1.48 ha for the Short-beaked Echidna (see Table 11-18).

The assessment evaluated potential impacts to MSES values following the implementation of all reasonable avoidance and mitigation measures, as outlined in Section 11.6. Where the assessment determined that SRIs are likely to remain, these values have been identified as requiring offsets under the EO Act and associated *Environmental Offsets Policy* (DESI, 2024).

The results of the SRI assessment indicate that the Project will likely result in a SRI for several prescribed environmental matters, primarily associated with the clearing of Category B regulated vegetation that are endangered or of concern REs within the Disturbance area. These impacts are considered unavoidable due to the location of the resource and operational requirements of the open-cut mining method.

Table 11-33 identifies that there will be significant residual impacts to:

- Endangered RE11.3.1
- Of concern RE11.3.2
- Of concern RE11.3.3
- Prescribed REs intersecting with a watercourse:
 - Of concern RE11.3.3
 - Least concern RE11.3.25.

Table 11-34 identifies that there will be significant residual impacts to Connectivity areas. Table 11-35 outlines the SRI Assessment for MSES - Protected Wildlife Habitat.

The only protected wildlife habitat that has not been assessed as a MNES listed species is the Short-beaked Echidna. An assessment against the SRI criteria for the Short-beaked Echidna is provided in Table 11-36. Based on the avoidance, minimisation, and mitigation measures that are proposed, the Project is **unlikely to result in a significant residual impact** to this species.

Table 11-33 SRI Assessment for MSES – Regulated Vegetation

Prescribed Matters		Significant Impact Criteria	Structural Category	RE (Status)	BVG	Disturbance area on Project MLs (ha) ¹	Disturbance not already assessed under EPBC Act as a TEC ²	SRI threshold	Result		
Regulated Vegetation	Prescribed REs that are ‘endangered’ or ‘of concern’ REs	The SRI assessment for impacts to regulated vegetation are assessed under the following criteria’s: Criteria 1: impact threshold per RE structure, as follows – 0.5 ha for dense and mid-dense, 2ha for sparse and very sparse, and 5ha for grasslands. Criteria 2: clearing within 50 m of the defining bank and is relevant only to REs that intersect areas on the Vegetation Management Wetlands map. Criteria 3: 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. NOTES: For a prescribed activity to have a significant residual impact on a regional ecosystem that lies within a mapped wetland, criteria 1 and 2 must be exceeded. For a prescribed activity to have a significant residual impact on a regional ecosystem that is within the defined distance of watercourses, criteria 1 and 3 must be exceeded. The values of the wetland and watercourses themselves are not covered in this section (only the	Dense/ mid dense	11.3.1 (EN)	25a	26.50	9.08	0.5 ha	SRI		
			Sparse	11.3.2 (OC)	17a	36.26	20.82	2 ha	SRI		
				11.3.3 (OC)	16c	40.17	40.17		SRI		
				11.4.8 (EN)	25a	0.00	0		No		
				11.4.9 (EN)	25a	11.80	0		No		
	Prescribed REs that intersect with an area shown as a wetland on the vegetation management wetlands map		Grassland	11.8.11 (OC)	30b	0	0	5 ha	No		
			Sparse	11.3.27b (LC)	34d	1.18	1.18	2 ha	No		
			Prescribed RE that is located within a defined distance from the defining		Dense/ mid dense	11.3.1 (EN)	25a	2.52	0.41	0.5 ha	No
					Sparse	11.3.2 (OC)	17a	0.05	0.05	2 ha	No

Prescribed Matters		Significant Impact Criteria	Structural Category	RE (Status)	BVG	Disturbance area on Project MLs (ha) ¹	Disturbance not already assessed under EPBC Act as a TEC ²	SRI threshold	Result
	banks of a relevant watercourse or drainage feature	vegetation associated with these natural features) —the values of the wetland and watercourses themselves are considered in section 5.		11.3.3 (OC)	16c	4.69	4.69	2 ha	SRI
				11.3.25 (LC)	16c	6.38	6.38	2 ha	SRI
				11.5.3 (LC)	17a	0.76	0.76	2 ha	No

Table 11-34 SRI Assessment for MSES - Connectivity Areas

Prescribed Matters		Significant Impact Criteria	Significance Test	Disturbance area on Project MLs (ha)	SRI threshold	Result
Connectivity Areas	Analysing impact on connectivity areas using the LFC Tool	A development impact on connectivity areas is determined to be significant if either of the following tests are true: 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 (see table below); or	SIGNIFICANCE TEST ONE The regional total area is 170434.14. The regional extent of core remnant is 52969.96. The regional extent of core remnant is 31.08 percent. This level of regional fragmentation sets a local impact threshold of 10.0 percent	347.55	10% for local scale remnant RE	No
		2. Any core area that is greater than or equal to 1 hectare is lost or reduced to patch fragments (core to noncore).	SIGNIFICANCE TEST TWO The number of core remnant areas occurring on the site: 3		≥1 ha	SRI

Prescribed Matters		Significant Impact Criteria	Significance Test	Disturbance area on Project MLs (ha)	SRI threshold	Result
			The number of core remnant areas remaining on the site post impact: 1 (Only core polygons greater than or equal to 1 hectare are included)			
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 347.55 hectares)						

Table 11-35 SRI Assessment for MSES - Protected Wildlife Habitat

Prescribed Matters			Disturbance area on Project MLs (ha)	Results	
Protected Wildlife Habitat	Prescribed REs that are areas of essential habitat on the essential habitat map for an EVNT plant or animal	<i>Endangered and vulnerable wildlife habitat (including essential habitat):</i> An action is likely to have a significant impact on endangered and vulnerable wildlife if the impact on the habitat is likely to: • lead to a long-term decrease in the size of a local population; or • reduce the extent of occurrence of the species; or	Per species listed below.	263.39	Assessment of whether impacts on essential habitat for the species are significant has been considered in the assessment of impacts on protected wildlife habitat
	A habitat for an endangered wildlife or vulnerable wildlife or SLC animal.	• fragment an existing population; or • result in genetically distinct populations forming as a result of habitat isolation; or • result in invasive species that are harmful to an endangered or vulnerable species becoming	Squatter Pigeon	Refer to Table 11-29	
			Australian Painted Snipe	Refer to Table 11-26	
			Common Greenshank	Refer to Section 11.7.1.8	
			Sharp-tailed Sandpiper	Refer to Section 11.7.1.13	

Prescribed Matters			Disturbance area on Project MLs (ha)	Results
		established in the endangered or vulnerable species' habitat; or	Koala	Refer to Table 11-27
		• introduce disease that may cause the population to decline, or	Greater Glider	Refer to Table 11-28
		• interfere with the recovery of the species; or	Ornamental Snake	Refer to Table 11-30
		• cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	Fork-tailed Swift	Refer to Table 11-31
			Oriental Cuckoo	Refer to Table 11-32
		<i>Special least concern (non-migratory) animal wildlife habitat:</i> An action is likely to have a significant impact on a special least concern (non-migratory) animal wildlife habitat if it is likely that it will result in:	Short-beaked Echidna	Refer to Table 11-36
		• a long-term decrease in the size of a local population; or • a reduced extent of occurrence of the species; or • fragmentation of an existing population; or • result in genetically distinct populations forming as a result of habitat isolation; or • disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species.		

¹ Note that where a prescribed RE occurred within a heterogeneous polygon, the mapped percentage of that RE within the polygon was used to calculate the impact area.

² Disturbance not already subject under EPBC Act are the areas where MSES offsets may be required. These areas were calculated by excluding disturbance areas already being offset under the EPBC Act, consistent with the Queensland Environmental Offsets Policy, which seeks to avoid duplication of offset requirements for the same or substantially the same prescribed impact and environmental values. Accordingly, polygons or portions of heterogeneous polygons proposed to be offset as TECs under the EPBC Act were not included in the calculation of MSES impacts requiring offsets where the same or substantially the same ecological values were being addressed through the Commonwealth offset (for example polygons or portions of polygons that were RE11.3.1 and RE11.4.9 where these polygons also met the key diagnostic criteria and conditions thresholds for Brigalow TEC were not included in the impact areas for MSES offsets).

Table 11-36 Assessment of Significance of Impacts to the Short-beaked Echidna

Criteria	Response
Lead to a long-term decrease in the size of a local population	Unlikely The Short-beaked Echidna is found throughout Australia, including Tasmania. The species is a habitat generalist, inhabiting a diverse range of environments, including forests, woodlands, heath, grasslands and arid environments where it requires rocky outcrops, fallen timber and hollow logs for shelter. The species is prevalent in urban and rural landscapes and is tolerant of disturbance. Most remnant and regrowth vegetation within the Project provides suitable habitat for this species, with the exception of non-remnant areas, though these areas may be used on occasion for the species to disperse to other remnant or regrowth REs throughout the region. This species was recorded near the Isaac River in the central part of the Project area during field surveys (Figure 11-11). As a result, it is likely that the species occurs within the Disturbance area at least on occasion, utilising it either for breeding, foraging or dispersal. Given the mobility of this species, it is anticipated that the Short-beaked Echidna will continue to utilise surrounding suitable habitat within and adjacent to the Disturbance area. While individuals may be temporarily displaced during vegetation clearing activities, suitable habitat is widespread in the surrounding landscape, and the species is expected to readily relocate to nearby remnant and regrowth vegetation. Mitigation measures have been proposed to manage potential interactions with the species during vegetation clearing works, as described in Table 11-23. Any individuals present during clearing activities are expected to self-relocate once clearing activities commence. To further mitigate the risk of injury, fauna spotter-catchers will undertake pre-clearance surveys and supervise vegetation clearing. Accordingly, while the Project may result in short-term disturbance or displacement of individuals, it is not expected to result in a reduction in the size of the local population, nor lead to a long-term decrease in the population of the Short-beaked Echidna.
Reduce the extent of occurrence of the species	Unlikely All remnant and regrowth vegetation within the Project area provides breeding and foraging habitat for this species (Figure 11-11). Approximately 332.72 ha of Short-beaked Echidna habitat will be directly impacted within the Disturbance area (Table 11-18). Short-beaked Echidnas have large home ranges, reported to be up to approximately 400 ha, and are capable of travelling several kilometres in search of food (Spring, 2018). The proposed clearing of up to 332.72 ha of habitat within the Disturbance area is not expected to reduce the extent of occurrence of the Short-beaked Echidna. The Short-beaked Echidna is widely distributed across Australia and occurs throughout the region. Extensive suitable habitat remains within and surrounding the Survey area, including remnant and regrowth vegetation beyond the Disturbance area. The clearing represents approximately 13% of the available habitat within the Survey area and a substantially smaller proportion of habitat within the broader Area of Interest and regional context. The Project will not introduce permanent barriers to movement, and the species is highly mobile, with large home ranges (up to approximately 400 ha) and the capacity to travel several kilometres. Individuals temporarily displaced during clearing are expected to relocate to adjacent suitable habitat, which is abundant in the surrounding landscape.

Criteria	Response
	Accordingly, while the Project will result in localised habitat loss, it will not reduce the geographic distribution of the species or constrain its regional occurrence. The extent of occurrence of the Short-beaked Echidna will therefore not be reduced as a result of the Project.
Fragment an existing population	Unlikely The Project area is surrounded by extensive suitable habitat for the Short-beaked Echidna that will not be impacted by the Project. While the proposed clearing will result in some localised loss and minor fragmentation of habitat within the Project area, it is not expected to disrupt landscape-scale connectivity or restrict movement of the species across the region. The Short-beaked Echidna is highly mobile and tolerant of disturbance and is known to traverse cleared and modified environments. Vegetation clearing within and adjacent to the Isaac River and Cherwell Creek will be limited in extent and will not create barriers to movement. Accordingly, the Project is not expected to fragment an existing population of the Short-beaked Echidna or result in isolation of individuals or sub-populations.
Result in genetically distinct populations forming as a result of habitat isolation	Unlikely The Project will not introduce permanent barriers to movement, and the species is highly mobile, with large home ranges (up to approximately 400 ha; Spring, 2018) and the capacity to travel several kilometres. The Project will cause minimal habitat fragmentation with vegetation clearing within and adjacent to the Isaac River and Cherwell Creek will be limited in extent. Hence, connectivity of habitat throughout the region will not be impacted. The Project unlikely to cause genetically distinct populations forming as a result of isolation.
Disrupt ecologically significant locations (breeding, feeding or nesting sites) of a species	Unlikely Short-beaked Echidnas breed under rocky overhangs, grass tussocks, hollows at the base of trees, rotten tree stumps, hollow logs and in burrows or depressions in the ground. Habitat features (e.g., hollow logs) present within the Survey area would provide suitable breeding habitat for this species. It is also likely the Project area is used for foraging and dispersal of the species throughout the region. However, it is unlikely the Project provides habitat that is ecologically significant. Regardless, the marginal clearing proposed compared to the species habitat throughout the Survey area (~13 %) would be deemed negligible on the species.
Assessment Outcome	The Project is unlikely to result in a significant residual impact on the species , with none of the significant residual impact criteria being met

11.7.3 MNES and MSES Offset Requirements

Following the application of all reasonable avoidance and mitigation measures, the Project is expected to result in significant residual impacts on MNES and MSES. These impacts have been identified through the MNES significant impact assessments in Section 11.7.1 and the MSES SRI assessment provided in Section 11.7.2.

Offsets will be required to address these residual impacts in accordance with the *EPBC Act Environmental Offsets Policy* (DSEWPac, 2012a) and the *Queensland Environmental Offsets Policy* (EPP/2015/1658, DETSI, 2025).

Proposed offsets for the Project are described in **Chapter 13**. The offset area management plan (**Appendix R**) defines the offset requirements for MNES, delivery framework, and mechanisms for achieving a

conservation outcome that aligns with the Commonwealth offset framework. While the offset delivery plan (**Appendix S**) defines the offset requirements for MSES, delivery framework, and mechanisms for achieving a conservation outcome that aligns with the State offset frameworks.

Offsets will be developed to:

- compensate for the loss of MNES and MSES values that cannot be avoided or mitigated
- maintain or improve the ecological function and connectivity of offset areas relative to the impacted values
- ensure consistency with the principles of additionality, equivalence, and long-term security
- where practicable, deliver coordinated offsets that address both MNES and MSES values within a single offset package.

Land-based offsets have been prioritised to achieve direct conservation gains through management, rehabilitation, and long-term protection of ecologically comparable vegetation communities and habitat.

11.8 Conclusion

The terrestrial ecology assessment provides a comprehensive evaluation of the terrestrial ecological values within and surrounding the Project area. The assessment has been informed by an extensive program of desktop investigations, targeted wet and dry season field surveys, habitat suitability and quality assessments, and detailed ecological mapping, by suitably qualified ecologists. Desktop assessments informed the likelihood of occurrence of listed threatened ecological communities and species in the Survey area. Ecology surveys were conducted in accordance with relevant Commonwealth and State guidelines in the Survey area, which encompasses the Project area and proposed Disturbance area.

The assessment confirmed that the Survey area supports terrestrial ecological values shaped by a long history of pastoral land use, including remnant, regrowth and non-remnant vegetation communities. These communities occur within the Brigalow Belt North bioregion and include ecosystems of State and national conservation significance. Regional ecosystem mapping was used to inform mapping of vegetation communities and habitat for Commonwealth and State listed threatened species.

The following MNES were identified in the Survey area:

- Brigalow TEC, Natural Grasslands TEC, Poplar Box TEC and SEVT TEC
- habitat for listed threatened species, namely Squatter Pigeon, Koala, Greater Glider (southern and central), Ornamental Snake, Australian Painted Snipe, Sharp-tailed Sandpiper, Common Greenshank, King Bluegrass and Bluegrass
- habitat for two listed migratory species.

The following MSES, that are not also MNES, were identified in the Survey area:

- endangered and of concern REs
- REs that intersect a wetland or a defined distance from a watercourse
- wildlife habitat for a special least concern species, the Short-beaked Echidna
- connectivity areas.

These ecological values represent the primary ecological values of conservation significance relevant to the Project, and informed the impact assessment and mitigation measures.

Consistent with the mitigation hierarchy, the Project has been designed to prioritise avoidance of sensitive ecological values where practicable. Where avoidance was not possible, mitigation and management measures have been developed to minimise impacts during construction, operation and rehabilitation.

The Project will result in direct impacts to terrestrial ecology values through vegetation clearing and loss of habitat. However, the Disturbance area has been carefully designed to minimise impacts to areas of

remnant vegetation that could contain MNES or MSES. Remnant vegetation represents 334 ha or 16% of the total Disturbance area of 2,083 ha. By comparison the Project area contains 769 ha of remnant vegetation, and therefore, 435 ha of remnant vegetation that could potentially have been impacted, has been avoided. Where high-value habitats occur, particularly along riparian corridors and within ecologically significant wetlands, these areas have been clearly identified to inform impact avoidance and management measures. Some MNES or MSES that occur in the Survey area and Project area have been avoided entirely, or have very small areas of occurrence (e.g. < 1.5 ha) in the Disturbance area, including Natural Grasslands TEC, SEVT TEC and habitat for Australian Painted Snipe, Sharp-tailed Sandpiper, Common Greenshank, King Bluegrass and Bluegrass. In addition, management measures are proposed to mitigate direct impacts including vegetation clearing protocols, pre-clearance surveys and a species management plan.

The Project has potential for indirect impacts on terrestrial ecology values, including from changes to pests and weeds, fragmentation or edge effects, fauna mortality, hydrological changes, changes to air quality, noise or lighting, and bushfire risk. However, management measures are proposed to mitigate indirect impacts including vegetation management in non-disturbance areas, a weed and pest management plan, buffer zones in sensitive ecological areas, worker training, rehabilitation of riparian ecosystems, water infrastructure designed to minimise hydrological impacts, erosion and sediment control plan, dust, noise and light management, and a bushfire management plan. With these management measures in place, indirect impacts are unlikely to result in significant residual impacts to MNES and MSES.

The potential for the Project to contribute to cumulative impacts to terrestrial ecology at the bioregional, sub-regional and local scales was found to be negligible to minor.

The significance of impacts, after implementation of the proposed management measures, was assessed in accordance with State and Commonwealth guidelines. The assessment determined that the Project was likely to result in the following significant impacts to MNES and MSES:

- Brigalow TEC – 53 ha
- Poplar Box TEC – 15.5 ha
- Squatter pigeon habitat – 334 ha
- Koala habitat – 318 ha
- Greater Glider habitat – 318 ha
- Ornamental Snake habitat – 76 ha
- Endangered and of concern REs – 70 ha
- REs that intersect a wetland or a defined distance from a watercourse – 11 ha
- connectivity areas - 347.5 ha.

The Project is unlikely to result in significant impacts to migratory species.

Biodiversity offsets are proposed to compensate for significant residual impacts to MNES and MSES. An offset area management plan has been prepared for significant residual impacts to MNES, and an offset delivery plan has been prepared for significant residual impacts to MSES. These plans will respectively be subject to Commonwealth and State regulatory approval.

The terrestrial ecology assessment demonstrates that, with the application of proposed management measures and biodiversity offsets, the Project can achieve the environmental objectives and performance outcomes under Schedule 8 of the EP Regulation, and be undertaken in a manner consistent with other regulatory requirements for ecology.

11.9 References

- Atlas of Living Australia. (2013). Atlas of Living Australia Records for *Bertya oppenens*. Available from: <http://www.ala.org.au/>.
- Ayers, D., Nash, S., & Baggett, K. (1996). Threatened Species of Western New South Wales, New South Wales.
- BirdLife Australia. (2020). The Australian National Directory of Important Migratory Shorebird Habitat. Prepared for the Department of Agriculture, Water and the Environment.
- Brigalow Belt Reptiles Workshop. (2010). Proceedings from the workshop for the nine listed reptiles of the Brigalow Belt bioregions. 18-19 August 2010.
- Commonwealth of Australia. (2015). Draft referral guideline for 14 birds listed as migratory species under the EPBC Act.
- Commonwealth of Australia. (2017a). Australian Pest Animal Strategy 2017–2027. Invasive Plants and Animals Committee.
- Commonwealth of Australia. (2017b). Australian Weeds Strategy 2017–2027 Invasive Plants and Animals Committee.
- Commonwealth of Australia. (2019). Australia's Strategy for Nature 2019–2030. Australia's national biodiversity strategy and action plan.
- DAWE. (2022a). Conservation Advice for *Phascolarctos cinereus* (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory. Canberra: Department of Agriculture, Water and the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/85104-conservation-advice-12022022.pdf>. In effect under the EPBC Act from 12-Feb-2022.
- DAWE. (2022b). National Recovery Plan for the EPBC Act listed Koala, *Phascolarctos cinereus* (combined populations of Queensland, New South Wales and the Australian Capital Territory). Department of Agriculture, Water and the Environment.
- DAWR. (2012). Weeds of National Significance. Australian Government Department of Agriculture and Water Resources.
- DCCEEW. (2012). Offsets Assessment Guide. Available at <https://www.dcceew.gov.au/environment/epbc/approvals/offsets/guidance/offsets-assessment-guide>. Australian Government, Department of Climate Change, Energy, the Environment and Water.
- DCCEEW. (2023a). Conservation Advice for Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions. Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/24-conservation-advice.pdf>. In effect under the EPBC Act from 31-Aug-2023. Department of Climate Change, Energy, the Environment and Water.
- DCCEEW. (2023b). Draft referral guidelines for the nationally listed Brigalow Belt reptiles. Environment Protection and Biodiversity Conservation Act 1999. v1.1. Department of Climate Change, Energy, the Environment and Water. Department of Climate Change, Energy, the Environment and Water.
- DCCEEW. (2023c). National Light Pollution Guidelines for Wildlife. Department of Climate Change, Environment, Energy and Water.
- DCCEEW. (2024a). Conservation Advice for *Calidris acuminata* (Sharp-tailed Sandpiper). Department of Climate Change, Energy, the Environment and Water.

DCCEEW. (2024b). Conservation Advice for *Tringa nebularia* (Common Greenshank). Department of Climate Change, Energy, the Environment and Water.

DCCEEW. (2024c). Environmental Management Plan Guidelines. Available at <https://www.dcceew.gov.au/sites/default/files/documents/environmental-management-plan-guidelines.pdf>. Australian Government, Department of Climate Change, Energy, the Environment, and Water .

DCCEEW. (2025a). *Geophaps scripta scripta* — Squatter Pigeon (southern) in Department of Climate Change, Energy the Environment and Water Species Profile and Threats Database. Available at https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64440.

DCCEEW. (2025b). Survey guidelines for the ornamental snake (*Denisonia maculata*) .

DCCEEW. (n.d.). How to use the Offsets Assessment Guide. Department of Environment, Energy, Climate Change and Water. Retrieved www.environment.gov.au/epbc/publications/environmental-offsets-policy.html

DEHP. (2014c). Queensland Environmental Offsets Policy Significant Residual Impact Guideline.

DES. (2020a). Flora Survey Guidelines-Protected Plants. Nature Conservation Act 1992. Version 2.01. Department of Environment and Science. https://www.des.qld.gov.au/policies?a=272936:policy_registry/gl-wl-pp-flora-survey.pdf

DES. (2020b). Guide to Determining Terrestrial Habitat Quality: Methods for assessing habitat quality under the Queensland Environmental Offsets Policy, Version 1.3. Department of Environment and Science.

DES. (2020c). Information Sheet for Species Management Program Requirements for tampering with a protected animal breeding place in Queensland. Department of Environment and Science. Version 1.00. Effective 22 AUG 2020 .

DETSI. (2025). Queensland Environmental Offsets Policy v1.17 (EPP/2015/1658). Department of Environment, Tourism, Science and Innovation.

DETSI. (2026). EIS Information Guideline – Terrestrial Ecology (ESR/2020/5309)

DETSI. (2026a). EIS Information Guideline – Biosecurity' (ESR/2020/5297)

DEWHA. (2008a). Threat abatement plan for competition and land degradation by rabbits, DEWHA, Canberra. Available on the internet at: <http://www.environment.gov.au/system/files/resources/7097f100-4a22-4651-b0e1-df26e17c622c/files/tap-rabbit-report.pdf>.

DEWHA. (2008c). Threat abatement plan for competition and land degradation by unmanaged goats, DEWHA, Canberra. Available on the internet at: <http://www.environment.gov.au/system/files/resources/2109c235-4e01-49f6-90d0-26e6cb58ff0b/files/tap-goat-report.pdf>.

DEWHA. (2008d). Threat abatement plan for predation by the European red fox, DEWHA, Canberra. Available on the internet at: <http://www.environment.gov.au/system/files/resources/1846b741-4f68-4bda-a663-94418438d4e6/files/tap-fox-report.pdf>.

DEWHA. (2010a). Survey guidelines for Australia's threatened bats. Guidelines for detecting bats listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999. Department of Environment, Water, Heritage and the Arts. www.ag.gov.au/cca.

DEWHA. (2010b). Survey guidelines for Australia's threatened birds. Guidelines for detecting birds listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999. Updated 2017. Department of Climate Change, Energy, the Environment and Water. www.ag.gov.au/cca.

DEWHA. (2010c). Survey guidelines for Australia's threatened frogs: Guidelines for detecting frogs listed as threatened under the EPBC Act. Department of the Environment, Water, Heritage and the Arts.

DEWHA. (2013). Significant Impact Guidelines 1.1 - Matters of National Environmental Significance. Environment Protection and Biodiversity Conservation Act 1999. Department of the Environment, Water, Heritage and the Arts.

DoE. (2013a). Approved Conservation Advice for the Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community. Department of the Environment.

DoE. (2013b). Matters of National Environmental Significance. Significant Impact guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999. Department of Environment.

DoE. (2015a). Threat abatement plan for predation by feral cats, Commonwealth of Australia. Available on the internet at: <http://www.environment.gov.au/system/files/resources/78f3dea5-c278-4273-8923-fa0de27aacfb/files/tap-predation-feral-cats-2015.pdf>.

DoE. (2026a). Brigalow (*Acacia harpophylla* dominant and co-dominant) in Community and Species Profile and Threats Database, Department of the Environment and Energy, Canberra. Available from: <http://www.environment.gov.au/sprat>. Accessed 2026-02-23T18:17:41AEDT.

DoEE. (2017). Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*). Available: <https://www.dcceew.gov.au/sites/default/files/documents/tap-feral-pigs-2017.pdf>.

DoEE. (2019). Conservation Advice (including listing advice) for the Poplar Box Grassy Woodland on Alluvial Plains. Canberra: Department of the Environment and Energy. Available from: <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/141pb-conservation-advice.pdf>.

DPI. (2023). Biosecurity, Department of Agriculture and Fisheries, Queensland Government (<https://www.daf.qld.gov.au/business-priorities/biosecurity>).

DSEWPaC. (2011b). Survey guidelines for Australia's threatened reptiles. Guidelines for detecting reptiles listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999. Department of Sustainability, Environment, Water, Population and Communities.

DSEWPaC. (2011c). Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads. Department of Sustainability, Environment, Water, Population and Communities. Canberra, ACT: Commonwealth of Australia. Available from: <http://www.environment.gov.au/resource/threat-abatement-plan-biological-effects-including-lethal-toxic-ingestion-caused-cane-toads>. In effect under the EPBC Act from 06-Jul-2011.

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

DSEWPaC. (2012b). Threat abatement plan to reduce the impacts on northern Australia's biodiversity by the five listed grasses.

DSEWPaC. (2013a). Approved Conservation Advice for *Dichanthium queenslandicum* (King Blue-grass). Department of Sustainability, Environment, Water, Population and Communities. In <http://www.environment.gov.au/biodiversity/threatened/species/pubs/5481-conservation-advice.pdf>. Department of Sustainability, Environment, Water, Population and Communities.

DSEWPaC. (2013b). Approved Conservation Advice for *Rostratula australis* (Australian painted snipe). Canberra: Department of Sustainability, Environment, Water, Population and Communities. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/77037-conservation-advice.pdf>. In effect under the EPBC Act from 15-May-2013.

- DSEWPaC. (2013b). Approved Conservation Advice for *Rostratula australis* (Australian painted snipe). Canberra: Department of Sustainability, Environment, Water, Population and Communities. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/77037-conservation-advice.pdf>. In effect under the EPBC Act from 15-May-2013.
- EcoSM. (2020). Terrestrial Ecology Impact Assessment Report. Isaac Downs Project.
- Eyre, T. J., Ferguson, D. J., Smith, G. C., Mathieson, M. T., Venz, M. F., Hogan, L. D., Hourigan, C. L., Kelly, A. L., & Rowland, J. (2022). Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland. Version 4.0.
- Eyre, T. J., Kelly, A., Wilson, V., Ferguson, B., Laidlaw, D., & Franks, M. (2015). BioCondition A Condition Assessment Framework for Terrestrial Biodiversity in Queensland Assessment Manual. Version 2.2.
- Eyre, T. J., Smith, G. C., Venz, M. F., Mathieson, M. T., Hogan, L. D., Starr, C., Winter, J., & McDonald, K. (2022). Guide to Greater Glider habitat in Queensland. Department of Environment and Science.
- Farner, A. (1993). THE EFFECTS OF DUST ON VEGETATION - A REVIEW. *Environmental Pollution*, 79(1), 63–75.
- Fletcher, M. (2001). Rare and Threatened plants of the Central Highlands.
- IECA. (2008). Best Practice Erosion and Sediment Control. International Erosion Control Association.
- Ison Environmental Planners. (2010). Moranbah South Coal Mine. Flora and Fauna Ecological Assessment. Environment Protection and Biodiversity Conservation Act 1999. Proposed Seismic Survey, Moranbah South. Prepared for Anglo American Metallurgical Coal Pty Ltd.
- Liveability and Sustainability. (2024). Isaac Region Biosecurity Plan 2024 -2027.
- Matrix Consulting. (2007). Chapter 10 Nature Conservation. Integrated Isaac Plains Project Environmental Impact Statement .
- Neldner, V. J., Wilson, B. A., Dillewaard, H. A., Ryan, T., Butler, D. W., McDonald, W. J. F., Addicott, E., & Appelman, C. N. (2023). Methodology for surveying and mapping regional ecosystems and vegetation communities in Queensland. Version 7.0. Queensland Herbarium, Queensland Department of Environment, Science and Innovation.
- Rogers, D., Hance, I., Paton, S., Tzaros, C., Griffioen, P., Herring, M., Jaensch, R., Oring, L., Silcocks, A., & Weston, M. (2005). The breeding bottleneck: breeding habitat and population decline in the Australian Painted Snipe. In P. Straw (Ed.), *Status and Conservation of Seabirds in the East Asian-Australasian Flyway* (pp. 15–23).
- Sattler, P. S., & Williams, R. D. (1999). The Conservation Status of Queensland’s Bioregional Ecosystems.
- Squatter Pigeon Workshop. (2011). Proceedings from the workshop for the Squatter Pigeon (southern). Toowoomba Office of the Queensland Parks and Wildlife Service.
- Statewide Environmental Assessments. (2012). Environmental Impact Statement (EIS) assessment report under the Environmental Protection Act 1994 Moranbah South Project proposed by Anglo American Metallurgical Coal Pty Ltd.
- Thompson, J. R., Mueller, P. W., Fliickigert, W., & Rutter, A. J. (1984). The Effect of Dust on Photosynthesis and its Significance for Roadside Plants . *Environmental Pollution (Series A)*, 34(1), 171–190.
- 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. Available from: <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/99-listing-advice.pdf>. In effect under the EPBC Act from 07-Jan-2009.

TSSC. (2013). Approved Conservation Advice for the Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community (s266B of the Environment Protection and Biodiversity Conservation Act 1999). Threatened Species Scientific Committee.

TSSC. (2016). Conservation Advice: *Petauroides volans*, Greater Glider. Threatened Species Scientific Committee.

Whitehaven Coal. (2021). Winchester South Project Environmental Impact Statement.

Wilson, S. K., & D.G. Knowles. (1988). Australia's Reptiles: A Photographic Reference to the Terrestrial Reptiles of Australia. Collins Publishers.

Youngentob, K. N., Marsh, K. F., & Skewes, J. A. (2021). A review of koala habitat assessment criteria and methods. www.anu.edu.au