

Matters of National Environmental Significance - Significant Impact Assessment

Grevillea Pit Continuation Project

21-Dec-2023
Grevillea Pit Continuation Project
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Matters of National Environmental Significance - Significant Impact Assessment

Grevillea Pit Continuation Project

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1.0 Introduction

1.1 Background

BM Alliance Coal Operations Pty Ltd (BMA) are currently mining the Grevillea Pit at Saraji Mine (SRM) within Mining Lease (ML) 1782 and are seeking to extend existing mining operations into ML 700021, named the Grevillea Pit Continuation Project (the Project). ML 700021 was granted in October 2018 following completion of environmental studies and impacts assessments to support an Environmental Authority (EA) amendment for the Project.

AECOM Australia Pty Ltd (AECOM) was engaged by BMA to undertake an assessment of potential impacts to Matters of National Environmental Significance (MNES) as a result of the Project. This assessment will support the referral of the Project under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.2 Project Area and Description

Within this report, the project area is wholly confined to ML 700021 (Figure 1). Where applicable, ecological values adjacent to the project area are considered, such as Phillips Creek to the south.

The Project proposes the continuation of SRM mining operations through extending the footprint of the existing Grevillea Pit to access further coal resources within ML 700021.

The Project is located within the Isaac Regional Council (IRC) Local Government Area (LGA), approximately 25 kilometres (km) north of Dysart and approximately 170 km south-west of Mackay in Queensland. The project area, ML 700021, is located adjacent to the east of existing SRM and covers approximately 220 hectares (ha).

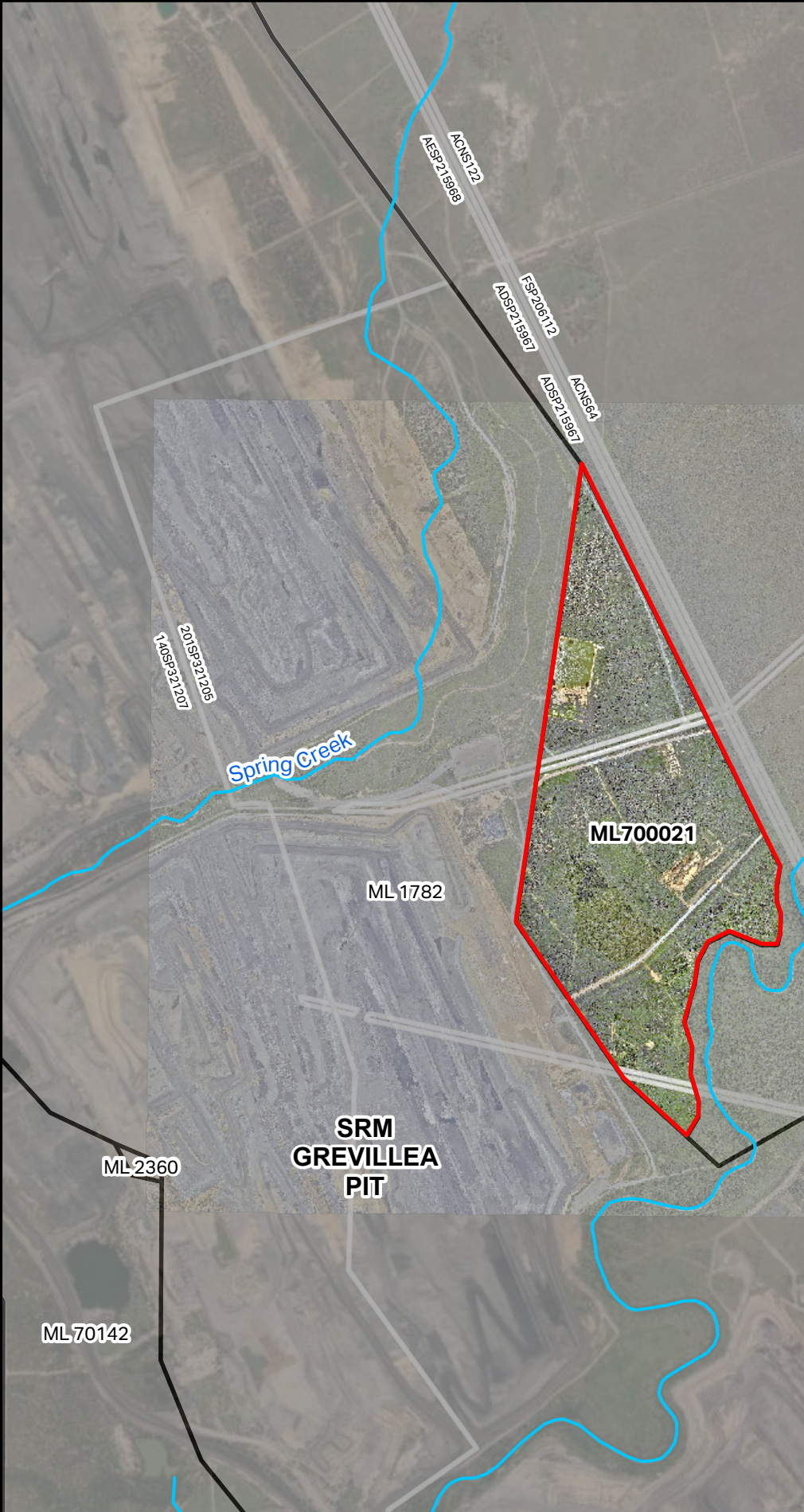
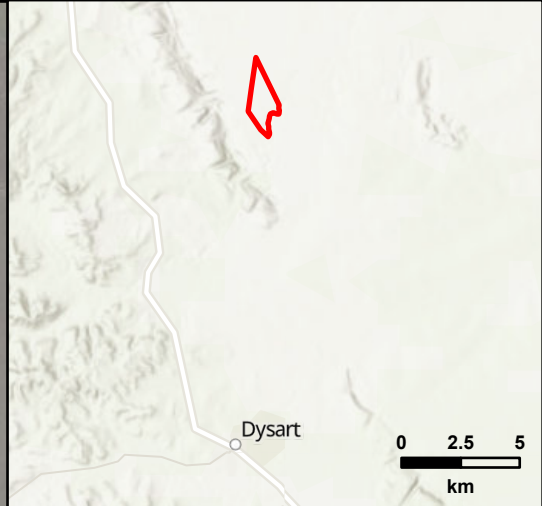
The existing SRM mines approximately 16 million tonnes per annum (Mtpa) of Run-of-Mine (ROM) coal. The Project will not increase the annual product tonnage output from SRM but will sustain current operations by enabling the Grevillea Pit to extend beyond the currently active ML boundaries.

1.3 Scope

The purpose of this assessment is to describe the MNES values of the project area protected under the EPBC Act, assess the potential impacts of the Project on these values, and present measures to avoid, minimise and / or mitigate potential impacts.

This MNES assessment included the following tasks:

- Conduct a review of available literature and previous studies in the vicinity of the project area, and conduct database searches for known or potentially occurring MNES.
- Analyse field-based data in conjunction with aerial imagery to determine the likely extent of vegetation communities, habitat types and associated MNES values across the project area.
- Undertake a likelihood of occurrence assessment to understand known, likely or potentially present MNES within the project area.
- Complete an impact assessment for identified or potentially occurring MNES values, inclusive of recommended mitigation and management measures.
- Determine the significance of identified potential impacts in accordance with the *Commonwealth Significant Impact Guidelines Policy Statement 1.1* (Department of the Environment, 2013b) and quantify the potential for any significant impacts.
- Identify potential offset requirements, if required.



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LEGEND

- Project Area (ML700021) - Proposed Action Area
- Mining leases
- Cadastre
- Watercourse (Water Act 2000)

PROJECT AREA

**Grevillea Pit Continuation Project
 MNES - Significant Impact
 Assessment Report**

 BHP Mitsubishi Alliance	PROJECT ID	60712195	Figure 1
	CREATED BY	Kate Brodie	
	LAST MODIFIED	21 Dec 2023	
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2.0 Regulatory Framework

2.1 *Environment Protection and Biodiversity Conservation Act 1999*

The EPBC Act is administered by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) and establishes a process for environmental assessment and approval of proposed actions that have, will have or are likely to have a significant impact on MNES or on Commonwealth land. MNES protected under the EPBC Act include:

- World Heritage Properties
- National Heritage Places
- Wetlands of International Importance (listed under the Ramsar Convention)
- Great Barrier Reef Marine Park
- Commonwealth Marine Areas
- Listed Threatened Species and Threatened Ecological Communities (TECs)
- Migratory Species (listed under international agreements)
- Nuclear Actions (including uranium mines)
- A Water Resource, in relation to coal seam gas development and large coal mining development.

2.1.1 EPBC Act Referral

Under the EPBC Act, a referral to the DCCEEW is required if the Project has the potential to cause a 'significant impact' on MNES. In relation to listed threatened and migratory species, an action will require approval if the action has, will have, or is likely to have a significant impact on a species listed in any of the following categories:

- Extinct
- Extinct in the Wild
- Critically Endangered
- Endangered
- Vulnerable; or
- Migratory (species which are native to Australia and are included in the appendices to the Bonn Convention, and/or included in annexes established under the Japan-Australia Migratory Bird Agreement (JAMBA) and the China-Australia Migratory Bird Agreement (CAMBA), and/or native, migratory species identified in a list established under an international agreement such as the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)).

Additionally, an action will require approval if the action has, will have, or is likely to have a significant impact on an ecological community listed in any of the following categories:

- Critically Endangered; or
- Endangered.

A 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment, which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts.

As identified in Section 1.3, the purpose of this report is to identify the occurrence of MNES within the project area and assess the impacts of the Project on these MNES against the EPBC Act Significant Impact Guideline Policy Statement 1.1 (Department of the Environment, 2013b). This MNES report describes and assesses all relevant potential impacts (direct and indirect) of the action on listed threatened species and communities, and migratory species, and describes avoidance, mitigation and management measures for these impacts.

3.0 Assessment Method

3.1 Desktop searches

A desktop assessment was undertaken to characterise and identify ecological values that may be supported in the project area. The desktop assessment included a review of literature, and searches of publicly available datasets and online mapping.

The following information sources were reviewed as part of this assessment:

- EPBC Act Protected Matters Search Tool (PMST) to identify MNES that may occur within or surrounding the project area in a 10 km buffer (Department of Climate Change Energy the Environment and Water, 2023b) (Appendix A).
- Wildlife Online database to identify threatened flora and fauna species recorded within or surrounding the project area under the *Nature Conservation Act 1992* (NC Act) (Department of Environment and Science, 2023a) (Appendix A).
- Atlas of Living Australia (ALA) database to identify locations of previously recorded flora and fauna species within or surrounding the project area (Atlas of Living Australia, 2023).
- Queensland Herbarium Regional Ecosystem Description Database (REDD) version 13 for vegetation and land zone descriptions (Queensland Herbarium, 2023).
- *Vegetation Management Act 1999* mapping including essential habitat, watercourse and wetland mapping (Department of Resources, 2023).
- Department of Environment and Science (DES) map of Queensland wetland environmental values to identify high ecological significance wetlands and general ecological significance wetlands (Department of Environment and Science, 2023b).
- DES Protected Plants Flora Survey Trigger Map to identify the high-risk areas for protected plants (Department of Environment and Science, 2023d).
- Saraji East Mining Lease Project – Environmental Impact Statement (EIS), Matters of National Environmental Significance Report (BMA, 2023).
- SRM Ecological Baseline Assessment (BAAM Ecological Consultants, 2021).
- Spring Creek to Phillips Creek Diversion – Assessment of Matters of National Environmental Significance (Eco Logical Australia, 2019b).
- SRM Grevillea Back Access Road Ecological Assessment (Eco Logical Australia, 2019a).
- SRM Spring Creek Diversion – Stage 1 Ecological Assessment (Eco Logical Australia, 2018).
- Spring Creek Diversion – Saraji Pit Geometry Optimisation MNES Self-Assessment (BMA, 2018).
- Saraji Open Cut Extension Project – Environmental Assessment Report (BMA, 2016).
- Saraji Open Cut Extension Project – Terrestrial Ecology Baseline Report (AECOM, 2016).

3.2 Ecological assessments

Previous assessments and survey effort at SRM have been reviewed to produce an understanding of the MNES values present within the project area. Key ecological findings of each assessment below have been incorporated into Section 4.0, where relevant to the project area. The survey sites are displayed in Figure 2. Each ecological assessment is introduced below.

3.2.1 BMA (2023) Saraji East Mining Lease Project – Environmental Impact Statement – Matters of National Environmental Significance

AECOM were contracted by BMA to produce an EIS to gain approvals to develop the Saraji East Mining Lease Project (EPBC Number 2016/7791). The project was determined to be a controlled action under the EPBC Act, hence as part of the EIS an MNES assessment was undertaken to assess the EPBC Act

listed values that may potentially be impacted by the project. The Saraji East Mining Lease Project is directly adjacent to the east of the Project.

3.2.2 BAAM Ecological Consultants (2021) SRM – Ecological Baseline Assessment

In 2021, Biodiversity Assessment and Management Pty Ltd (BAAM) undertook an ecological baseline assessment at SRM to gain knowledge of ecological values within areas that may be potentially impacted by future projects. This assessment applied the use of desktop information followed up by field surveys to ground-truth MNES and MSES values.

3.2.3 AECOM (2016) Saraji Open Cut Extension Project – Terrestrial Ecology Assessment

AECOM were contracted by BMA in August 2016 to undertake a terrestrial ecology assessment for the Project (known as Saraji Open Cut Extension project at that stage), to extend the existing Grevillea Pit coal mine eastward of ML 1782. This ecology assessment included a review of desktop information and field surveys. Flora surveys determined the presence of threatened flora species and vegetation communities, and fauna surveys assessed available habitat for conservation significant fauna.

3.3 Likelihood of occurrence

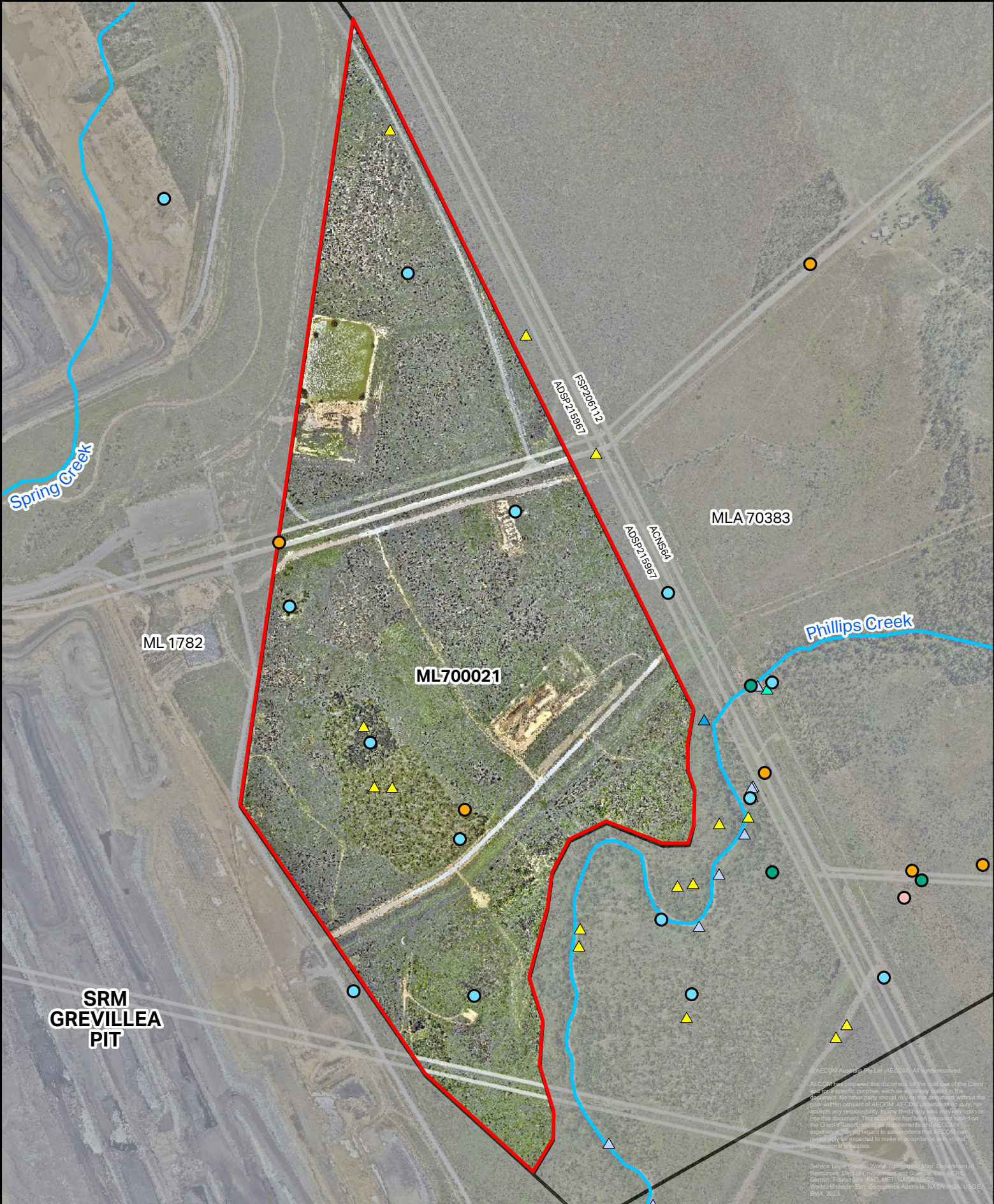
A likelihood of occurrence assessment was undertaken for MNES communities and species identified in the PMST and Wildlife Online desktop searches (Appendix A). Where available, the likelihood of occurrence assessments were founded on previous ecological assessments and survey effort undertaken within the project area and the broader SRM. Where past survey data was unavailable or insufficient, species records occurring within or adjacent to the project area from the ALA were used to inform the likelihood of occurrence assessment (Atlas of Living Australia, 2023).

Each species was assessed against the categories defined below.

- **Known:** Species was positively identified and recorded in the project area during previous assessments.
- **Likely:** Species was not recorded during past field surveys, however there are known and current records within the surrounding area (generally within 10 km, however greater distances may be allowed for highly mobile fauna species and species with patchy distributions), and suitable habitat has been mapped in the project area.
- **Potential:** Species was not recorded during previous field surveys, however known records occur in the surrounding area and habitat in the project area is marginal or degraded.
- **Unlikely:** Habitat in the project area might be suitable or marginally suitable; however, the species was not recorded during past field surveys, and/or no known records of the species exist within the surrounding area.

3.4 Nomenclature

Taxonomic nomenclature used for the description of floral species is according to Census of the Queensland Flora 2020 (Brown, G.K. & Bostock, 2020). Exotic species are signified in text by an asterisk (*) within this report.



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LEGEND	
	Project Area (ML700021)
	Mining leases
	Cadastre
	Watercourse (Water Act 2000)
Flora	
	Threatened Flora (SKM 2020)
	Quaternary sites (BAAM 2021)
	Secondary Sites (BMA 2016)
Fauna	
	Quaternary Sites (BMA 2016)
	Vertebrate Fauna Observations (BAAM 2020)
	Threatened Fauna Records (AECOM 2016)
	Winter Sites (BMA 2016)
	Ecology Survey Sites (AECOM 2016)
	Aquatic Survey Sites (AECOM 2018)

SURVEY SITES

**Grevillea Pit Continuation Project
MNES - Significant Impact
Assessment Report**

	PROJECT ID	60712195	Figure 2
	CREATED BY	Kate Brodie	
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3.5 Impact assessment

MNES known, likely or having potential to occur within the project area were subject to a two-step process to assess the potential for significant impacts. The purpose of the two-step approach was to focus in on MNES values relevant to potential Project impacts and determine significant impacts using a condensed risk assessment and then, if recommended, significant impact assessments.

The first step was a screening assessment, which involved reviewing the consequences of potential Project impacts and the likelihood of the consequence occurring. The findings of this indicated the MNES' vulnerability to potential significant impacts, and whether further assessment via the significant impact assessment process was completed to determine potential significant impacts.

For the impact assessments, direct impact to the entire project area identified in Figure 1 has been assumed to occur. The significant impact assessment is documented in Section 8.0.

3.5.1 Screening assessment

To determine the Project's anticipated consequence, the nature and magnitude of potential Project impacts were assessed against three consequence levels which contained multiple criteria (Table 1). To determine the likelihood, the potential for species presence was assessed (Table 2). These scores were then reviewed against a screening assessment matrix.

The context of the specific MNES values' ecology such as community or species' distribution, habitat preferences including breeding habitat and movement patterns was considered. For MNES with referral guidance documents, any terminology, area thresholds and recommendations detailed within were considered foremost. Knowledge gaps and known threats were also reviewed. To assign a consequence level of one or two, all criteria associated with that level must be met, otherwise a level three is automatically assigned. Only one of the criteria in consequence level three needs to be met in order for that level to be assigned.

MNES that are evaluated via the outcome matrix with a 'potential risk' outcome (orange) (i.e. consequence level of 3 and possible likelihood) triggered further assessment whilst MNES with a 'low risk' outcome (green) were not recommended for further assessment (Table 3). The risk assessment framework, including likelihood and consequence criteria for specific MNES are outlined below in Table 1, Table 2, and Table 3.

Table 1 Screening framework: consequence criteria

Consequences	Criteria	
	Threatened species and communities	Migratory species
	1	<ul style="list-style-type: none"> No impacts to threatened species populations, ecological communities, habitat extent and habitat quality; and No increase in threatening processes to threatened species and ecological communities; and Threatened species and ecological communities recovery or persistence is unaffected.
2	<ul style="list-style-type: none"> Impacts to threatened species, ecological communities and associated habitats are of a low magnitude or are short-term; and Increased threatening processes to threatened species and ecological communities can effectively be mitigated by well characterised management measures; and In a regional context, reduction in available habitat is inconsequential; and Species specific referral guidance (if available) indicates a low risk. 	<ul style="list-style-type: none"> Impact area is below species-specific clearing thresholds (if available); and No impacts to areas supporting an ecologically significant proportion of a population; and Impacts to migratory species important habitat are of a low magnitude or are short-term; and Increased threatening processes to migratory species can effectively be mitigated by well characterised management measures; and In a regional context, reduction in available habitat is inconsequential.
3	<ul style="list-style-type: none"> Species has been confirmed within the project area or in adjacent properties; however uncertainty on population density, population dynamics and or habitat utilisation occurs; or Population numbers and habitat utilisation within the project area may vary temporally and spatially due to dependence on climatic conditions i.e. rainfall events recharging wetlands. Therefore, full extent of potential impacts on threatened species is uncertain; or Impacts to threatened species, ecological communities and associated habitats are of a moderate or high magnitude or are longer-term; or Increased threatening processes to threatened species and ecological communities require more intensive, longer-term management or intervening measures to mitigate impacts; or Receiving environment is more sensitive to impacts or the consequence of the impact is uncertain; or In a regional context, reduction in available habitat is notable; or Species specific referral guidance (if available) indicates a moderate or high risk. 	<ul style="list-style-type: none"> Multiple individuals were recorded using habitat within the project area; Close to or above species-specific clearing thresholds (if available); or Impacts to areas supporting or close to supporting an ecologically significant proportion of a population; or Impacts to migratory species important habitat are of a moderate or high magnitude or are longer-term; or Increased threatening processes to migratory species require more intensive, longer term management or intervening measures to mitigate impacts; or Receiving environment is more sensitive to impacts or the consequence of the impact is uncertain; or In a regional context, reduction in available habitat is notable.

Table 2 Screening framework: likelihood criteria

Likelihood level	Descriptor
Highly unlikely	<ul style="list-style-type: none"> May only occur in exceptional circumstances No previous incidence of occurring
Unlikely	<ul style="list-style-type: none"> Very low chance of occurring One rare previous incidence of occurring
Possible	<ul style="list-style-type: none"> Might occur in some circumstances Few previous incidences of occurring

Table 3 Screening framework: outcome matrix

Likelihood	Consequence		
	1	2	3
Highly unlikely	Low risk – no further assessment recommended	Low risk – no further assessment recommended	Low risk – no further assessment recommended
Unlikely	Low risk – no further assessment recommended	Low risk – no further assessment recommended	Low risk – no further assessment recommended
Possible	Low risk – no further assessment recommended	Low risk – no further assessment recommended	Potential risk – further assessment recommended

3.5.2 Significant impact assessment

Significant impact assessments were undertaken for all MNES evaluated with a 'potential risk' outcome (orange) using the matrix in Table 3 within the screening assessment process (Section 3.5.1). The *EPBC Act Policy Statement 1.1 Significant Impact Guidelines: Matters of National Environmental Significance* (Department of the Environment, 2013b) provides the framework for the assessment of potential impacts upon MNES as well as a process for determining the level of significance of impacts.

In accordance with the guidelines, impacts on MNES are to be assessed utilising the broadest scope of the Project, with consideration to both direct and indirect impacts and proposed measures that may avoid and reduce impacts. Significance is tested through a set criterion stipulated in the guideline, which is tailored to each MNES and for some values, the conservation status of the MNES.

The significant impact criteria utilised in the assessment is outlined as per the guidelines in Table 4.

Table 4 Significant impact criteria and key definitions

MNES	Criteria	Key definitions
Critically endangered and endangered species and ecological communities	<p>An action is likely to have a significant impact on a Critically Endangered or Endangered species if there is a real chance or possibility that it will:</p> <ul style="list-style-type: none"> • Lead to a long-term decrease in the size of a population; • Reduce the area of occupancy of the species; • Fragment an existing population into two or more populations; • Adversely affect habitat critical to the survival of a species; • Disrupt the breeding cycle of a population; • Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; • Result in invasive species that are harmful to a Critically Endangered or Endangered species becoming established in the Endangered or Critically Endangered species' habitat; • Introduce disease that may cause the species to decline; or • Interfere with the recovery of the species. 	<p>'Habitat critical to the survival of a species' refers to areas that are necessary:</p> <ul style="list-style-type: none"> • For activities such as foraging, breeding, roosting, or dispersal; • For the long-term maintenance of the species (including the maintenance of species essential to the survival of the species, such as pollinators); • To maintain genetic diversity and long-term evolutionary development, or • For the reintroduction of populations or recovery of the species.
Vulnerable species and ecological communities	<p>An action is likely to have a significant impact on a Vulnerable species if there is a real chance or possibility that it will:</p> <ul style="list-style-type: none"> • Lead to a long-term decrease in the size of an important population of a species; • Reduce the area of occupancy of an important population; • Fragment an existing important population into two or more populations; • Adversely affect habitat critical to the survival of a species; • Disrupt the breeding cycle of an important population; • Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; • Result in invasive species that are harmful to a Vulnerable species becoming established in the Vulnerable species' habitat; • Introduce disease that may cause the species to decline; or • Interfere substantially with the recovery of the species. 	<p>'Habitat critical to the survival of a species' as defined above. An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:</p> <ul style="list-style-type: none"> • Key source populations either for breeding or dispersal; • Populations that are necessary for maintaining genetic diversity, and/or • Populations that are near the limit of the species range.

MNES	Criteria	Key definitions
Migratory species	<p>An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:</p> <ul style="list-style-type: none"> • Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species; • Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or • Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species. 	<p>An area of 'important habitat' for a migratory species is:</p> <ul style="list-style-type: none"> • Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or • Habitat that is of critical importance to the species at particular life-cycle stages, and/or • Habitat utilised by a migratory species which is at the limit of the species range, and/or • Habitat within an area where the species is declining. <p>Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an 'ecologically significant proportion' of the population varies with the species (each circumstance will need to be evaluated). Some factors that should be considered include the species' population status, genetic distinctiveness and species-specific behavioural patterns (for example, site fidelity and dispersal rates).</p>

3.6 Limitations

This assessment has been completed using a combination of desktop information and information extrapolated from recent field surveys within and surrounding the project area. As such the results are subject to the level of accuracy and detail associated with this information. To address this limitation, a precautionary approach has been applied. Where potential suitable habitat for MNES, or Regional Ecosystems (REs) (remnant or high value regrowth (HVR) condition) analogous to a potential TEC has been identified, presence has been assumed and therefore included in the impact assessment.

For the purpose of the impact assessments, it has been assumed that the clearing impact area is the maximum direct impact encompassing the entire project area. As this is the maximum disturbance area, the impact assessment is considered conservative.

4.0 Ecological Values

4.1 Vegetation communities

Using the Queensland Regional Ecosystems method of classification, field surveys identified three remnant vegetation systems within the project area, namely RE 11.4.9 and RE 11.5.3 within a small area of vegetation in the western half of the project area, and minor sections of RE 11.3.4 along the southern edge of the project area adjacent to Phillips Creek (BAAM Ecological Consultants, 2021). Vegetation communities are summarised in Table 5. These REs are shown in Figure 3.

Table 5 Vegetation communities within the project area

Vegetation Community	Regional Ecosystem	Condition	Area (ha)
<i>Eucalyptus populnea</i> and/or <i>E. melanophloia</i> and/or <i>Corymbia clarksoniana</i> on Cainozoic sand plains/remnant surfaces	11.5.3	Remnant	9.7
<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest in depressions on Cainozoic sand plains and remnant surfaces	11.4.9	Remnant	3.1
<i>Eucalyptus tereticornis</i> and/or <i>Eucalyptus</i> spp. woodland on alluvial plains	11.3.4	Remnant	0.02
Total remnant vegetation			12.8
Non-remnant			208.1
Total			220.9

4.2 Threatened ecological communities

The PMST report generated for the Project indicated that three EPBC Act listed TECs potentially occur within the project area (Appendix A):

- Brigalow (*Acacia harpophylla* dominant and co-dominant) (Brigalow TEC);
- Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin (Natural Grasslands TEC); and
- Poplar Box Grassy Woodland on Alluvial Plains (Poplar Box TEC).

The likelihood of occurrence assessment identified the Brigalow TEC as likely to occur in the project area, associated with 3.1 ha of remnant RE 11.4.9 (BAAM Ecological Consultants, 2021). The Brigalow TEC is listed as Endangered under the EPBC Act and is characterised by the presence of Brigalow (*Acacia harpophylla*) as one of the three most abundant tree species (Butler, 2007). Brigalow is usually either dominant in the tree layer or co-dominant with other species such as *Casuarina cristata* (Belah), other species of *Acacia*, or species of *Eucalyptus*. The assumed Brigalow TEC mapped within the project area is displayed in Figure 4.

Surveys from 2016 identified this isolated patch as regrowth RE 11.5.16 dominated by Belah with regrowth Brigalow, and therefore not considered Brigalow TEC (AECOM, 2016). It is plausible that the Brigalow has grown to maturity during this time, particularly if the regrowth is a result of resprouting from a larger root system, which grow far more rapidly (Johnson, 1964). While additional field validation is required to determine the full extent and condition of Brigalow TEC within the project area, for the purposes of this assessment it has been treated as meeting the definition of the TEC.

Both Natural Grasslands TEC and Poplar Box TEC were considered unlikely to occur in the project area, primarily due to the absence of analogous REs associated with each TEC (Appendix B). The presence of *Eucalyptus populnea* (poplar box) is associated with RE 11.5.3, which does not form part of the Poplar Box TEC. There is potential for *Dichanthium* spp. (bluegrasses) to occur on cracking clay

soils, which may meet the Natural Grasslands TEC. However, numerous surveys by different ecologists did not find either TEC within the project area.

4.3 Conservation significant flora

The PMST identified five EPBC Act listed flora species as having potential to occur within 10 km of the project area (Appendix A). The likelihood of occurrence assessment determined two EPBC Act listed flora species with potential to occur within the project area, being *Dichanthium queenslandicum* and *Dichanthium setosum* (Appendix B).

There were no threatened flora species under the EPBC Act found within the project area during previous field surveys (AECOM, 2016; BAAM Ecological Consultants, 2021). However, one species (*Dichanthium setosum*) was recorded adjacent to the project area south of Phillips Creek (Figure 7) and potential habitat for *D. setosum* and *D. queenslandicum* has been mapped within the remnant vegetation RE 11.4.9 in the project area (AECOM, 2016; BAAM Ecological Consultants, 2021). *D. setosum* is considered as likely to occur within the project area while *D. queenslandicum* is considered as having potential to occur.

4.4 Conservation significant fauna

The PMST identified 33 EPBC Act listed fauna species as having potential to occur within 10 km of the project area. Based on past field surveys, the likelihood of occurrence assessment determined 19 fauna species as likely or having potential to occur in the project area (Table 6). Two mammal species are considered as likely to occur within the project area, namely the greater glider (southern and central) (*Petauroides volans*) and the koala (*Phascolarctos cinereus*). These two species were found within Phillips Creek immediately adjacent to the project area (AECOM, 2016; BAAM Ecological Consultants, 2021). In total, six bird species, seven migratory birds, four mammals and two reptiles are considered as likely or with potential to occur.

Locations of threatened fauna species records from previous surveys and mapped potential fauna habitat are shown in Section 8.0 (Figure 5, Figure 6, Figure 8 and Figure 9). The complete likelihood of occurrence assessment can be found in Appendix B.

Table 6 Conservation significant fauna species potentially occurring in the project area

Common name	Scientific name	EPBC Act Status ¹	Likelihood of Occurrence in the project area
Birds			
Grey falcon	<i>Falco hypoleucos</i>	V	Potential
Squatter pigeon (southern)	<i>Geophaps scripta scripta</i>	V	Likely
Painted honeyeater	<i>Grantiella picta</i>	V	Potential
White-throated needletail	<i>Hirundapus caudacutus</i>	V, Mi	Potential (flyover only)
Star finch (eastern)	<i>Neochmia ruficauda ruficauda</i>	E	Potential
Australian painted snipe	<i>Rostratula australis</i>	E	Potential
Mammals			
Ghost bat	<i>Macroderma gigas</i>	V	Potential
Corben's long-eared bat	<i>Nyctophilus corbeni</i>	V	Potential
Greater glider (southern and central)	<i>Petauroides volans</i> , (syn. <i>P. armillatus</i> , <i>P. v. volans</i>)	E	Likely
Koala	<i>Phascolarctos cinereus</i>	E	Likely
Reptiles			
Ornamental snake	<i>Denisonia maculata</i>	V	Potential

Common name	Scientific name	EPBC Act Status ¹	Likelihood of Occurrence in the project area
Yakka skink	<i>Egernia rugosa</i>	V	Potential
Migratory birds			
Fork-tailed swift	<i>Apus pacificus</i>	Mi	Potential (flyover only)
Sharp-tailed sandpiper	<i>Calidris acuminata</i>	Mi	Potential
Pectoral sandpiper	<i>Calidris melanotos</i>	Mi	Potential
Oriental cuckoo	<i>Cuculus optatus</i>	Mi	Potential
Latham's snipe	<i>Gallinago hardwickii</i>	Mi	Potential
Satin flycatcher	<i>Myiagra cyanoleuca</i>	Mi	Potential
Rufous fantail	<i>Rhipidura rufifrons</i>	Mi	Potential

¹ Conservation status under the EPBC Act where CE=Critically Endangered, E=Endangered, V=Vulnerable, Mi = Migratory.

4.5 Introduced flora and fauna species

Four introduced flora species listed as Category 3 restricted matter under the *Biosecurity Act 2014* (Biosecurity Act) were found to occur within the project area during previous field surveys (AECOM, 2016) (Table 7). Two of these species are also listed as Weeds of National Significance (WoNS).

Table 7 Introduced flora species potentially occurring in the project area

Common name	Scientific name	WoNS List	Biosecurity Act
Harrisia cactus	<i>Harrisia martinii</i> *	-	Category 3
Lantana	<i>Lantana camara</i> *	Yes	Category 3
Velvet tree pear	<i>Opuntia tomentosa</i> *	-	Category 3
Parthenium	<i>Parthenium hysterophorus</i> *	Yes	Category 3

Three other WoNS and Biosecurity Act listed weed species were found during recent surveys within the broader SRM, and hence may also occur within the project area (BAAM Ecological Consultants, 2021). These species were:

- *Cryptostegia grandiflora** (rubber vine)
- *Opuntia stricta** (prickly pear)
- *Parkinsonia aculeata** (Parkinsonia).

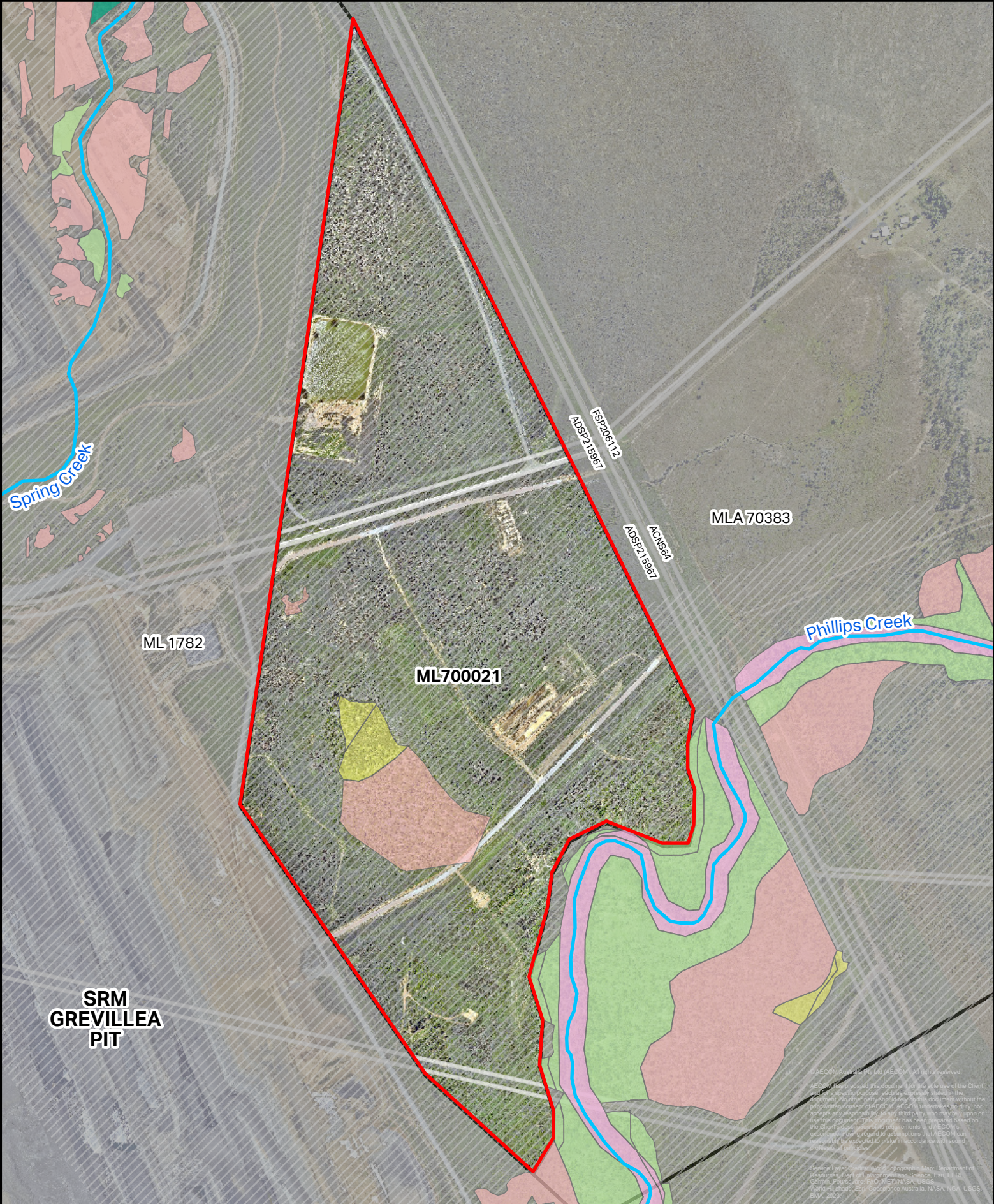
A total of four introduced fauna species were recorded during previous field surveys within the project area (AECOM, 2016), three of which are listed as restricted matter under the Biosecurity Act (Table 8). Other introduced fauna that were not detected during the field surveys but are considered likely to occur within the project area include feral cat (*Felis catus**), dog (*Canis lupus**), European hare (*Lepus capensis**), house mouse (*Mus musculus**) and cane toad (*Rhinella marina**) (AECOM, 2016).

Table 8 Introduced fauna species known within the project area

Common name	Scientific name	Biosecurity Act status
European rabbit	<i>Oryctolagus cuniculus</i> *	Category 3,4,5,6
Fox	<i>Vulpes vulpes</i> *	Category 3,4,5,6
Pig	<i>Sus scrofa</i> *	Category 3,4,6
Cattle	<i>Bos taurus</i> *	-

4.6 Wetlands and watercourses

One ephemeral major waterway occurs immediately adjacent to the project area to the south, namely Phillips Creek (AECOM, 2016; BAAM Ecological Consultants, 2021) (Figure 1). No other naturally occurring permanent or ephemeral wetlands or watercourses were identified within the project area or surrounding area, based on biological features observed during previous field survey effort (AECOM, 2016; BAAM Ecological Consultants, 2021).



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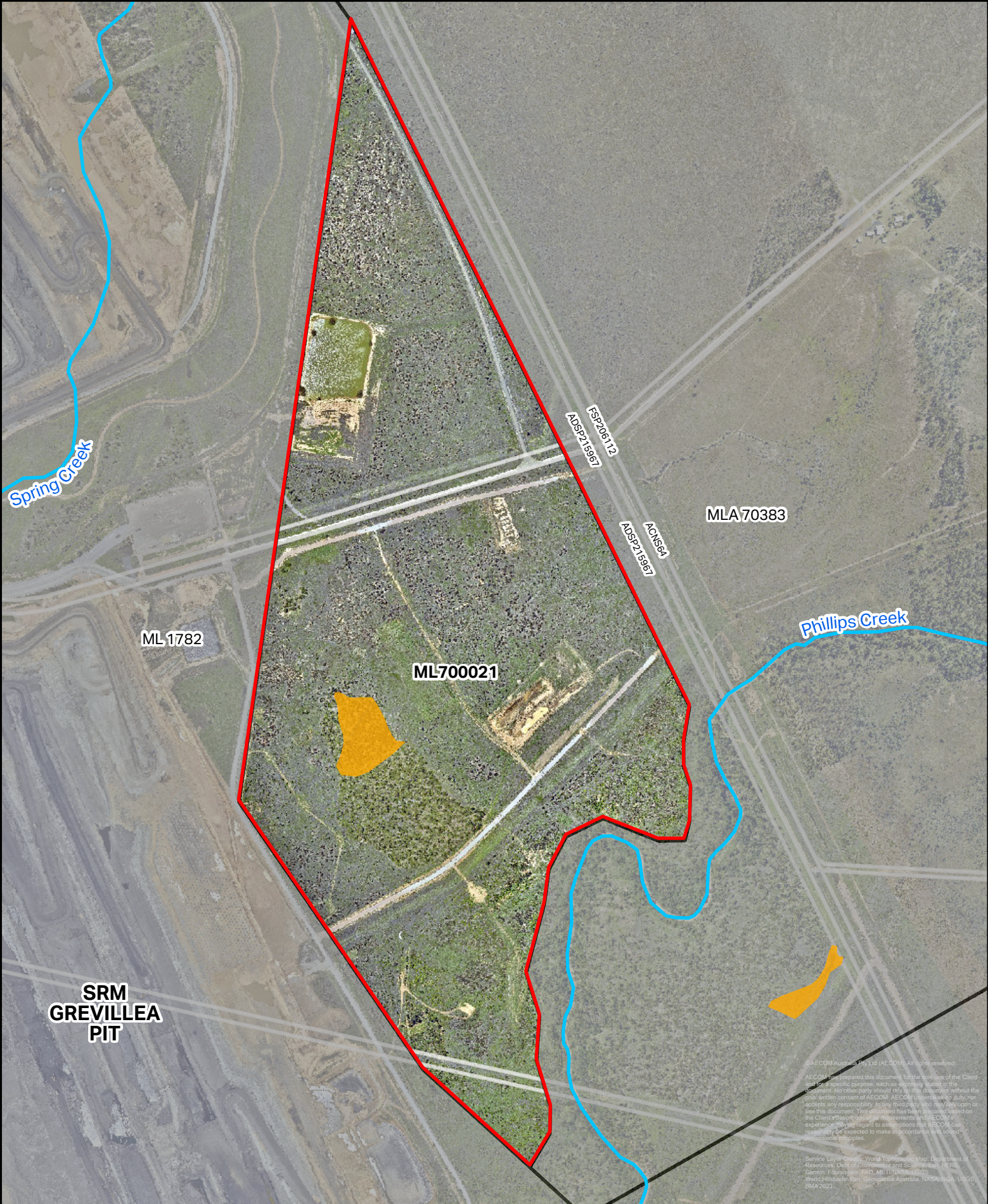
- Project Area (ML700021)
- Mining leases
- Cadastre
- Watercourse (Water Act 2000)
- Regional Ecosystems (BAAM, 2021) 11.3.2
- 11.3.25
- 11.3.4
- 11.4.9
- 11.5.3
- Non-remnant

REGIONAL ECOSYSTEMS

Grevillea Pit Continuation Project
 MNES - Significant Impact Assessment Report

BMA
 BHP Mitsubishi Alliance

PROJECT ID	60712195	Figure 3
CREATED BY	Kate Brodie	
LAST MODIFIED	21 Dec 2023	
VERSION	3	



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LEGEND

- Project Area (ML700021)
- Mining leases
- Cadastre
- Watercourse (Water Act 2000)
- Threatened Ecological Communities (TECs) (BAAM, 2021)
- Brigalow (Acacia harpophylla dominant and co-dominant)

THREATENED ECOLOGICAL COMMUNITIES
Grevillea Pit Continuation Project
MNES - Significant Impact Assessment Report



PROJECT ID 60712195
 CREATED BY Kate Brodie
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 VERSION: 3

Figure
4

5.0 Matters of National Environmental Significance

A summary of MNES values and whether they have been identified within the project area is presented in Table 9.

Table 9 MNES values within the project area

MNES Value	Value Present?	Comments
World heritage properties	✘	There are no world heritage properties within or nearby the project area.
National heritage places	✘	There are no natural heritage places within or nearby the project area.
Wetlands of international importance (listed under the Ramsar convention)	✘	There are no wetlands of international importance within or nearby the project area.
Listed threatened species and ecological communities	✓	<p>The likelihood of occurrence assessment identified the following EPBC Act listed species and communities as known, likely or with potential to occur within the project area:</p> <p>Fauna</p> <ul style="list-style-type: none"> • Grey falcon (Potential) • Squatter pigeon (southern) (Likely) • Painted honeyeater (Potential) • White-throated needletail (Potential, flyover only) • Star finch (eastern) (Potential) • Australian painted snipe (Potential) • Ghost bat (Potential) • Corben's long-eared bat (Potential) • Greater glider (southern and central) (Likely) • Koala (Likely) • Ornamental snake (Potential) • Yakka skink (Potential) <p>Flora</p> <ul style="list-style-type: none"> • King bluegrass (Potential) • Bluegrass (Likely) <p>TECs</p> <ul style="list-style-type: none"> • Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant) (Likely)
Migratory species	✓	<p>The likelihood of occurrence assessment identified the following EPBC Act listed migratory species as known, likely or with potential to occur within the project area:</p> <ul style="list-style-type: none"> • Fork-tailed swift (Potential, flyover only) • Sharp-tailed sandpiper (Potential) • Pectoral sandpiper (Potential) • Oriental cuckoo (Potential) • Latham's snipe (Potential) • Satin flycatcher (Potential) • Rufous fantail (Potential)
Commonwealth marine areas	✘	The project area is sufficiently distant from any Commonwealth Marine Area that no impacts are anticipated.

MNES Value	Value Present?	Comments
Great Barrier Reef Marine Park	✘	The Great Barrier Reef Marine Park does not occur within or nearby to the project area.
Commonwealth Land	✘	Commonwealth land is not located within proximity to the project area.
Nuclear Actions	✘	The Project is not and does not involve a nuclear action.
Protection of water resources from coal seam gas development and large coal mining development	✓	The Project involves a coal mining development and as such impacts to 'a water resource' are possible.

6.0 Potential Impacts

Information on the potential impacts associated with the Project are outlined below per project phase. Proposed mitigation measures to minimise potential impacts on relevant MNES values are outlined in Section 7.0 of this report.

6.1 Operation phase

The greatest risk of potential impact on MNES values from the Project will occur during the operation phase. Mining activities related to the Project will involve permanent and temporary impacts from:

- Vegetation clearing.
- Civil earthworks, ground disturbance and ground reinstatement.
- Construction of temporary and permanent mine facilities and associated infrastructure.
- Progressive re-vegetation of embankments, disturbed areas and open channel drains where practical.
- Open cut coal mining.

Potential direct and indirect impacts associated with these activities are described below.

6.1.1 Direct impacts

6.1.1.1 Vegetation clearing

The disturbance area for the Project is 220.9 ha, comprised primarily of non-remnant vegetation (208.1 ha) with some remnant vegetation (12.8 ha) (Figure 3).

Potential impacts as a result from vegetation clearing may include:

- Loss of habitat causing a reduction of biological diversity or loss of individuals and genotypes.
- Loss of or disturbance to microhabitat features such as leaf litter, ground timber, shrubs and hollows.
- Loss of floristic diversity and the food resources this provides such as foliage, flowers, nectar, fruit and seeds.
- Increase in edge effects adjacent to the project area, leading to increase in light and noise penetration, alterations in microclimates, and further weed/pest incursion.
- Fragmentation or loss of habitats resulting in reduced dispersal opportunities for fauna, particularly ground dwelling species such as ornamental snake.
- Destruction of abiotic features necessary to support vegetation communities and habitat types.

6.1.1.2 Loss and disturbance to fauna habitat

Clearing of vegetation (both native and exotic) can adversely impact native fauna including MNES species, through direct habitat loss, reduction in habitat quality, edge effects and habitat fragmentation.

While most impacts for the Project are to occur within non-remnant and modified vegetation consisting of minimal habitat resources, potential impacts to terrestrial fauna habitat may include:

- Direct displacement of fauna from the project area, an overall reduction in fauna diversity and/or loss of local populations.
- Reduced availability of important habitat features (e.g., tree hollows, forage trees) for MNES species which rely on the availability of nesting, foraging, breeding and shelter habitat for survival.
- Fragmentation of habitats resulting in reduced dispersal opportunities for fauna.
- Fragmentation of populations, potentially reducing gene flow.

6.1.1.3 Habitat Fragmentation

Habitat fragmentation can occur as a result of operation phase activities for the Project. While habitats within the project area are modified and have already been subject to fragmentation, the following impacts have the potential to occur:

- Dissect and disconnect vegetation communities.
- Reduce the size of habitat patches.
- Impact the success of seed dispersal, species recruitment and ultimately the long-term viability and persistence of a vegetation community.
- Reduce fauna movement opportunities, leading to reduced species recruitment, genetic flow and ultimately affect the long-term viability and persistence of fauna populations within the landscape.

Due to the already highly disturbed state of vegetation within the project area fragmentation impacts are expected to be minor in nature.

6.1.1.4 Fauna disturbance, injury and mortality

The number of road vehicles is likely to increase during operation phase to what is currently experienced in the project area, and as such the potential for disturbance, injury and mortality of fauna is also likely to increase.

Potential impacts associated with the disturbance, injury and mortality of fauna as a result of the Project includes:

- Increase in strikes, particularly for species with low mobility such as koala, ornamental snake and squatter pigeon (southern);
- Entrapment and/or disorientation in the use of habitats and movement pathways, particularly for tree- or hollow-dwelling species, such as koala and greater glider;
- Entrapment in trenches/holes particularly for ground-dwelling and/or nocturnal species, such as ornamental snake; and
- Acute and chronic stress, particularly for threatened mammals.

6.1.2 Indirect impacts

6.1.2.1 Introduction and spread of weeds, pest and pathogens

Weeds including WoNS and pests have been observed within the project area, and pathogens may also occur. Weeds, pests and pathogens can become a significant biosecurity risk and problem for the Project's public amenity and/or the environment (that is ecosystems and habitat) (Department of Agriculture Fisheries and Forestry, n.d.). Weeds, pests and pathogens can also compromise the integrity of and outcompete native species, reduce the native flora germination, increase the intensity and/or frequency of fires, impact the environment's resilience to drought, bushfires, flood and changing climates, and threaten the long-term survival of native species, especially threatened species which are generally more sensitive to threats.

Due to weeds and pests previously being observed in the project area, it is unlikely the introduction or spread of these, or pathogens, would occur as a result of the Project.

6.1.2.2 Increased noise, light and vibration

Increases in noise, light and vibration will occur during the operation phase, however this will be similar to the current levels associated with active mining directly adjacent to the project area. Increased light, noise and vibration can alter individual species behaviours, and disrupt the balance of inter-species interactions. Typically, fauna will move away from noise and light sources as these may be perceived as a threat. However, it is noted that acclimatisation by some species may occur over the medium to long term.

Current research indicates that there are no government policies or other widely accepted guidelines in respect to the noise levels which may be acceptable to wildlife. The levels or character of noise that may "startle" or otherwise affect the feeding or breeding pattern of birds or other wild animals are also

not firmly established in the technical literature. Sudden loud, impulsive or impact noises are capable of causing birds and other fauna to become startled, which if occurring over the longer term, may affect feeding and breeding behaviour in some species. These impacts are expected to occur to the fauna using the habitats immediately adjacent to the project area.

Potential impacts to adjacent habitat associated with increased noise, light and vibration levels as a result of the Project includes:

- Artificial light disrupting sleep cycle patterns, with nocturnal, diurnal and crepuscular species exhibiting different responses due to quality of light (e.g. wavelength, colour), intensity and duration.
- Disorientation from or attraction toward artificial sources of light.
- Temporary loss of senses leading to mortality from collisions with vehicles and structures.
- Effects on life history stages of species, such as foraging and movement behaviours, breeding cycles, migration patterns, and flower/fruitletting patterns for plants.
- Reduced foraging ability by auditory predators due to increased background noise.
- Artificial light and increased noise increasing the abundance and efficiency of predators.

However, it is recognised that these indirect impacts will be similar to the current levels associated with active mining directly adjacent to the project area.

6.1.2.3 Erosion, sediment runoff and alteration to hydrology

The Project has the potential to cause erosion, sediment runoff, and alterations to surface water and groundwater levels which can have adverse impacts such as:

- Soil structure and composition change through the loss of topsoil and exposure of subsoil, which often has poor physical and chemical properties;
- Alteration of water quality and nutrient levels;
- Reduction in aquatic habitats;
- Degradation of vegetation composition and health; and
- Watercourse turbidity.

Significant alterations to hydrology, increases to erosion or sediment runoff are considered unlikely as a result of the Project.

6.1.2.4 Increased dust

Deposition of dust, sand and soil resulting from operation phase may have potential impacts on vegetation if excessive levels are sustained over extended periods. When dust settles on plant foliage it can reduce the amount of light penetration on the leaf surface, block and damage stomata, and slow rates of gas exchange and water loss (Farmer, 1993). A reduction in the ability to photosynthesise may result in reduced growth rates of vegetation, and decrease in plant vigour and overall community health. Potential effects of dust deposition on vegetation are determined by a number of factors including:

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

To note, the dominant vegetation community in the surrounding area (such as Phillips Creek) comprises sclerophyllous species such as *Eucalyptus*, *Corymbia* and *Acacia* species. Sclerophyllous species are not generally sensitive to dust deposition, since they generally have pendulous leaves (i.e., the leaf points down), with a thick smooth cuticle that does not encourage particulate matter to remain on the surface. Therefore, impacts associated with increased dust deposition are considered low.

6.1.2.5 Potential environmental spills

The Project has the potential to cause environmental spills due to the use of vehicles, machinery and the use/storage of fuel and chemicals.

In particular, the Project is located within vicinity to drainage features and Phillips Creek, which may be sensitive to sediment runoff and alterations to hydrology.

6.1.2.6 Groundwater drawdown

The Project has the potential to impact groundwater resources through direct interaction with aquifers by open cut mining and indirect take from adjacent hydrostratigraphic units due to changes in hydraulic gradients.

Potential impacts to groundwater resources may include:

- reduction in groundwaters and availability for use including ecological, stock watering, and mine water extraction
- long term impacts associated with ongoing final void pit water evaporation
- blending and water deterioration due to evaporation from final proposed action void.

The proposed action, based on the initial assessment of potential groundwater impacts within the approved SRM, is considered not to have a significant impact on water resources.

6.2 Decommissioning and rehabilitation phase

The decommissioning phase will involve the removal of mine infrastructure and rehabilitation of landforms. As such further direct disturbances are not expected during this phase or will be temporary in nature.

There is the potential for indirect impacts to occur if the decommissioning process is not managed appropriately. These indirect impacts can include introduction and spread of weeds, pests and pathogens, erosion, sediment runoff and alteration to hydrology, increased dust, and potential environmental spills.

However, the abovementioned impacts as a result of the Project are considered to be low risk provided proposed decommissioning works will be undertaken in accordance with the Mine Void Closure Plan (WSP, 2022), which outlines how the Project will minimise environmental harm through a closure landform design that comprises residual void partial backfill, increased off set distance, removal of culverts and other infrastructure from watercourses/floodplains and changes to flood protection landforms to provide increased protection from flood water.

7.0 Mitigation Measures

BMA has implemented the hierarchy of management principles in the planning for and development of the Project. These principles and the order in which they have been applied is as follows.

1. **Avoid:** locating activities to avoid direct and indirect impacts on MNES.
2. **Minimise:** minimising direct and indirect impacts where they cannot be completely avoided.
3. **Mitigate:** implementing mitigation and management measures to reduce direct, indirect and cumulative impacts.
4. **Remediate and rehabilitate:** actively remediate and rehabilitate impacted areas to promote long-term recovery.
5. **Offset (where necessary):** provide suitable offsets for activities that result in significant residual impacts to MNES even with the implementation of the above principles.

The following section outlines how potential Project impacts on MNES will be avoided, minimised, mitigated, remediated/rehabilitated and offset (where necessary). BMA has committed to undertaking mitigation measures throughout all phases of the Project to avoid, reduce or compensate for potential impacts on MNES. BMA have committed to preparing further management and monitoring plans to address specific impacts and mitigation measures relevant to MNES. Further information relating to these plans is provided in this section.

Management and monitoring plans will also be prepared if requested to address specific impacts and mitigation measures relevant to MNES.

7.1 Avoid and minimise

Significant mine engineering design has been undertaken in the development of the finalised project area. The Project location is defined by the nature and scale of the coal deposit. As such, it is constrained by resource, geography, existing infrastructure and feasibility considerations. While an alternative option to not proceed with the Project would avoid potential environmental impacts, it would also result in substantial socio-economic impacts, including:

- loss of economic benefit;
- reduced local, state and nationwide job opportunities;
- reduced demand and income for support industries and service suppliers;
- resources will not be available to supply high quality coal products to export markets; and
- missed opportunity for employee opportunities, apprenticeship programs, support of local businesses and financial donations to community groups and local projects.

The finalised layout of the Project aims to optimise mining to access most of the target resource with the smallest footprint to minimise impacts to land, environment, heritage and community values. The Project location has also been identified to enable an opportunity for strategic growth, as the extent and nature of the resource is well understood due to extensive exploration and historic mining in the area. As such, BMA can bring this Project into production reasonably quickly compared to less well-known resources.

7.2 Mitigate and rehabilitate

All phases of the Project will be undertaken in accordance with conditions outlined in EA EPML00862313, effective 29 June 2023. The EA conditions the development and implementation of several management plans which document the potential risk to the environment from activities, control measures and procedures to be implemented, managing incidents and performance indicators. These management plans include:

- Waste Management Plan
- Topsoil Management Plan

- Rehabilitation Management Plan
- Receiving Environment Management Plan
- Water Management Plan.

In addition, mitigation and management measures are in place as per the SRM environmental management framework which will be implemented and updated for the project area where necessary, as a continuation of the existing operation at SRM.

Table 10 below outlines recommendations for mitigation and management measures.

Table 10 Recommendations for mitigation and management measures for the Project

Impact	Mitigation measures
General	<p>The following general measures will be implemented to mitigate and manage potential environmental impacts:</p> <ul style="list-style-type: none"> • pre-clearing inspections, establishment of exclusion zones and on-ground identification of specific habitat features to be retained. • temporary fencing to minimise the risk of fauna injury / mortality due to vehicle strike or entrapment in deep excavations. <p>Progressive Rehabilitation and Closure Plan (PRCP) will be implemented and audited which:</p> <ul style="list-style-type: none"> • Includes rehabilitation and revegetation requirements for disturbed areas no longer required for active use, particularly within fauna habitat and along creek lines. • Recommends species list for rehabilitation of disturbed areas and batters. • Guides progressive rehabilitation that considers the <i>Mined Land Rehabilitation Policy</i> (Department of Environment and Science, 2019). • Achieves properly managed waterways in relation to mine associated environmental impacts • Achieves rehabilitation in alignment with post mining land use objectives in line with the <i>BHP Queensland Coal Rehabilitation Completion Criteria</i> (BHP, 2018). • Waterways that are comparable to pre-mining conditions where practicable • mitigates environmental risk.
Vegetation clearing; loss and disturbance to fauna habitats.	<p>A qualified fauna spotter catcher¹ should be engaged prior to and during any vegetation clearing to ensure that legislative obligations with respect to protection of native fauna are met. The responsibilities of the fauna spotter catcher will ensure that:</p> <ul style="list-style-type: none"> • Pre-clearance searches of habitat to be undertaken, with habitat features/trees clearly identified and searched for fauna presence. • Hollows to be inspected for breeding places prior to clearing using work platforms, inspection cameras, or other suitable methods. • Clearing only occurs once a spotter catcher gives sign off that vegetation has been inspected and is clear of native fauna identified as present on the site. • Where possible, clearing commences in areas of least connectivity and directs fauna towards retained areas, in particular towards remnant vegetation with the project area. • Clearing is sequenced to ensure adequate time for fauna to relocate towards retained areas. <p>In order to minimise and manage potential edge effects, the following mitigation measures are recommended:</p> <ul style="list-style-type: none"> • methods for ensuring clearing does not occur outside of the approved boundaries • measures associated with weed management.

¹ That is, a person holding a Rehabilitation Permit under Queensland's Department of Environment and Science.

Impact	Mitigation measures
	<p>During vegetation clearing:</p> <ul style="list-style-type: none"> • Qualified fauna spotter catcher to be present at all times. • Undertake staged clearing approach to minimise the amount of clearing at one time. • Stockpile cleared vegetation within clearing limits and retain vegetation for on-site rehabilitation. • Hollow bearing trees to be 'slow felled' to minimise the chances of injury or death and are inspected by a qualified fauna spotter catcher to confirm no injured wildlife are present. <p>Where native vegetation is to be cleared, the following recommendations should be implemented in order to minimise impacts on fauna and ensure current ecological values of habitat are maintained during the operational phases of the Project.</p> <ul style="list-style-type: none"> • Restrict the amount of vegetation to be cleared to the minimum footprint required and clearly mark vegetation to be retained. • Clearing should be undertaken in stages to ensure that isolated stands of vegetation are not created and the connectivity of habitat remains intact to allow for the dispersal of fauna. • Clearing should be undertaken towards the direction of any adjacent contiguous vegetation that is not to be cleared to ensure connectivity of habitat is not disrupted. • Clearing near any waterways will include adequate sedimentation fencing to ensure sediment impacts to waterways are restricted. • Qualified fauna spotter catcher to walk through the site prior to vegetation clearing to identify threatened fauna species and their habitat, and to minimise disturbances to sensitive environmental areas where possible. • Qualified fauna spotter catcher to be present during clearing vegetation to ensure fauna is not harmed during clearing activities. • Re-use hollows from hollow bearing trees, cleared trees (as log) and/or provide wildlife habitat such as nest boxes to replace the loss of habitat.
Increased noise, light and vibration	<p>Where night works are required, lights should be directed to minimise light spill into adjacent habitats and to reduce noise and vibration impacts on nocturnal fauna species.</p> <p>All equipment and machinery used during operation will be maintained in good working order, and where practical shielded to minimise noise emissions.</p> <p>Lights used during operation of mine facilities and associated infrastructure will be of a minimum power to fulfil requirements, will be used sparingly, and should not be directed towards surrounding bushland. Hoods or covers will be used to reduce the amount of light spilling onto these areas.</p> <p>Wildlife friendly lighting should be considered and designed. For example, light impacts are to be minimised as much as possible through the use of sensor lighting and/ or directional lighting, where possible</p>
Increased dust	<p>Dust suppression (e.g. watering or polymer application) to be carried out on internal unsealed access roads and other disturbed area to limit generation of dust.</p> <p>All temporary soil stockpiles will be stabilised and/or moistened as required to minimise generation of dust</p> <p>Dust inspections to be undertaken to ensure operation activities are not generating excessive dust near sensitive receivers.</p>
Fauna injury and mortality	<p>Reduction of traffic movements and speed on arterial roads and on/off ramps during dawn and dusk periods, where animal activity is likely to be high.</p> <p>Speed limits on arterial roads and on/off ramps with appropriate signage</p>

Impact	Mitigation measures
	<p>Install fauna awareness signage in locations along access track where fauna are likely to cross.</p> <p>Wherever possible, use existing access and disturbed areas when crossing waterways.</p> <p>Fauna management and protection measures as per general and fauna-specific impacts above.</p>
<p>Erosion, sediment runoff and alteration to hydrology; Environmental spills</p>	<p>The SRM Erosion and Sediment Control Plan (ESCP) and SRM Water Management Plan will be reviewed and updated, where necessary, to manage erosion and sedimentation and water in the project area.</p> <ul style="list-style-type: none"> • Refuelling, chemical storage and maintenance activities will be undertaken in designated containment areas away from environmentally sensitive locations. Containment areas will be designed and managed in accordance with relevant regulatory requirements and standards • Permanent stormwater management systems will be installed as early as possible in the operation phase. • Erosion and sediment control structures will be regularly inspected and maintained. • Topsoil will be stockpiled away from drainage lines to protect it from erosion by surface water runoff. • Dust suppression measures will be implemented • Vehicle washdown will take place in designated areas away from flood plains and drainage lines. • Water from vehicle washdown areas should be treated to remove seeds, oils and other contaminants before reuse for dust suppression or other on-site use or directed to the mine complex water management system for reuse. • Road crossings of streams should be stabilised to minimise wash outs and bank erosion. <p>The following general mitigation measures are required to manage impacts of spills and leaks of fuels, oils and other contaminants on receiving waters.</p> <ul style="list-style-type: none"> • Refuelling to occur within contained, hardstand areas in accordance with AS1940 - The Storage and Handling of Flammable and Combustible Liquids where practical. Where this is not possible, refuelling activities will be located away from streams and drainage lines and supervised by an appropriately trained operator equipped with a spill kit. • Spill clean-up kits will be sited appropriately, based on the risk of a spill occurring and potential volume of material that might be spilled. • All fuel and chemical storages will be designed and operated in accordance with Australian Standards, including AS1940 - The Storage and Handling of Flammable and Combustible Liquids and AS3780 The Storage and Handling of Corrosive Substances. • Spills are to be contained and cleaned up as soon as practical to mitigate the mobilisation of pollutants in drainage lines or watercourses. • Wastewater from vehicle washdown areas should be directed through oil and grease separators and effluent utilised for dust suppression or other use or directed to the mine WMS for reuse.
<p>Introduction and spread of weeds, pests and pathogens</p>	<p>All reasonable and practical measures should be taken to minimise the risks and threats associated with weeds, pests and pathogens.</p>

8.0 Significant Impact Assessment

8.1 MNES species considered in impact assessment process

Potential impacts have been considered for MNES that have either been identified within the project area or assessed as potentially present. MNES subject to further impact assessment are summarised in Table 11 below. The likelihood of occurrence assessment is provided in Appendix B.

Table 11 MNES subject to or discounted from project impact considerations

MNES	EPBC Act Status	Likelihood of occurrence
CONSIDERED IN IMPACT ASSESSMENT PROCESS		
Greater glider (southern and central) (<i>Petauroides volans</i>)	Endangered	Likely
Koala (<i>Phascolarctos cinereus</i>)	Endangered	Likely
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Likely
<i>Dichanthium queenslandicum</i>	Endangered	Potential
Star finch (eastern) (<i>Neochmia ruficauda ruficauda</i>)	Endangered	Potential
Australian painted snipe (<i>Rostratula australis</i>)	Endangered	Potential
Bluegrass (<i>Dichanthium setosum</i>)	Vulnerable	Likely
Squatter pigeon (southern) (<i>Geophaps scripta scripta</i>)	Vulnerable	Likely
Ornamental snake (<i>Denisonia maculata</i>)	Vulnerable	Potential
Yakka skink (<i>Egernia rugosa</i>)	Vulnerable	Potential
Grey falcon (<i>Falco hypoleucos</i>)	Vulnerable	Potential
Painted honeyeater (<i>Grantiella picta</i>)	Vulnerable	Potential
White-throated needletail (<i>Hirundapus caudacutus</i>)	Vulnerable, Migratory	Potential
Ghost bat (<i>Macroderma gigas</i>)	Vulnerable	Potential
Corben's long-eared bat (<i>Nyctophilus corbeni</i>)	Vulnerable	Potential
Fork-tailed swift (<i>Apus pacificus</i>)	Migratory	Potential
Sharp-tailed sandpiper (<i>Calidris acuminata</i>)	Migratory	Potential
Pectoral sandpiper (<i>Calidris melanotos</i>)	Migratory	Potential
Oriental cuckoo (<i>Cuculus optatus</i>)	Migratory	Potential
Latham's snipe (<i>Gallinago hardwickii</i>)	Migratory	Potential
Satin flycatcher (<i>Myiagra cyanoleuca</i>)	Migratory	Potential
Rufous fantail (<i>Rhipidura rufifrons</i>)	Migratory	Potential
NOT FURTHER CONSIDERED (assessed as unlikely to occur in the project area)		
Curlew sandpiper (<i>Calidris ferruginea</i>)	Critically Endangered, Migratory	Unlikely
Southern snapping turtle (<i>Eelseya albagula</i>)	Critically Endangered	Unlikely
Northern quoll (<i>Dasyurus hallucatus</i>)	Endangered	Unlikely
Red goshawk (<i>Erythrotriorchis radiatus</i>)	Endangered	Unlikely
Grey Snake (<i>Hemiaspis damelii</i>)	Endangered	Unlikely

MNES	EPBC Act Status	Likelihood of occurrence
Allan's Ierista (<i>Lerista allanae</i>)	Endangered	Unlikely
Black-throated finch (southern) (<i>Poephila cincta cincta</i>)	Endangered	Unlikely
Australian painted snipe (<i>Rostratula australis</i>)	Endangered	Unlikely
<i>Aristida annua</i>	Vulnerable	Unlikely
Black ironbox (<i>Eucalyptus raveretiana</i>)	Vulnerable	Unlikely
Dunmall's snake (<i>Furina dunmali</i>)	Vulnerable	Unlikely
Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>)	Vulnerable	Unlikely
Fitzroy River turtle (<i>Rheodytes leukops</i>)	Vulnerable	Unlikely
Quassia (<i>Samadera bidwillii</i>)	Vulnerable	Unlikely
Diamond firetail (<i>Stagonopleura guttata</i>)	Vulnerable	Unlikely
Common sandpiper (<i>Actitis hypoleucos</i>)	Migratory	Unlikely
Latham's snipe (<i>Gallinago hardwickii</i>)	Migratory	Unlikely
Caspian tern (<i>Hydroprogne caspia</i>)	Migratory	Unlikely
Black-faced monarch (<i>Monarcha melanopsis</i>)	Migratory	Unlikely
Yellow wagtail (<i>Motacilla flava</i>)	Migratory	Unlikely
Osprey (<i>Pandion haliaetus</i>)	Migratory	Unlikely
Common greenshank (<i>Tringa nebularia</i>)	Migratory	Unlikely

8.2 Screening assessment

MNES values within the project area may be directly or indirectly impacted by the development of the Project. However, the overall risk to MNES values, that is the risk of Project impacts constituting an impact which is “important, notable, or of consequence, having regard to its context or intensity”, will differ based on a combination of factors including the community or species’ ecological characteristics and the likely consequence of such impacts. As such, a screening assessment was undertaken in accordance with the developed risk framework and the approach detailed in Section 3.5.1, to identify MNES that are at low risk of potential Project impacts and MNES that are at potential risk and are recommended for further assessment.

Findings of the screening assessment (Table 12) identified the following seven MNES for further assessment against the significant impact assessment criteria:

- Brigalow TEC
- Koala
- Greater glider (southern and central)
- *Dichanthium queenslandicum*
- Ornamental snake
- *Dichanthium setosum*
- Squatter pigeon (southern).

Table 12 Screening assessment

MNES	Habitat, Threats and Regional Context	Likelihood of occurrence (Appendix B)	Consequence	Likelihood	Risk Rating
Critically Endangered and Endangered species and TECs					
Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant)	In Queensland, the listed Brigalow ecological community comprises the following 16 regional ecosystems (REs): 6.4.2, 11.3.1, 11.4.3, 11.4.7, 11.4.8, 11.4.9, 11.4.10, 11.5.16, 11.9.1, 11.9.5, 11.11.14, 11.12.21, 12.8.23, 12.9-10.6, 12.12.26. The listed Brigalow ecological community extends from south of Charters Towers in Queensland, in a broad swathe east of Blackall, Charleville and Cunnamulla, south to northern New South Wales. In Queensland, the listed ecological community occurs predominantly within the Brigalow Belt North, Brigalow Belt South, Darling Riverine Plains and Southeast Queensland bioregions, with smaller amounts in the Mitchell Grass Downs, Mulga Lands and Einasleigh Uplands bioregions. This community occurs roughly within the 500-750 mm annual rainfall belt. In Queensland, most of the community remnants occur on flat to undulating Cainozoic clay plains not associated with current alluvium, and on gently undulating landscapes with fine grained sedimentary rocks. The remainder is associated with river and creek flats, old loamy and sandy plains, basalt plains, hills and lowlands on metamorphic or granitic rock (Department of Climate Change, Energy, the Environment and Water, 2023c).	Likely	3	Possible	Potential risk - further assessment recommended and completed in Section 8.4.
Australian painted snipe (<i>Rostratula australis</i>)	Preferred habitat includes shallow inland wetlands, brackish or freshwater, that are permanently or temporarily inundated. Breeding habitat requirements may be quite specific: shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby. The Australian painted snipe has been recorded from wetlands in all Australian states, however is most common in eastern Australia, especially the Murray-Darling Basin. Individuals are nomadic, and there is some evidence of partial migration from south-eastern wetlands to coastal central and northern Queensland in autumn and winter (Department of Climate Change, Energy, the Environment and Water, 2023f).	Potential	2	Possible	Low risk - no further assessment recommended
Greater glider (southern and central) (<i>Petauroides volans</i>)	During the day, this species spends most of its time denning in hollowed trees, with each animal inhabiting up to twenty different dens within its home range. It is primarily folivorous, with a diet mostly comprising the leaves and flowers of Myrtaceae (e.g. eucalypt) trees. The greater glider is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The greater glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria, with an elevational range from sea level to 1200 m above sea level. An isolated inland subpopulation occurs in the Gregory Range west of Townsville, and another in the Einasleigh (Department of Climate Change, Energy, the Environment and Water, 2023f).	Likely	3	Possible	Potential risk - further assessment recommended and completed in Section 8.5.
Koala (<i>Phascolarctos cinereus</i>)	Koalas inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities. Koalas eat a variety of eucalypt leaves and a few other related tree species, including <i>Lophostemon</i> , <i>Melaleuca</i> and <i>Corymbia</i> species. Koalas are found in higher densities where food trees are growing on more fertile soils and along watercourses. They do, however, remain in areas where their habitat has been partially cleared and in urban areas (Department of Climate Change, Energy, the Environment and Water, 2023f). In Queensland, the koala's distribution extends inland from the east coast: from the Wet Tropics bioregion, into the Einasleigh Uplands bioregion in the north of the state; from the Central Mackay Coast bioregion, through the Brigalow Belt North bioregion to the Desert Uplands and Mitchell Grass Downs bioregions, and from the Southeast Queensland bioregion, through the Brigalow Belt to the Mulga Lands and Channel Country bioregions in the southwest of the state.	Likely	3	Possible	Potential risk - further assessment recommended and completed in Section 8.6.
<i>Dichanthium queenslandicum</i>	<i>Dichanthium queenslandicum</i> occurs on 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, Simon 1982). It is mostly confined to natural grassland on the heavy black clay soils (basalt downs, basalt cracking clay, open downs) on undulating plains. Other species recorded in the grasslands include <i>Aristida leptopoda</i> , <i>Bothriochloa erianthoides</i> , <i>Moorochloa eruciformis</i> , <i>Corchorus trilocularis</i> , <i>Cyperus bifax</i> , <i>Dichanthium sericeum</i> , <i>Digitaria brownii</i> , <i>Digitaria divaricatissima</i> , <i>Eulalia fulva</i> , <i>Ipomoea lonchophylla</i> , <i>Iseilema vaginiflorum</i> , <i>Panicum decompositum</i> , <i>Panicum queenslandicum</i> , <i>Paspalidium globoideum</i> , <i>Parthenium hysterothorus</i> and <i>Thellungia advena</i> . Other communities where <i>Dichanthium queenslandicum</i> can be found include <i>Acacia salicina</i> thickets in grassland and eucalypt woodlands (i.e., <i>Corymbia dallachiana</i> , <i>C. erythrophloia</i> , <i>E. orgadophila</i>). <i>Dichanthium queenslandicum</i> occurs from near Dalby north to about 90 km north of Hughenden and west as far as Clermont. The main concentration of populations in central Queensland in the Emerald region. It is found in Gemini Peaks NP north east of Clermont and Alpinia NP near Rolleston. (Queensland Herbarium, 2012) (Department of Environment and Science, 2022).	Potential	3	Possible	Potential risk - further assessment recommended and completed in Section 8.7.
Star finch (eastern) (<i>Neochmia ruficauda ruficauda</i>)	The star finch (eastern) occurs mainly in grasslands and grassy woodlands that are located close to bodies of fresh water. It also occurs in cleared or suburban areas such as along roadsides and in towns. Studies at nine former sites of the star finch (eastern) found that the habitat consisted mainly of woodland. These habitats are dominated by trees that are typically associated with permanent water or areas that are regularly inundated; the most common species are <i>Eucalyptus coolabah</i> , <i>Eucalyptus tereticornis</i> , <i>Eucalyptus tessellaris</i> , <i>Melaleuca leucadendra</i> , <i>Eucalyptus camaldulensis</i> and <i>Casuarina cunninghamiana</i> .	Potential	2	Possible	Low risk - no further assessment recommended

MNES	Habitat, Threats and Regional Context	Likelihood of occurrence (Appendix B)	Consequence	Likelihood	Risk Rating
	Based on the small number of accepted records, the distribution of this subspecies formerly extended from Bowen in central Queensland, south to the Namoi River in northern New South Wales, and west to the Blackall Range. Recent records have been obtained only from scattered sites in central Queensland (i.e. between 21°S and 25°S, and 141°E and 150°E) and, consequently, the star finch (eastern) now appears to be extinct in both south-eastern Queensland and northern New South Wales (Department of Climate Change Energy the Environment and Water, 2023e).				
Vulnerable species					
Grey falcon (<i>Falco hypoleucos</i>)	<p>The grey falcon occurs at low densities across inland Australia, though the ecology of the grey falcon is known almost entirely from anecdotal and opportunistic observations. This species frequents timbered lowland plains, particularly Acacia shrublands that are crossed by tree-lined water courses. It has been observed hunting in treeless areas and frequents tussock grassland and open woodland, especially in winter.</p> <p>The grey falcon occurs in arid and semi-arid Australia, including the Murray-Darling Basin, Eyre Basin, central Australia and Western Australia. This species is mainly found where annual rainfall is less than 500 mm, except when wet years are followed by drought, when the species becomes more widespread (Department of Climate Change, Energy, the Environment and Water, 2023f).</p>	Potential	2	Unlikely	Low risk - no further assessment recommended
Painted honeyeater (<i>Grantiella picta</i>)	<p>The species inhabits mistletoes in eucalypt forests/woodlands, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands, acacia-dominated woodlands, paperbarks, casuarinas, callitris, and trees on farmland or gardens. The species prefers woodlands which contain a higher number of mature trees, as these host more mistletoes. It is more common in wider blocks of remnant woodland than in narrower strips (Garnett et al., 2011), although it breeds in quite narrow roadside strips if ample mistletoe fruit is available (BirdLife International, n.d.).</p> <p>The species is sparsely distributed from south-eastern Australia to north-western Queensland and eastern Northern Territory. The greatest concentrations and almost all records of breeding come from south of 26°S, on inland slopes of the Great Dividing Range between the Grampians, Victoria and Roma, Queensland (Higgins et al., 2001) (Threatened Species Scientific Committee, 2015).</p>	Potential	2	Possible	Low risk - no further assessment recommended
Squatter pigeon (southern) (<i>Geophaps scripta scripta</i>)	<p>The squatter pigeon (southern) occurs in dry grassy woodland and open forest, mostly in sandy areas close to water (generally within 3 km). In Queensland, squatter pigeon (southern) foraging and breeding habitat is known to occur on well-draining, sandy or loamy soils on low, gently sloping, flat to undulating plains and foothills (i.e. Queensland Regional Ecosystem Land Zone 5), and lateritic (duplex) soils on low 'jump-ups' and escarpments (i.e. Queensland Regional Ecosystem Land Zone 7) (Department of Climate Change, Energy, the Environment and Water, 2023f).</p> <p>This sub-species is now largely (if not wholly) restricted to Queensland, from the New South Wales border, north to the Burdekin River, west to Charleville and Longreach, and east to the coast to Townsville and Proserpine. In southern Queensland, only small, isolated and sparsely distributed sub-populations of the sub-species occur in this part of its range.</p>	Likely	3	Possible	Potential risk - further assessment recommended and completed in Section 8.10.
White-throated needletail (<i>Hirundapus caudacutus</i>)	<p>In Australia, the white-throated needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Due to their aerial nature, it has been stated that conventional habitat descriptions are inapplicable (Cramp 1985), but there are, nevertheless, certain preferences exhibited by the species. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland.</p> <p>This species is widespread in eastern and south-eastern Australia. In eastern Australia, it is recorded in all coastal regions of Queensland and New South Wales, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains (Department of Climate Change, Energy, the Environment and Water, 2023f).</p>	Potential	2	Possible	Low risk - no further assessment recommended
Corben's long-eared bat (<i>Nyctophilus corbeni</i>)	<p>Corben's long-eared bat inhabits a variety of vegetation types, including mallee, bulloak <i>Allocasuarina leuhmanni</i> and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland.</p> <p>Overall, the distribution of the south-eastern form coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species (Office of Environment and Heritage, 2017).</p>	Potential	2	Unlikely	Low risk - no further assessment recommended

MNES	Habitat, Threats and Regional Context	Likelihood of occurrence (Appendix B)	Consequence	Likelihood	Risk Rating
Ghost bat (<i>Macroderma gigas</i>)	<p>Regional populations of ghost bat are centred on permanent maternity roosts that are genetically isolated from each other. Roost sites are deep natural caves or disused mines with a specific microclimate, which is a relatively stable temperature (23°C to 28°C) with moderate to high (50-90 %) relative humidity, and the ceiling at least 2 m above the floor. Individuals aggregate in these maternity roosts during spring and summer (Department of Climate Change, Energy, the Environment and Water, 2023f).</p> <p>Ghost bat is endemic to Australia. In Queensland this species is currently distributed in only 4-5 highly disjunct populations along the coast and inland from the McIlwraith Range in Cape York to Rockhampton. The major colony of <i>M. gigas</i> occurs at Mount Etna. <i>Macroderma gigas</i> also occurs in the northern Pilbara and Kimberley in Western Australia, and the top end of the Northern Territory.</p>	Potential	2	Unlikely	Low risk - no further assessment recommended
Ornamental snake (<i>Denisonia maculata</i>)	<p>The ornamental snake's preferred habitat is 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 Queensland Regional Ecosystem Land Zone 4, but also lake margins and wetlands (Agnew 2010 pers. Comm.; Brigalow Belt Reptiles Workshop 2010; Wilson & Knowles 1988). Gilgai formations are found where deep-cracking alluvial soils with high clay contents occur (Brigalow Belt Reptiles Workshop 2010).</p> <p>The species is known only from the Brigalow Belt North and parts of the Brigalow Belt South biogeographical regions. The core of the species' distribution occurs within the drainage system of the Fitzroy and Dawson Rivers (McDonald et al. 1991; Cogger et al. 1993) (Department of Climate Change, Energy, the Environment and Water, 2023f).</p>	Potential	3	Possible	Potential risk - further assessment recommended and completed in Section 8.8.
Yakka skink (<i>Egernia rugosa</i>)	<p>Habitat requirements are poorly known; however, this species is known from rocky outcrops, sand plain areas and dense ground vegetation, in association with open dry sclerophyll forest (ironbark) or woodland, brigalow forest and open shrubland. In the Brigalow Belt bioregion, core habitat includes: poplar box (<i>Eucalyptus populnea</i>) woodland, mulga (<i>Acacia aneura</i>) woodland, white cypress pine (<i>Callitris glaucophylla</i>); usually in association with eucalypt species such as <i>E. populnea</i>, <i>E. melanophloia</i> or <i>Corymbia tessellaris</i>, ironbark (typically <i>E. melanophloia</i>) woodland, and disturbed, treated and cleared areas of suitable habitat, grazed or ungrazed, where suitable microhabitat features still remain. Colonies have been found in large hollow logs, cavities or burrows under large fallen trees, tree stumps, logs, stick-raked piles, large rocks and rock piles, dense ground-covering vegetation, and deeply eroded gullies, tunnels and sinkholes.</p> <p>The known distribution of the Yakka skink extends from the coast to the hinterland of sub-humid to semi-arid eastern Queensland. This vast area covers portions of the Brigalow Belt, Mulga Lands, South-east Queensland, Einasleigh Uplands, Wet Tropics and Cape York Peninsula Biogeographical Regions (Department of Climate Change, Energy, the Environment and Water, 2023f).</p>	Potential	2	Possible	Low risk - no further assessment recommended
Bluegrass (<i>Dichanthium setosum</i>)	<p><i>Dichanthium setosum</i> is associated with heavy basaltic black soils and red-brown loams with clay subsoil (NSW OEH 2013a). Associated species include White Box (<i>Eucalyptus albens</i>), Silver-leaved Ironbark (<i>Eucalyptus melanophloia</i>), Yellow Box (<i>Eucalyptus melliodora</i>), Manna Gum (<i>Eucalyptus viminalis</i>), Amulla (<i>Myoporum debile</i>), Purple Wire-grass (<i>Aristida ramosa</i>), Kangaroo Grass (<i>Themeda triandra</i>), Fine-leaved Tussock-grass (<i>Poa sieberiana</i>), Red-leg Grass (<i>Bothriochloa ambigua</i>), Pitted Blue-grass (<i>Bothriochloa decipiens</i>), <i>Macrozamia stenomera</i>, Small Woolly Burr-medic (<i>Medicago minima</i>), Scaly Buttons (<i>Leptorhynchus squamatus</i>), <i>Lomandra aff. longifolia</i>, Australian Bugle (<i>Ajuga australis</i>), Bogan-flea (<i>Calotis hispidula</i>) and <i>Austrodanthonia spp.</i>, <i>Dichopogon spp.</i>, <i>Brachyscome spp.</i>, <i>Vittadinia spp.</i>, <i>Wahlenbergia spp.</i> and <i>Psoralea spp.</i> (Ayers et al. 1996; NSW OEH 2013a).</p> <p><i>Dichanthium setosum</i> has been reported from inland NSW and Queensland (ALA 2013). There are also reports from Western Australia (NSW OEH 2013a) and Tasmania (Henderson 1997) although other sources do not support similar claims (CHAH 2012) (Department of Climate Change Energy the Environment and Water, 2023e).</p>	Likely	3	Possible	Potential risk - further assessment recommended and completed in Section 8.9.
Migratory species					
Fork-tailed swift (<i>Apus pacificus</i>)	<p>The fork-tailed swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. This species mostly occurs over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. They often occur over cliffs and beaches and over islands and sometimes well out to sea.</p> <p>This species is generally recorded east of the Great Dividing Range from Cooktown to the New South Wales border, but extends further west in southern Queensland (Department of Climate Change, Energy, the Environment and Water, 2023f).</p>	Potential	2	Possible	Low risk - no further assessment recommended

MNES	Habitat, Threats and Regional Context	Likelihood of occurrence (Appendix B)	Consequence	Likelihood	Risk Rating
Latham's snipe (<i>Gallinago hardwickii</i>)	In Australia, Latham's snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity. Latham's snipe is a non-breeding visitor to south-eastern Australia and is a passage migrant through northern Australia. This species has been recorded along the east coast of Australia from Cape York Peninsula through to south-eastern South Australia. In Queensland, the range extends inland over the eastern tablelands in south-eastern Queensland (Department of Climate Change, Energy, the Environment and Water, 2023f).	Potential	2	Possible	Low risk - no further assessment recommended
Oriental cuckoo (<i>Cuculus optatus</i>)	This species uses a range of vegetated habitats such as monsoon rainforest, wet sclerophyll forest, open woodlands and appears quite often along edges of forests, or ecotones between forest types. It mainly inhabits coniferous, deciduous and mixed forests. It feeds mainly on insects and their larvae, foraging for them in trees and bushes as well as on the ground. The oriental cuckoo is a regular migrant to Australia, where it spends the non-breeding season (Sept- May) in coastal regions across northern and eastern Australia as well as offshore islands (Department of the Environment, 2015).	Potential	2	Unlikely	Low risk - no further assessment recommended
Pectoral sandpiper (<i>Calidris melanotos</i>)	In Australasia, the pectoral sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. This species is usually found in coastal or near coastal habitat but very occasionally found further inland. In Queensland, most records for the pectoral sandpiper occur around Cairns. There are scattered records elsewhere, mainly from east of the Great Divide between Townsville and Yeppoon. Records also exist in the south-east of the state as well as a few inland records at Mount Isa, Longreach and Oakley (Department of Climate Change, Energy, the Environment and Water, 2023f).	Potential	2	Possible	Low risk - no further assessment recommended
Rufous fantail (<i>Rhipidura rufifrons</i>)	In east and south-east Australia, the rufous fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts, usually with a dense shrubby understorey often including ferns. The rufous fantail is found in northern and eastern coastal Australia, being more common in the north. This species migrates to south-east Australia in October-April to breed, mostly in or on the coastal side of the Great Dividing Range (Department of Climate Change, Energy, the Environment and Water, 2023f).	Potential	2	Unlikely	Low risk - no further assessment recommended
Satin flycatcher (<i>Myiagra cyanoleuca</i>)	Satin flycatchers are eucalypt forest and woodland inhabitants. They are particularly common in tall wet sclerophyll forest, often in gullies or along water courses. In woodlands they prefer open, grassy woodland. The diversity of occupied habitats expands during migration, with the species recorded in most wooded habitats. Wintering birds in northern Queensland will use rainforest – gallery forests interfaces, and birds have been recorded wintering in mangroves and paperbark swamps. In Queensland, this species is widespread but scattered in the east, being recorded on passage on a few islands in the western Torres Strait. Satin flycatchers are also found extensively along the Great Dividing Range (Department of Climate Change, Energy, the Environment and Water, 2023f).	Potential	2	Possible	Low risk - no further assessment recommended
Sharp-tailed sandpiper (<i>Calidris acuminata</i>)	In Australasia, the sharp-tailed sandpiper prefers 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, salt pans and hypersaline salt lakes inland. They also occur in saltworks and sewage farms. In Queensland, the sharp-tailed sandpiper is recorded in most regions, being widespread along much of the coast and are very sparsely scattered inland, particularly in the centre and south-west (Department of Climate Change, Energy, the Environment and Water, 2023f).	Potential	2	Possible	Low risk - no further assessment recommended

8.3 Significant impact assessment summary

The *EPBC Act Policy Statement 1.1 Significant Impact Guidelines: Matters of National Environmental Significance* (Department of the Environment, 2013b) provides the framework for the assessment of potential impacts upon MNES as well as a process for determining the level of significance of impacts.

The significant impact criteria utilised in the assessment is outlined in Table 4 of Section 3.5.2 along with the method for assessment. The screening assessment informed the MNES values recommended for significant impact assessment (Table 12).

The screening assessment identified seven MNES values with further assessment recommended due to their potential risk of significant impacts. Significant impact assessments have been undertaken for each of the seven MNES values in accordance with the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines: Matters of National Environmental Significance* (Department of the Environment, 2013b). The precautionary principle has been applied when deciding whether or not the Project is likely to have a significant impact on a value.

The significant impact assessments, relevant criteria and supporting documents are detailed below for the following species:

- Species or communities listed as Endangered under the EPBC Act:
 - Brigalow TEC in Section 8.4
 - Greater glider (southern and central) in Section 8.5
 - Koala in Section 8.6
 - *Dichanthium queenslandicum* in Section 8.7
- Species listed as Vulnerable under the EPBC Act:
 - Ornamental snake in Section 8.8
 - *Dichanthium setosum* in Section 8.9
 - Squatter pigeon (southern) in Section 8.10.

Commonwealth referral guidelines and policy statements were used to support the assessment of MNES impacts, as well as additional Commonwealth resources such as threat abatement plans and approved conservation advice statements have been referred to in the impact assessments.

8.4 Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC

8.4.1 Description and status under the EPBC Act

The Brigalow TEC is listed as Endangered under the EPBC Act. This TEC is characterised by *Acacia harpophylla* (brigalow) as one of the dominant species in the tree layer. The species may also be co-dominant (most commonly *Casuarina cristata* (belah)). The community ranges in composition and structure, however, is typically represented by a combination of species which are associated with acidic and salty clay soils (Threatened Species Scientific Committee, 2013). In Queensland, 16 REs are considered analogous with the Brigalow TEC, provided that other key diagnostic criteria and condition thresholds are met.

8.4.2 Distribution

The Brigalow TEC occurs in semi-arid eastern New South Wales and Queensland, predominantly west of the Great Dividing Range (Threatened Species Scientific Committee, 2013). The TEC reaches as far north as Townsville in Queensland and as far south as Narrabri in New South Wales. In Queensland it is found in the Brigalow Belt, Mulga Lands and Southeast Queensland bioregions based on the RE framework.

8.4.3 Threats

Key threats to the Brigalow TEC have been identified as those which may lead to further reduction in extent or cause a decline in condition. These are listed and discussed below in order of significance:

- Vegetation clearing resulting in fragmentation and reduced patch size
- Inappropriate fire regime
- Weed invasion, particularly invasive pasture species
- Feral animals degrading habitat or outcompeting native species, particularly pigs, cane toads, foxes and cats
- Inappropriate grazing impacting the ground and shrub layer, and compacting the soil profile
- Climate change impacts.

8.4.4 Presence and survey effort

The likelihood of occurrence assessment identified the Brigalow TEC as likely to occur in the project area, associated with 3.1 ha of remnant RE 11.4.9 (BAAM Ecological Consultants, 2021). The Brigalow TEC mapped within the project area is displayed in Figure 4. This patch of vegetation is isolated, connected only to a small patch of RE 11.5.3, it occurs within a non-remnant paddock adjacent to active mining operations and is functionally disconnected from other Brigalow TEC vegetation in the surrounding area.

Surveys undertaken in 2016 identified this patch as regrowth RE 11.5.16 dominated by *belah* with regrowth brigalow, and therefore not considered Brigalow TEC (AECOM, 2016). It is plausible that the Brigalow has grown to maturity during this time, particularly if the regrowth is a result of resprouting from a larger root system, which grow far more rapidly (Johnson, 1964).

8.4.5 Potential impacts and mitigation measures

A maximum total of 3.1 ha of Brigalow TEC will be cleared as part of the Project, which is the full extent of the community within the project area.

8.4.6 Significant impact criteria assessment

An assessment of the significance of impacts to this TEC under the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (Department of the Environment, 2013b) is provided in Table 13. The assessment identified that the Project is unlikely to have a significant impact on Brigalow TEC.

Table 13 Significant impact assessment – Brigalow TEC

EPBC Act criteria – is there a real chance or possibility that the Project will:	Assessment of significance
Reduce the extent of an ecological community?	<p>Unlikely</p> <p>A total of 3.1 ha of Brigalow TEC is proposed to be cleared as part of the Project. Whilst the extent of brigalow vegetation in the surrounding landscape has been substantially reduced by historical land practices, the clearing of a small isolated patch of this amount is unlikely reduce the extent of the ecological community within the region. Avoidance, mitigation and management measures are unable to reduce the extent of clearing of Brigalow TEC. However, this isolated patch occurs in a highly disturbed location and is unlikely to contribute to the regional presence of Brigalow TEC.</p>
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines?	<p>Unlikely</p> <p>Within the project area, Brigalow TEC occurs as a single small patch that is disconnected from most other vegetation and will be cleared as part of the Project. The Project will not fragment or increase fragmentation of Brigalow TEC within the project area.</p>

EPBC Act criteria – is there a real chance or possibility that the Project will:	Assessment of significance
Adversely affect habitat critical to the survival of an ecological community?	<p>Unlikely</p> <p>Areas considered critical to the survival of the Brigalow TEC includes all patches that meet the key diagnostic characteristics and condition thresholds for the ecological community; as well as the buffer zones (areas directly adjacent to the community), particularly where these include native vegetation (Department of the Environment, 2013a). By this definition all habitat supporting Brigalow TEC within the project area is considered habitat critical to the survival of the community. However, the Project will impact a small area of 3.1 ha of habitat disconnected from other occurrences of the TEC. This amount of clearing is unlikely to adversely affect the long-term survival of the TEC in the broader landscape.</p>
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?	<p>Unlikely</p> <p>The identified 3.1 ha patch of Brigalow TEC will be completely cleared as part of the pit development. All abiotic features that support this patch of TEC will be removed, however it is unlikely this patch will substantially modify or destroy the abiotic features available in the landscape for Brigalow TEC.</p>
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?	<p>Possible</p> <p>The Project has the potential to change species composition of Brigalow TEC within the project area through complete clearing. However, this patch is unlikely to contribute to the species composition or genetic material for important species found within Brigalow TEC in the surrounding area.</p>
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?	<p>Unlikely</p> <p>The identified 3.1 ha patch of Brigalow TEC will be totally cleared as part of the pit development. Avoidance, mitigation and management measures are unable to reduce the extent of clearing of Brigalow TEC.</p>
Interfere with the recovery of an ecological community?	<p>Unlikely</p> <p>The Project is unlikely to interfere with the recovery of Brigalow TEC due to the small, isolated patch being impacted.</p>

8.5 Greater glider (southern and central) (*Petauroides volans*)

8.5.1 Description and status under the EPBC Act

The greater glider (southern and central) is listed as Endangered under the EPBC Act.

The greater glider is the largest gliding possum in Australia, with a head and body length of 35–46 cm and a long furry tail measuring 45–60 cm. Its tail is not prehensile. This species has thick fur that increases its apparent size. The fur is white or cream in colour below and varies from dark grey, dusky brown through to light mottled grey and cream above. It has large furry ears and a short snout.

This species was formerly the only species in the genus. Two subspecies were recognised: *P. v. minor* (in north-eastern Qld) and *P. v. volans* (in south-eastern Australia) (Van Dyck & Strahan, 2008). Jackson & Groves (2015) split the species into three separate species: *P. minor* (Atherton Tablelands and coastal central and northern Qld), *P. armillatus* (inland central Qld), and *P. volans* (from south-east Qld to Victoria). McGregor et al. (2020) agreed with this taxonomic arrangement within *Petauroides* on the basis of genomic-scale nuclear markers and external morphological data (Department of Climate Change, Energy, the Environment and Water, 2023f).

8.5.2 Distribution

The greater glider (southern and central) occurs in eastern Australia, where it has a broad distribution from around Proserpine in Qld, south through NSW and the ACT, to Wombat State Forest in central Victoria. It occurs across an elevational range of 0–1200 m above sea level (Kavanagh & Wheeler, 2004a) (Department of Climate Change, Energy, the Environment and Water, 2023f).

8.5.3 Habitat requirements

The greater glider is an arboreal nocturnal marsupial, largely restricted to eucalypt forests and woodlands. During the day, this species spends most of its time denning in hollowed trees, with each animal inhabiting up to twenty different dens within its home range. It is primarily folivorous, with a diet mostly comprising the leaves and flowers of Myrtaceae (e.g. eucalypt) trees. Home ranges of this species are typically relatively small (1 – 4 ha) but are larger in lower productivity forests and more open woodlands (up to 16 ha). They are larger for males than for females, with male home ranges being largely non-overlapping. A study on the greater glider population in the Seven Mile Beach National Park area found that while the species can cover distances up to 100 m, they usually glide less than 30 m and have a steeper trajectory than other species of glider (NSW Scientific Committee, 2016).

Hollows develop extraordinarily slowly in Australian eucalypts, with figures most often quoted as minimum lag times of 150 – 360 years from germination to the beginning of hollow development (Gibbons & Lindenmayer, 2002). A fall in the number of hollows below a minimum critical threshold for greater gliders could cause a decline in any local population and compromise population viability in the longer term if there is not a new cohort of hollow trees available to replace trees lost (Lindenmayer et al., 1997).

8.5.4 Threats

The greater glider is considered to be particularly sensitive to forest clearance and to intensive logging. Notwithstanding relatively small home ranges (1 – 4 ha), but in part because of low dispersal ability, this species may be sensitive to fragmentation, have relatively low persistence in small forest fragments, and disperse poorly across vegetation that is not native forest.

It has been identified that the species requires a Recovery Plan, however one has not yet been developed. Although taxonomically different, the related Mahogany glider (*Petaurus gracilis*) does have a Draft Recovery Plan (Jackson & Diggins, 2020).

As per the species Conservation Advice (Department of Climate Change, Energy, the Environment and Water, 2022), all known threats include:

- habitat loss and fragmentation
- too intense or frequent fires
- timber production
- climate change

- barbed wire fencing entanglement
- hyper-predation by owls
- competition from sulphur-crested cockatoos
- phytophthora root fungus.

8.5.5 Presence and survey effort

The species was detected adjacent the project area in habitat associated with the riparian vegetation adjoining Phillips Creek during previous surveys (AECOM, 2016; BAAM Ecological Consultants, 2021). A total of 9.7 ha of potential greater glider habitat was ground-truthed within the project area. However, due to the relatively small size of the patch and lack of connectivity to denning habitat within the broader landscape (>100m) it is unlikely the isolated patch provides habitat for the species due to gliding capabilities.

There is some uncertainty regarding the quality of canopy trees in this location, as it is a fragmented patch with a disturbed canopy of *Eucalyptus populnea* (poplar box). The number of hollows available within this habitat that would be suitable for the greater glider is unknown.

8.5.6 Potential impacts and mitigation measures

A total of 9.7 ha of potential greater glider habitat may be cleared as part of the Project. Other Project related potential indirect impacts relevant to the greater glider include:

- fauna mortality via felling of hollow-bearing trees
- increased competition for hollows in surrounding habitat due to a potential reduction in hollow availability.

Refer to Section 7.0 of this report for species-specific and general avoidance, minimisation and mitigation measures.

8.5.7 Significant impact criteria assessment

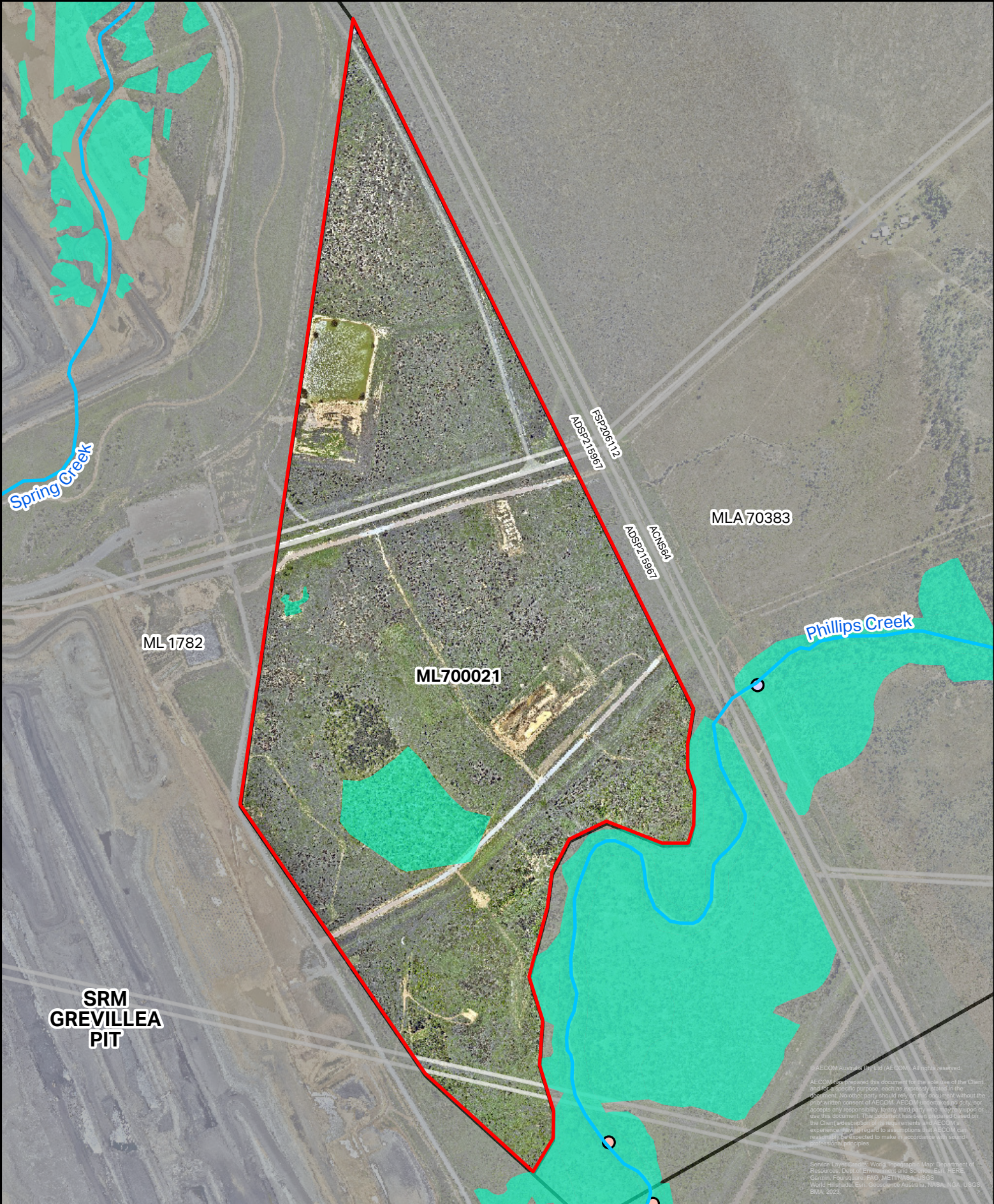
An assessment of the significance of impacts to this species under the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (Department of the Environment, 2013b) is provided in Table 14. The outcome of this assessment is that the Project is unlikely to result in a significant impact on the species.

Table 14 Significant impact assessment – greater glider

EPBC Act Criteria – is there a real possibility that the Proposed Action will:	Assessment of Significance
Lead to a long-term decrease in the size of a population of a species?	<p>Unlikely</p> <p>While no individuals of this species were recorded within the project area during the field survey (AECOM, 2016; BAAM Ecological Consultants, 2021). potential foraging habitat occurs within the project area.</p> <p>A total of 9.7 ha of suitable foraging habitat occurs within the project area. This habitat is isolated and occurs over 200 m away from other suitable habitat which exceeds the volplane distance of the species (>100 m) (NSW Scientific Committee, 2016). Due to the relatively small size of the patch and lack of connectivity to denning habitat within the broader landscape (>100m) it is unlikely the isolated patch provides habitat for the species due to gliding capabilities.</p> <p>Large intact patches of potential habitat will remain in surrounding vegetation following the operation phase of the Project, including riparian vegetation adjoining Phillips Creek with previous surveys confirming species presence in this area. Given this, it is unlikely this amount of clearing will lead to a long-term decrease in any potential greater glider populations present within the region. The species will continue to persist within the current distribution, regardless of impacts of habitat within the project area. Therefore, the Project</p>

EPBC Act Criteria – is there a real possibility that the Proposed Action will:	Assessment of Significance
	is unlikely to lead to a long-term decrease in the size of a population of the species.
Reduce the area of occupancy of the species?	<p>Unlikely</p> <p>It is unlikely the Project will reduce the area of occupancy of the species. A total of 9.7 ha of suitable foraging habitat occurs within the project area. However, due to the relatively small size of the patch and lack of connectivity to habitat within the broader landscape (>100m) it is unlikely the isolated patch provides habitat for the species due to gliding capabilities. No individuals have been observed utilising this patch during previous field surveys (AECOM, 2016; BAAM Ecological Consultants, 2021). Therefore, it is unlikely the Project will reduce the area of occupancy of the species.</p>
Fragment an existing population into two or more populations?	<p>Unlikely</p> <p>This species is sensitive to fragmentation due to low dispersal ability and relatively small home ranges (Eyre, 2006), and the greater glider does not disperse across vegetation that is not native forest (due to the high predation risk and limited gliding distance). While potential habitat for the species occurs within the project area, it is primarily a treeless area less than 2 km wide, surrounded by fragmentation and barriers from the active mining area and Back Access Road. Furthermore, habitat within the project area is isolated and over 200 m away from suitable habitat which exceeds the volplane distance of the species (>100 m) (NSW Scientific Committee, 2016). Further, no individuals have been observed utilising this patch during previous field surveys (AECOM, 2016; BAAM Ecological Consultants, 2021). Therefore, it is unlikely the Project will fragment an existing population into two or more populations.</p>
Adversely affect habitat critical to the survival of a species?	<p>Unlikely</p> <p>While habitat for the species may occur within the project area, the site has been previously fragmented from historic land. Furthermore, habitat within the project area is isolated and over 200 m away from suitable habitat which exceeds the volplane distance of the species (>100 m) (NSW Scientific Committee, 2016). The habitat patch within the project area is highly unlikely to provide habitat critical to the survival of the species, due to its isolation, edge effects and likely diminished canopy quality. Based on this, it is considered unlikely that the Project will adversely affect habitat critical to the survival of the species.</p>
Disrupt the breeding cycle of a population?	<p>Unlikely</p> <p>Breeding is restricted to a very brief period in February to May, and females give birth to a single young from March to June. Tree hollows are required for this species to breed, and potential breeding habitat may be impacted. The use of fauna spotter catchers will ensure that any displaced individuals possibly bearing young are captured and relocated safely. Whilst the density of suitable hollows for the species within the vegetation patch is unknown, the reduction of available hollows has the potential to disrupt the breeding cycle of an individual, it is unlikely to disrupt the breeding cycle at a population scale. Furthermore, no individuals have been identified within the project area from field survey efforts to date (AECOM, 2016; BAAM Ecological Consultants, 2021).</p>

EPBC Act Criteria – is there a real possibility that the Proposed Action will:	Assessment of Significance
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	<p>Unlikely</p> <p>The Project is proposed to remove 9.7 ha of potential habitat, however the site has been previously fragmented from historic land use and surrounding access tracks. Furthermore, habitat within the project area is isolated and over 200 m away from suitable habitat which exceeds the volplane distance of the species (>100 m) (NSW Scientific Committee, 2016). Other areas of contiguous breeding, foraging and dispersal habitat occur outside the project area for the species to persist. Current recognised threats to the species are unlikely to be exacerbated by the Project. As such, it is considered unlikely the Project may modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.</p>
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?	<p>Unlikely</p> <p>Predation by foxes (<i>Vulpes vulpes</i>*) and cats (<i>Felis catus</i>*) are listed as threats to the greater glider. These species, as well as the dog (<i>Canis lupus familiaris</i>*) occur within the project area and surrounds; however, evidence of presence and utilisation was not detected during the field survey. The Project is not expected to exacerbate these invasive species beyond current levels. It is unlikely the Project will result in invasive species becoming established in greater glider habitat.</p>
Introduce disease that may cause the species to decline?	<p>Unlikely</p> <p>A threat to this species includes the root fungus <i>Phytophthora</i> which is known to impact on the health of <i>Eucalyptus</i> species. This threat is considered minor. It is unlikely that the Project will introduce a disease to the extent that this species would decline.</p>
Interfere with the recovery of the species?	<p>Unlikely</p> <p>The SPRAT profile identifies that a Recovery Plan for the greater glider is required and no such plan exists at the time of this report. In Queensland, there are no species-specific management actions currently in place for the greater glider. As the Project is unlikely to exacerbate current recognised threats to the species, or introduce these threats in the local area, it is unlikely the Project will interfere with the recovery of the species.</p>



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LEGEND

- Project Area (ML700021)
- Mining leases
- Cadastre
- Watercourse (Water Act 2000)
- Greater Glider - Potential Habitat
- Greater Glider Observations**
- AECOM (2016)
- BAAM (2021)

GREATER GLIDER POTENTIAL HABITAT
Grevillea Pit Continuation Project
 MNES - Significant Impact Assessment Report



PROJECT ID 60712195
 CREATED BY Kate Brodie
 LAST MODIFIED 21 Dec 2023
 VERSION: 3

Figure
5

8.6 Koala (*Phascolarctos cinereus*)

8.6.1 Description and status under the EPBC Act

The koala is listed as Endangered under the EPBC Act.

The koala is a tree-dwelling, medium-sized marsupial with a stocky body, large, rounded ears, sharp claws and variable but predominantly grey-coloured fur. It is one of Australia's most distinctive and iconic wildlife species (Department of Agriculture Water and the Environment, 2022a).

8.6.2 Distribution

The koala's distribution includes Queensland, New South Wales, the Australian Capital Territory, Victoria and South Australia. The listed population of the koala has a wide but patchy distribution that spans the coastal and inland areas of Queensland north to the Herberton area, extending westwards into hotter and dryer semi-arid climates of central Queensland, New South Wales and the Australian Capital Territory. Although the species is often more abundant in coastal areas, inland populations do occur. The species' distribution is not continuous within its range, with populations isolated by cleared land or unsuitable habitat (Department of Agriculture Water and the Environment, 2022a).

8.6.3 Habitat requirements

Koala habitat includes both coastal and inland areas that are typically characterised by *Eucalyptus* forests and woodlands. The wide-ranging distribution of the koala has resulted in a diverse range of habitat associations across different bioregions, influenced by local climate, topographical and landscape associations. Biophysical habitat attributes for the koala include places that contain the resources necessary for individual foraging, survival (including predator avoidance), growth, reproduction and movement. The total amount of resources (including habitat attributes) and how they are arranged in the landscape influence the viability of metapopulations and processes (Department of Climate Change Energy the Environment and Water, 2023d).

Koalas are tree-dwelling, obligate folivores (leaf eaters) with a highly specialised diet. The koala's diet is defined by the availability and palatability of *Eucalyptus*, *Corymbia* and *Angophora* species. Koalas are nocturnal and spend significant periods of time moving across the ground between food and shelter trees. Movement increases in the breeding season (typically September to February).

Koalas are reported to utilise more than 400 different species of tree for their food and habitat requirements with different tree species varying by habitat type and location across their range. Primary food species differ across habitats and may be as few as two at a particular location (Melzer et al. 2000; Tucker et al. 2008; Kjeldsen et al. 2019). Koala browsing preferences show regional differences which are influenced by the chemical profiles and water content of different target food leaves. There is both intra- and inter-species variability in the palatability and nutritional value of the leaves of their preferred food trees. Their specialist dietary requirements determine their potential habitat and range distributions.

Koalas have a wide-ranging distribution and therefore inhabit a diverse range of habitat associated with different bioregions which can be influenced by local climate, topography and landscapes. Generally koala habitat includes both coastal and inland areas that are typically characterised by *Eucalyptus* forests and woodland (Department of Climate Change Energy the Environment and Water, 2023d).

Biophysical habitat attributes for the koala include places that contain the resources necessary for individual foraging, survival (including predator avoidance), growth, reproduction and movement. The total amount of resources (including habitat attributes) and how they are arranged in the landscape influence the viability of metapopulations and processes. For an individual koala, these resources include access to sufficient quality food and shelter trees to meet their daily energetic requirements and reproductive needs, and a place to avoid predators. This includes forests or woodlands, road-side and rail vegetation and paddock trees, safe intervening ground matrix for travelling between trees and patches to forage and shelter and reproduce and access to vegetated corridors or paddock trees to facilitate movement between patches. These resources fall within individual koala's home ranges and allow for interaction with adjacent individuals (Department of Climate Change Energy the Environment and Water, 2023d).

8.6.4 Threats

The main identified threats to the species as identified in the *Referral guideline for the endangered koala* (Department of Climate Change, Energy, the Environment and Water, 2023e) include:

- loss and fragmentation of habitat
- vehicle strike
- disease
- predation by dogs.

Drought and extreme heat are also known to cause very significant mortality, and post-drought recover may be substantially impaired by the range of other threatening factors (Department of Climate Change, Energy, the Environment and Water, 2023e).

8.6.5 Presence and survey effort

Two adult koalas including indirect evidence (scats) were found during previous surveys 300 m to the south of the project area along Phillips Creek (Figure 6) (BAAM Ecological Consultants, 2021). Approximately 9.7 ha of potential koala habitat has been mapped as potentially occurring within the project area, associated with a patch of remnant RE 11.5.3. However, there is some uncertainty with the quality of canopy trees in this location, as it is a fragmented patch with a disturbed canopy of *Eucalyptus populnea* (poplar box). The patch is not considered to represent habitat critical to the survival of the species.

8.6.6 Potential impacts and mitigation measures

A total of 9.7 ha of potential koala habitat may be cleared as part of the Project. Other Project related potential indirect impacts relevant to the koala includes:

- further pest incursion, particularly dogs
- fauna injury or mortality via strike from moving vehicles and machinery.

Refer to Section 7.0 of this report for species-specific and general avoidance, minimisation and mitigation measures.

8.6.7 Significant impact criteria assessment

Assessing significance of impacts to the koala is a two-step process to determine whether the Project will:

- substantially interfere with the recovery of the species (Table 15)
- adversely affect habitat critical to the survival of the species (Table 16).

Both Table 15 and Table 16 discuss whether these impacts are likely to occur as a result of the Project. Table 16 identified that the Project is unlikely to substantially interfere with the recovery of the koala.

These outcomes are considered in the full assessment under the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (Department of the Environment, 2013b). The outcome of this assessment is that the Project is unlikely to result in a significant impact to the koala.

Table 15 Impacts which are likely to substantially interfere with the recovery of the koala

Impacts which are likely to substantially interfere with the recovery of the koala	Potential for Impact to occur as a result of the Project
Increasing koala fatalities in habitat critical to the survival of the koala due to dog attacks to a level that is likely to result in multiple, ongoing mortalities.	Unlikely The dog (<i>Canis lupus familiaris</i> *) is likely to occur within the project area and surrounds; however, evidence of presence and utilisation was not detected during the field survey. No mechanisms which would facilitate the exacerbation of this species are expected as a result of the Project. The Project is unlikely to result in multiple, ongoing mortalities from dog attack.

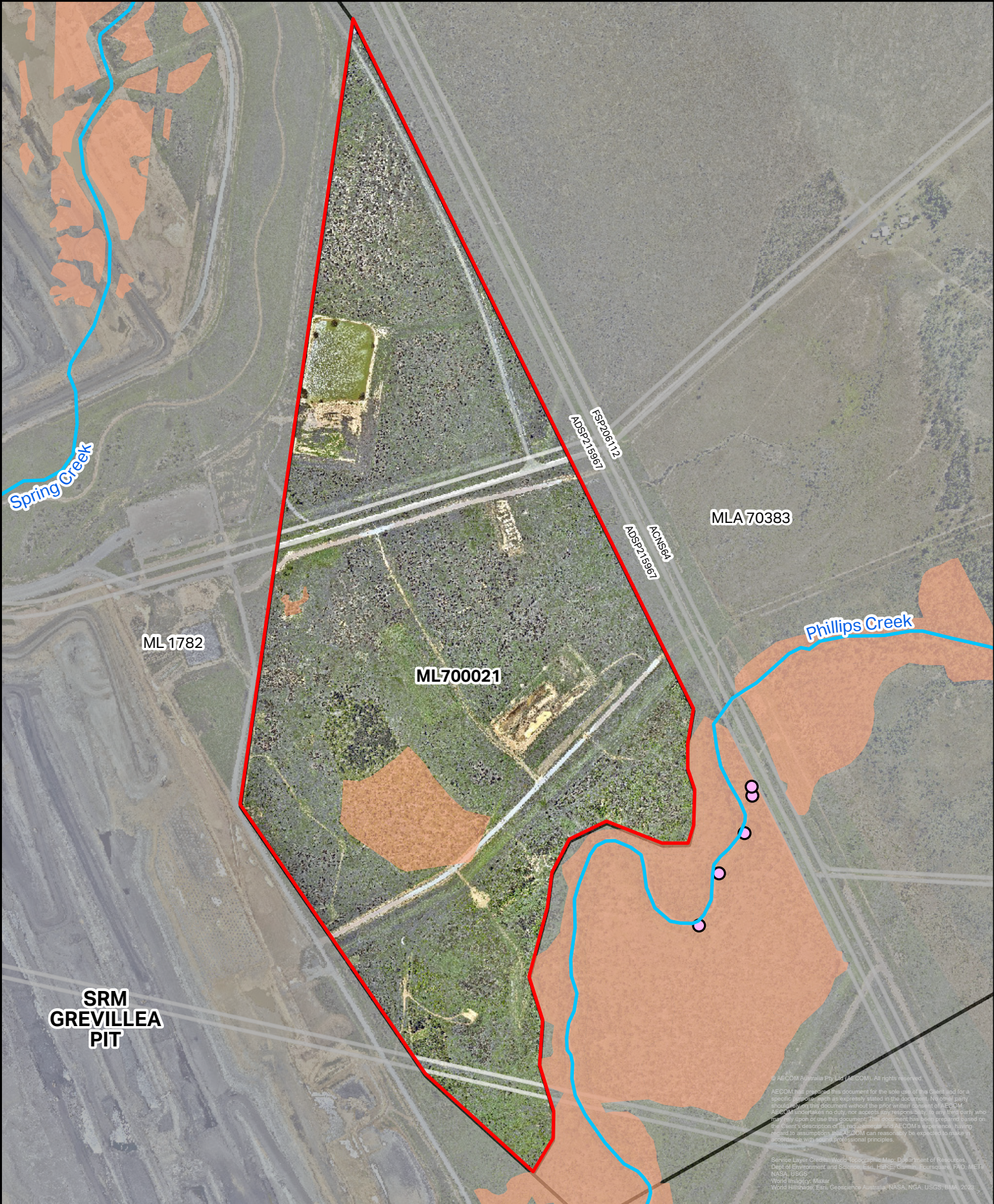
Impacts which are likely to substantially interfere with the recovery of the koala	Potential for Impact to occur as a result of the Project
Increasing koala fatalities in habitat critical to the survival of the koala due to vehicle-strikes to a level that is likely to result in multiple, ongoing mortalities.	<p>Unlikely</p> <p>An increase in vehicle and machinery movement across the project area will occur during operation phase; however impacts to fauna will be managed through the adoption of vegetation clearing protocols and site mitigations (i.e. speed limits) through the EA conditions and measures listed in Section 7.2.</p> <p>Based on the implementation of mitigation and management measures, and the lack of habitat or movement corridors available for the koala within the project area, the Project is not expected to result in multiple, ongoing fatalities to koala due to vehicle strikes.</p>
Facilitating the introduction or spread of disease or pathogens for example <i>Chlamydia</i> or <i>Phytophthora cinnamomi</i> , to habitat critical to the survival of the koala, that are likely to significantly reduce the reproductive output of koalas or reduce the carrying capacity of the habitat.	<p>Unlikely</p> <p>The Project is not expected to introduce or exacerbate the spread of disease or pathogens (i.e. <i>Chlamydia</i> or <i>Phytophthora cinnamomi</i>) that may reduce the reproductive output of koalas or reduce the carrying capacity of the habitat. Symptoms of individuals carrying <i>Chlamydia</i> can become overt when subjected to additional stress. Such stress may be caused by habitat clearing. However, due to the low impact nature of the Project within potential koala habitat (9.7 ha), it is not expected to exacerbate this disease on a population scale. Further, the Project is unlikely to lead to new pathways for dispersal into the project area for any individuals which may carry the disease.</p> <p>Implementation of weed and pest controls measures for the Project in accordance with management measures listed in Section 7.2 will ensure best practice site hygiene.</p>
Creating a barrier to movement to, between or within habitat critical to the survival of the koala that is likely to result in a long-term reduction in genetic fitness or access to habitat critical to the survival of the koala.	<p>Unlikely</p> <p>A maximum of 9.7 ha of potential koala habitat may be cleared as a result of the Project, in an already fragmented landscape. The shape and magnitude of this impact will not create new barriers to movement to the koala, as the project area is primarily a treeless area less than 2 km wide, surrounded by existing barriers such as the active mining area and Back Access Road.</p> <p>Mitigation and management measures will also be implemented, including pre-clearance surveys to accurately locate the presence and extent of koala habitat, and clearing with a fauna spotter-catcher present (refer Section 7.2 for details).</p>
Changing hydrology which degrades habitat critical to the survival of the koala to the extent that the carrying capacity of the habitat is reduced in the long-term.	<p>Unlikely</p> <p>Changes to hydrology can potentially impact the extent of local catchments, run-off characteristics and intensity of flood flows, which can impact on the condition and stability of riparian habitats.</p> <p>No significant works are proposed that will alter drainage across the ephemeral creek lines adjacent to the project area. No creek diversions are proposed as part of this Project. Therefore, current environmental flows should not be significantly impacted.</p>

Table 16 Significant impact assessment - koala

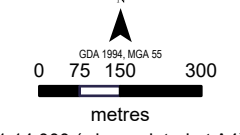
EPBC Act criteria – is there a real possibility that the Project will:	Assessment of significance
Lead to a long-term decrease in the size of a population?	<p>Unlikely</p> <p>Approximately 9.7 ha of koala habitat is proposed to be impacted for the Project, consisting of a single fragmented patch of vegetation. This amount of clearing is unlikely to lead to a long-term decrease in any potential koala populations present in the region. Large intact patches of potential habitat will remain in the surrounding landscape following the operation period of the Project, including the Phillips Creek riparian vegetation where the koala has been observed. The koala is highly mobile and known to utilise cleared areas as long as scattered suitable food or shelter trees occur.</p> <p>The species will continue to persist within its current distribution, regardless of the presence of habitat within the project area. Therefore, the Project is unlikely to lead to a long-term decrease in the size of a koala population.</p> <p>Mitigation and management measures will also be implemented, including pre-clearance surveys to accurately locate the presence and extent of koala habitat, and clearing with a fauna spotter-catcher present (refer to Section 7.2 for details).</p>
Reduce the area of occupancy of the species?	<p>Unlikely</p> <p>The Project is unlikely to reduce the area of occupancy for the koala. As per the koala's referral guidelines (Department of Climate Change Energy the Environment and Water, 2023d), impacts include disturbance and/or creation of barriers on areas of land that either contains locally important koala trees or is land that provides the means for koalas to move between patches of habitat. As an endangered species, even small areas of habitat loss can have a significant impact. While the Project will result in 9.7 ha of potential koala habitat being cleared, this vegetation is isolated from other habitat areas by approx 200m and there is no evidence of species utilisation. Most records of koala in Central Queensland occur along waterways in riparian vegetation where leaf moisture content is higher. Dry woodland areas such as that in the project area are used for intermittent feeding in wetter seasons and as passages for movement. The latter is unlikely in the project area due to other barriers in the vicinity. However, the amount of habitat that will remain in the surrounding area following the Project will still be able to support the species if present in the area. Mitigation and management measures will also be implemented, including pre-clearance surveys to accurately locate the presence and extent of koala habitat, and clearing with a fauna spotter-catcher present.</p>
Fragment an existing population into two or more populations?	<p>Unlikely</p> <p>The project area would likely provide limited foraging and dispersal opportunities for koala as it comprises of a small disconnected 'stepping stone' patches and narrow linear contiguous linkages. Given the project area occurs alongside to an active mine, it is unlikely that the project will create a barrier for koala movement.</p> <p>Mitigation and management measures will also be implemented, including pre-clearance surveys to accurately locate the presence and extent of koala habitat, and clearing with a fauna spotter-catcher present.</p>

EPBC Act criteria – is there a real possibility that the Project will:	Assessment of significance
Adversely affect habitat critical to the survival of a species?	<p>Unlikely</p> <p>Koala are known to occur in habitat surrounding the project area, and may utilise the isolated habitat patch within the project area for marginal foraging and dispersal. The <i>Referral guidance for the endangered koala</i> (Department of Climate Change Energy the Environment and Water, 2023d) defines habitat is considered critical to the survival of the species as habitat used to meet essential life cycle requirements. However, the isolated patch is unlikely to provide contribute to the essential requirements for a koala's life cycle, despite the presence of scattered foraging trees.</p> <p>The Project is unlikely to have an adverse impact on habitat critical to the survival of the species. Habitat critical to the survival is known to occur in the surrounding landscape, such as adjacent to the project area associated with Phillips Creek where koala occurrences are known.</p>
Disrupt the breeding cycle of a population?	<p>Unlikely</p> <p>The koala breeding season is generally between September and March, with females giving birth to a single young between October and May (Department of Agriculture Water and the Environment, 2022b). During the breeding season, males actively seek females and koala movements are more extensive. Therefore, there is a chance that dispersing males may move into the project area during this time regardless of the quality of habitat. Mitigation measures including pre-clearance surveys to accurately locate the presence and extent of koala habitat, and clearing with a fauna spotter-catcher present will occur to reduce the potential to disrupt the breeding cycle of a population. Whilst the Project has the potential to disrupt the breeding cycle of a dispersing individual, it is unlikely to disrupt the breeding cycle at a population scale.</p>
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	<p>Unlikely</p> <p>While the Project is proposed to remove 9.7 ha of potential koala habitat, other areas of contiguous breeding, foraging and dispersal habitat occur outside the project area. Since koalas are mobile and no significant works are proposed that will alter drainage across the ephemeral creek lines within the project area, the Project is unlikely to modify, destroy, remove or decrease the availability or quality of habitat to the extent that the species is likely to decline. Mitigation and management measure will also be implemented to reduce risk of habitat degradation from weed and pest incursion, erosion, sedimentation and contamination.</p>
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?	<p>Unlikely</p> <p>The primary invasive species which poses a threat to the koala is the dog (<i>Canis lupus</i>*). As the project area and surrounding landscape is likely to already support populations of feral dogs, it is unlikely that the proposed works will result in further introductions of feral species. Due to invasive species being present already, it is unlikely the Project will result in additional invasive species that are harmful to koala becoming established in koala habitat.</p>
Introduce disease that may cause the species to decline?	<p>Unlikely</p> <p>As identified in Table 15, the Project is not expected to introduce or exacerbate the spread of disease or pathogens (i.e. <i>Chlamydia</i>, koala retrovirus or <i>Phytophthora cinnamomi</i>) that may reduce the reproductive output of koalas or reduce the carrying capacity of the habitat. The implementation of weed and pest controls measures for the Project will ensure best practice site hygiene through measures detailed in Section 7.2.</p>

EPBC Act criteria – is there a real possibility that the Project will:	Assessment of significance
Interfere substantially with the recovery of the species?	Unlikely Based on the assessment outlined within Table 15 above, the Project is unlikely to substantially interfere with the recovery of the koala. Measures such as koala spotters and sequential clearing have been considered to minimise and mitigate potential Project impacts.



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LEGEND

- Project Area (ML700021)
- Mining leases
- Cadastre
- Watercourse
- Koala - Potential Habitat
- Observations (BAAM 2021)

KOALA POTENTIAL HABITAT

**Grevillea Pit Continuation Project
 MNES - Significant Impact
 Assessment Report**



PROJECT ID 60712195
 CREATED BY Kate Brodie
 LAST MODIFIED 21 Dec 2023
 VERSION 3

**Figure
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8.7 *Dichanthium queenslandicum*

8.7.1 Description and status under the EPBC Act

Dichanthium queenslandicum is listed as Endangered under the EPBC Act.

Dichanthium queenslandicum (king blue-grass), family Poaceae, is a perennial grass growing to 80 cm tall. Its culms are solitary or rarely branched, erect, glabrous, smooth with a single groove, 4–5-noded with nodes prominently hairy. Leaf sheaths are hirsute with the hairs arising from wart-like projections. Inflorescences are single racemes of paired spikelets to 10 cm long. Sessile spikelets are bisexual, dorsally compressed, and straw-coloured to pale mauve. Pedicelled spikelets are male and straw-coloured to pale mauve (Sharp & Simon, 2002).

8.7.2 Distribution

King blue-grass is endemic to central and southern Queensland where it occurs in three disjunct populations: 1) Hughenden district (one record); 2) from Nebo to Monto and west to Clermont and Rolleston; and 3) Dalby district, Darling Downs (Queensland Herbarium, 2009).

Its extent of occurrence has reduced from 1100 km² to 245 km² (Accad et al., 2008). Its area of occupancy is unknown, but based on the extent of occurrence is likely to be restricted (Queensland Herbarium, 2009). King blue-grass occurs within the South Eastern Queensland, Brigalow Belt South, Brigalow Belt North, Central Mackay Coast, Desert Uplands, Mitchell Grass Downs and Einasleigh Uplands Bioregions; and the South East Queensland, Condamine, Border Rivers, Maranoa, Balonne, Burnett Mary, Fitzroy, Burdekin, Mackay Whitsunday, Southern Gulf and Desert Channels Natural Resource Management Regions.

8.7.3 Habitat requirements

The distribution of this species overlaps with the following EPBC Act-listed threatened ecological communities:

- Brigalow (*Acacia harpophylla* dominant and co-dominant)
- Weeping Myall Woodlands
- Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and southern Queensland
- Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin (Department of Environment and Science, 2022).

8.7.4 Threats

The main potential threats to king blue-grass include further expansion of mining activities (Butler, 2007), and further weed invasion resulting in competition and potential displacement (Department of Environment and Science, 2022). This includes 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 the extent of blue-grass grasslands and this species which is a component of these ecological communities (Butler, 2007). Grazing is also a known threat to king blue-grass, as although it is known to be of good fodder value (Simon, 1982) this species cannot tolerate continual heavy stocking regimes (Fensham, 1999). Invasion from weeds such as parthenium (*Parthenium hysterophorus*) and parkinsonia (*Parkinsonia aculeata*) is another known threat.

8.7.5 Presence and survey effort

No *D. queenslandicum* individuals have been recorded within the project area despite multiple survey events by different ecologists (AECOM, 2016; BAAM Ecological Consultants, 2021). The nearest species records are 35 km to the west of the project area from 2011, and 27 km north from 2022, and the species is considered a potential occurrence within the project area (Appendix B). Potential habitat for *D. queenslandicum* is mapped on Figure 7 within 3.1 ha of remnant RE 11.4.9 in the project area (AECOM, 2016; BAAM Ecological Consultants, 2021).

8.7.6 Potential impacts and mitigation measures

A total of 3.1 ha of potential *D. queenslandicum* habitat may be cleared as part of the Project. Other Project related potential indirect impacts relevant to the species include:

- weed incursion.

Refer to Section 7.0 of this report for species-specific and general avoidance, minimisation and mitigation measures.

8.7.7 Significant impact criteria assessment

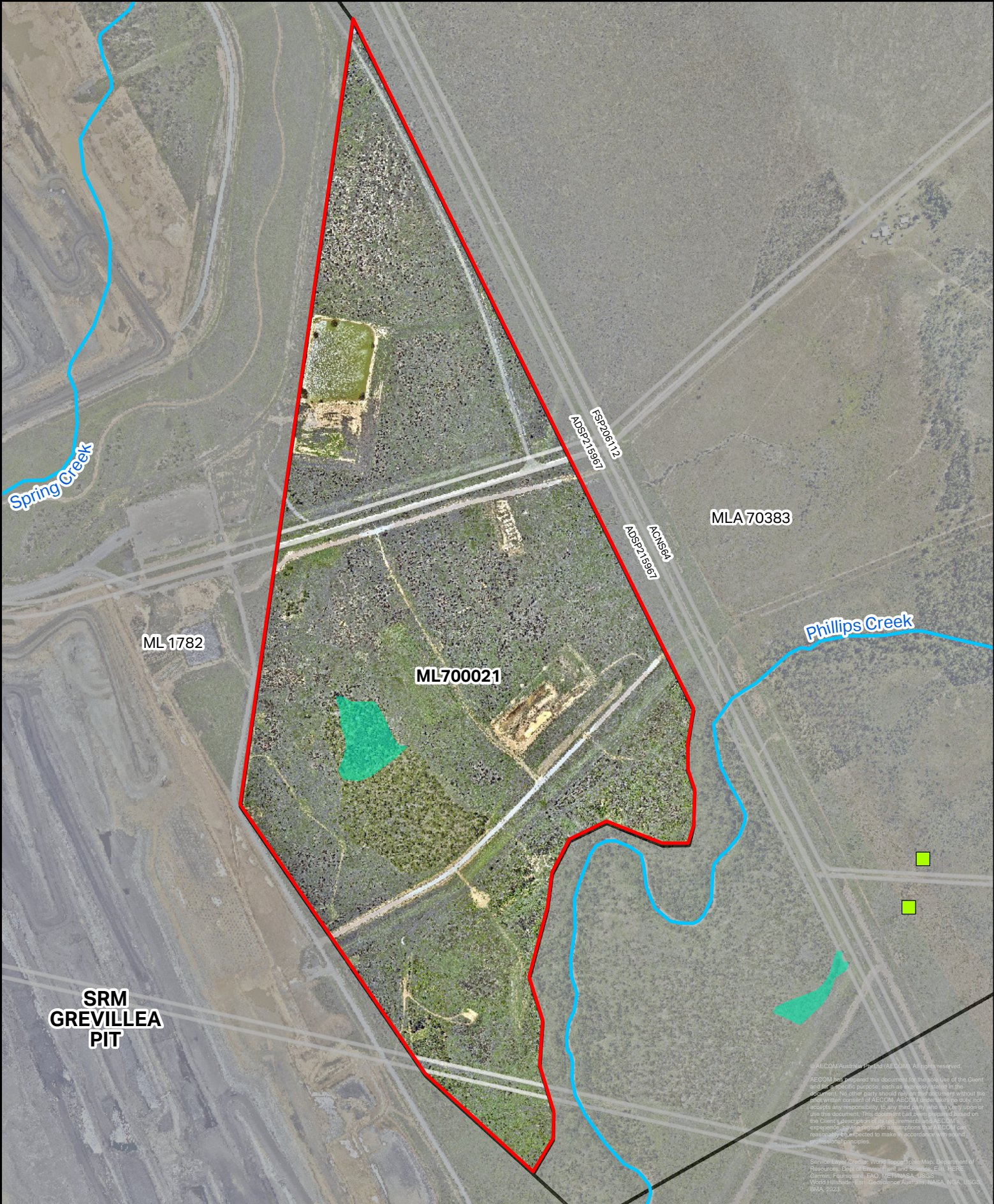
An assessment of the significance of impacts to this species under the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (Department of the Environment, 2013b) is provided in Table 17. The outcome of this assessment is that the Project is unlikely to result in a significant impact to the species.

Table 17 Significant impact assessment – King blue-grass

EPBC Act Criteria – is there a real possibility that the Project will:	Assessment of Significance
Lead to a long-term decrease in the size of a population?	<p>Unlikely</p> <p>No <i>D. queenslandicum</i> individuals were recorded within the project area during multiple survey events. However, approximately 3.1 ha of potential habitat within remnant RE 11.4.9 for the species is proposed to be impacted for the Project.</p> <p>Habitat loss, disturbance and modification from mining are a primary threat to the survival of the species. Targeted meander surveys are yet to be undertaken to reduce uncertainty on the species' occurrence and extent. However, due to the expected disturbed condition of the habitat for this species, and its location on a mining lease, it is likely that the understorey of the habitat is dominated by exotic pasture species rather than <i>D. queenslandicum</i>. Therefore, whilst 3.1 ha of potential habitat is proposed to be impacted, the Project is considered unlikely to lead to a long-term decrease in the size of a population.</p>
Reduce the area of occupancy of the species?	<p>Unlikely</p> <p>No <i>D. queenslandicum</i> individuals were recorded within the project area during multiple survey events. However, approximately 3.1 ha of potential habitat within remnant RE 11.4.9 for the species is proposed to be impacted for the Project, which equates to 0.031 km².</p> <p>King bluegrass is known to be endemic to central and southern Queensland occurring in grassland communities on black soil within three disjunct populations. The species has undergone a 68.8% reduction in the extent of occurrence from 1,100 km² to 245 km², as a result of continued expansion of agriculture, mining and infrastructure development.</p> <p>Avoidance, mitigation and management measures are unable to reduce the extent of clearing of potential <i>D. queenslandicum</i> habitat.</p> <p>Targeted surveys have not been undertaken to determine the species' presence within the project area, however the species' likelihood of occurrence is considered potential. If it was confirmed as habitat for <i>D. queenslandicum</i>, 3.1 ha equates to 0.031 km² which would reduce the total area of occupancy by a very low value of 0.01%. Given this, the Project is unlikely to substantially reduce the area of occupancy for the species.</p>
Fragment an existing population into two or more populations?	<p>Unlikely</p> <p>Targeted surveys to determine the occurrence and extent of populations for the species are yet to be undertaken for the Project.</p> <p>Whilst 3.1 ha of potential habitat for the species is proposed to be impacted, this patch is already functionally disconnected from other</p>

EPBC Act Criteria – is there a real possibility that the Project will:	Assessment of Significance
	habitat for the species. Therefore, the Project is unlikely to significantly fragment an existing population into two or more populations.
Adversely affect habitat critical to the survival of a species?	<p>Unlikely</p> <p>Habitat critical to the survival of <i>D. queenslandicum</i> is not defined, so the general definition applies. The 3.1 ha of potential habitat is unlikely to contribute to the long-term maintenance of the species, or its genetic diversity and evolutionary development, as it is already functionally disconnected from other habitat for the species. The species has windborne pollination method, and seed material is unlikely to disperse to another suitable patch of remnant vegetation for the project area to contribute to genetic diversity.</p> <p>Based on this information, it is unlikely the project area contains habitat critical to the survival of <i>D. queenslandicum</i>, and therefore the Project is unlikely to adversely affect habitat critical to the survival of a species.</p>
Disrupt the breeding cycle of a population?	<p>Unlikely</p> <p>The 3.1 ha of potential habitat is unlikely to contribute to the long-term maintenance of the species, or its genetic diversity and evolutionary development, as it is already functionally disconnected from other habitat for the species. The species has windborne pollination method, and seed material is unlikely to disperse to another suitable patch of remnant vegetation for the project area to contribute to genetic diversity.</p> <p>Therefore, the Project is unlikely to disrupt/interfere with the successful breeding cycle (wind associated pollination and seed dispersal) of a population.</p>
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	<p>Unlikely</p> <p>While the Project proposes to impact 3.1 ha of potential habitat for the species, this area is negligible in comparison to the species' known area of occupancy of 245 km².</p> <p>Due to the small area of habitat and the assessment of the patch being functionally disconnected for the purpose of pollination and genetic diversity, the Project is considered unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.</p>
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat?	<p>Unlikely</p> <p>The species is known to be threatened by weed invasion. However, provided appropriate weed management measures are implemented as part of the BMP and rehabilitation measures are implemented as part of the PCRPP for the Project, the Project is unlikely to result in additional invasive species that are harmful to a species becoming established in its habitat.</p>
Introduce disease that may cause the species to decline?	<p>Unlikely.</p> <p>No diseases are known to affect the species.</p> <p>Provided rehabilitation measures are implemented as part of the PCRPP for the Project, the Project is unlikely to introduce disease that may cause the species to decline.</p>
Interfere with the recovery of the species?	<p>Unlikely</p> <p>The following themes to support the recovery of the species are outlined within its conservation advice:</p> <ul style="list-style-type: none"> • Habitat loss, disturbance and modification • Invasive weeds • Trampling, grazing and browsing • Conservation information

EPBC Act Criteria – is there a real possibility that the Project will:	Assessment of Significance
	Due to the existing disturbance and fragmentation influencing the 3.1 ha of potential habitat, the Project is unlikely to interfere with or exacerbate the abovementioned recovery themes for the species, since it is functionally disconnected from the regional population.



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LEGEND

- Project Area (ML700021)
- Mining leases
- Cadastre
- Watercourse (Water Act 2000)

Threatened Flora

- Potential *Dichanthium setosum* and *Dichanthium queenslandicum* habitat (BAAM, 2021)
- Observations (*Dichanthium setosum*) (AECOM, 2016)

THREATENED FLORA

**Grevillea Pit Continuation Project
 MNES - Significant Impact
 Assessment Report**

 BHP Mitsubishi Alliance	PROJECT ID	60712195	Figure 7
	CREATED BY	Kate Brodie	
	LAST MODIFIED	21 Dec 2023	
	VERSION:	3	

8.8 Ornamental snake (*Denisonia maculata*)

8.8.1 Description and status under the EPBC Act

The ornamental snake is listed as Vulnerable under the EPBC Act.

Denisonia maculata, also known as the ornamental snake, is a brown, grey brown or black snake with lighter coloured body scales often with darker streaks that grows to 50 cm in length within the family elapidae. The head is darker brown/black with lighter flecks, distinctly barred lips, white/cream belly with dark spots/flecks on the outer edges (Cogger, 2000) (Threatened Species Scientific Committee, 2014).

8.8.2 Distribution

The ornamental snake is known only from within the drainage system of the Fitzroy and Dawson Rivers in Queensland. This species is sparsely distributed across its geographic range and the population size is unknown. However, it is not thought to have experienced range declines, although the extent of habitat clearance in the region suggests that its long term survival is threatened (Threatened Species Scientific Committee, 2014).

8.8.3 Habitat requirements

The ornamental snake can be found on floodplains, undulating clay pans and along the margins of swamps, lakes and watercourses. It also occurs on adjoining areas of elevated ground and has been recorded in woodlands and open woodlands of coolabah, poplar box, and brigalow, and in fringing vegetation along watercourses (WWF-Australia/QMDC, 2008). The ornamental snake feeds almost exclusively on frogs.

The ornamental snake occurs within the Brigalow Belt Bioregion and the Burdekin and Fitzroy Natural Resource Management Regions. The distribution of this species is associated with the "Brigalow (*Acacia harpophylla* dominant and co-dominant)" EPBC Act-listed threatened ecological community (Threatened Species Scientific Committee, 2014).

8.8.4 Threats

The approved Conservation Advice for the ornamental snake (Threatened Species Scientific Committee, 2014) identifies the following specific threats affecting this species:

- broadscale land clearing and habitat degradation due to heavy presence of agricultural and urban development within the Brigalow Belt Bioregion
- destruction of wetland habitat by feral pigs (*Sus scrofa**)
- the destruction of prey habitat and direct competition for prey (frogs)
- potential threat of poisoning due to the ingestion of cane toads (*Rhinella marina**).

8.8.5 Presence and survey effort

The species was detected in the neighbouring MLA70383 during past surveys conducted within the project area (AECOM, 2016). A total of 14.2 ha of marginal habitat was mapped during recent surveys as occurring within the northern and western parts of the project area, including in association with the remnant RE 11.4.9 and non-remnant gilgai habitat (BAAM Ecological Consultants, 2021; BMA, 2018).

8.8.6 Potential impacts and mitigation measures

A total of 14.2 ha of marginal habitat for the ornamental snake will be cleared as part of the Project. Other Project related potential indirect impacts relevant to the ornamental snake includes:

- further pest incursion
- fauna mortality via entrapment in trenches or being dissected from digging equipment
- erosion and sedimentation
- water contamination
- altered hydrology
- light disturbance.

Refer to Section 7.0 of this report for avoidance, minimisation and mitigation measures.

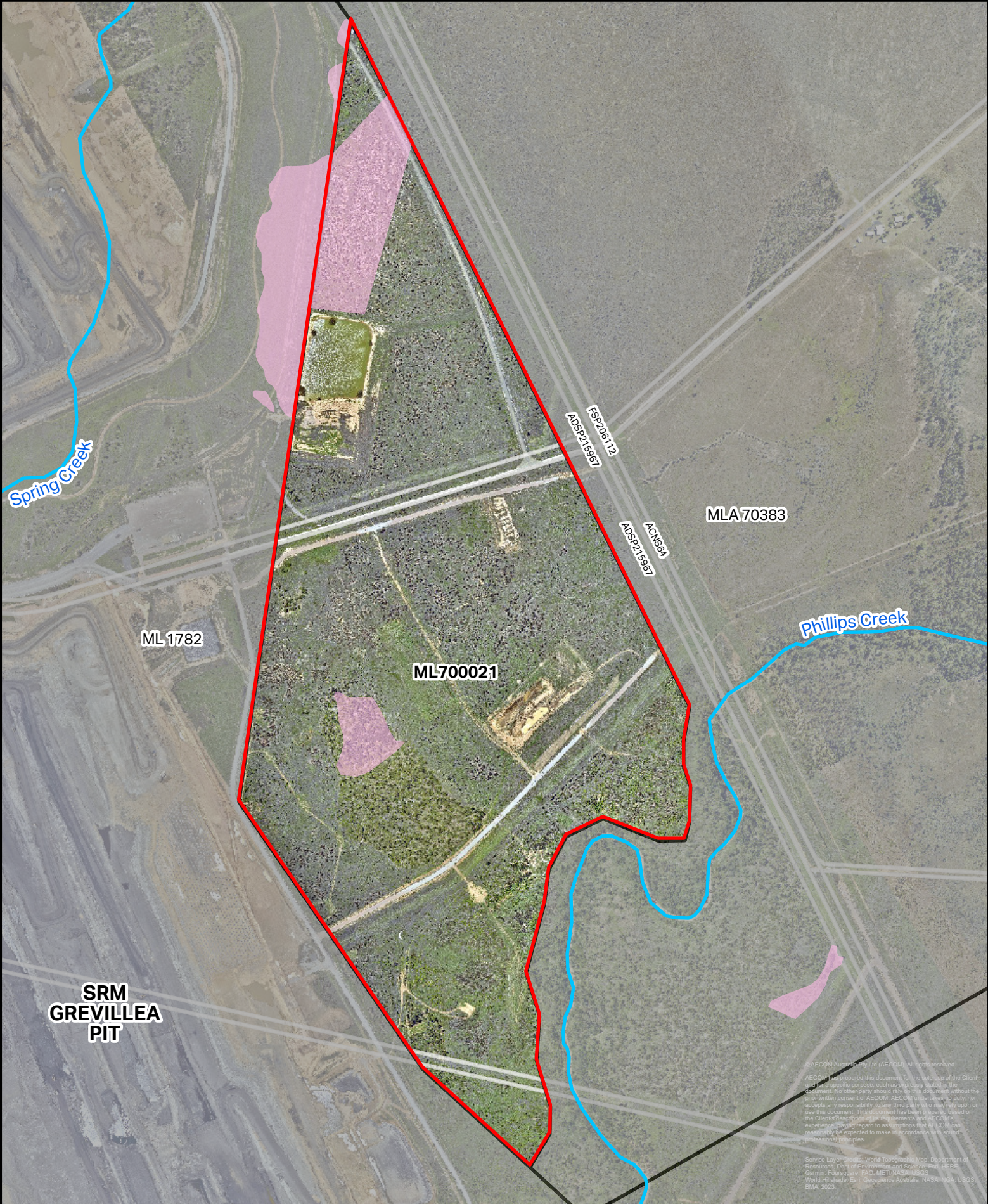
8.8.7 Significant impact criteria assessment

An assessment of the significance of impacts to this species under the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (Department of the Environment, 2013b) is provided in Table 18. The outcome of this assessment is that the Project may result in a significant impact on the species.

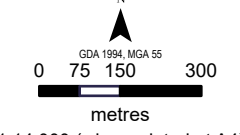
Table 18 Significant impact assessment – ornamental snake

EPBC Act Criteria – is there a real possibility that the Proposed Action will:	Assessment of Significance
Lead to a long-term decrease in the size of an important population of a species?	<p>Possible</p> <p>Field verified habitat mapping identifies 14.2 ha of potential habitat within the project area including RE 11.4.9 and non-remnant gilgai landform, which is considered potentially important habitat for the species. Given the low detectability of the species important habitat has been defined as a surrogate for important populations. Clearing small areas of important ornamental snake habitat, altering water quality or quantity, or impacting riparian habitat is considered high risk for significant impacts on the species. The potential habitat areas to be impacted are highly modified and isolated from other habitat areas. Accordingly, the species has not been recorded on site. Given this, it is possible that the Project will lead to a long-term decrease in the size of an important population.</p>
Reduce the area of occupancy of an important population?	<p>Possible</p> <p>Suitable habitat for the ornamental snake occurs in a wide variety of non-remnant and remnant vegetation, predominantly acacia dominated forests to woodlands and grassland communities. RE 11.4.9 was ground-truthed to occur within the project area, as well as non-remnant gilgai landforms. Field verified habitat mapping identifies 14.2 ha of potential habitat within the project area. Whilst no species were identified within the project area during previous field surveys, the species has been recorded within the broader landscape. Important habitat has been identified as a surrogate for important population. The potential habitat areas to be impacted are highly modified and isolated from other habitat areas. Accordingly, the species has not been recorded on site. Given this, it is possible the Project will lead to a decrease in the occupancy of an important population.</p>
Fragment an existing important population into two or more populations?	<p>Unlikely</p> <p>Habitat within the project area is already fragmented due to access tracks and historical vegetation clearing. No individuals were observed within the project area during previous targeted field survey and habitat is considered sub-optimal given the isolation from larger patches of remnant vegetation. Furthermore, in a regional context the project area is located in high disturbance and occurs adjacent to existing mining activities. Given the relative isolation and lack of viable landscape corridor, it is unlikely the Project will fragment an existing population into two or more populations.</p>
Adversely affect habitat critical to the survival of a species?	<p>Possible</p> <p>The Project may adversely affect habitat critical to the survival of the species. Clearing small areas of important ornamental snake habitat, altering water quality or quantity, or impacting riparian habitat is considered high risk for significant impacts on the species. The Project is proposed to impact 14.2 ha of habitat. Whilst the species has not been observed within the project area and potential habitat is considered sub-optimal given isolation from remnant vegetation, RE 11.4.9 and non-remnant gilgai landform was identified during field surveys, which is considered important habitat for the species. Due to</p>

EPBC Act Criteria – is there a real possibility that the Proposed Action will:	Assessment of Significance
	<p>these factors, impacts may adversely affect habitat critical for the survival of the species.</p> <p>Subsequently, the surrounding habitat located to the south of the Project area appears to provide large amounts of preferred habitat that will not be impacted by the Project. Provisions to relocate individuals of ornamental snake by suitably qualified fauna spotter catchers will be in place for the potential any should be observed.</p>
Disrupt the breeding cycle of an important population?	<p>Possible</p> <p>No existing population is known within the project area. The species is viviparous (Threatened Species Scientific Committee, 2014) and probably active year-round with the exception of the cooler months, with peak activity likely to be early summer through to the wet season when prey is abundant. During dry times the snake can remain inactive in suitable shelter sites for extended periods. As the species has no specific breeding periods, it is possible the Project may disrupt the breeding cycle of an important population.</p> <p>Measures to manage potential Project impacts to the species include the use of fauna spotter catchers are considered for the Project. Nonetheless, the Project has the potential to disrupt the breeding cycle of the species.</p>
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	<p>Unlikely</p> <p>While the Project is proposed to remove a small area of habitat (14.2 ha), other areas of contiguous breeding, foraging and dispersal habitat occur outside the project area. No existing populations are known within the project area. As such, proposed impacts as a result of the Project are unlikely to modify, destroy, remove or decrease the availability or quality of habitat to the extent that the species is likely to decline.</p>
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?	<p>Unlikely</p> <p>Feral pigs (<i>Sus scrofa</i>*) are considered a threat to wetland habitat values that may be suitable for the species. Domestic cattle are likely to have similar degrading impacts on wetland values on grazing lands. The species is potentially threatened by cane toads (<i>Rhinella marina</i>*) by poisoning via ingestion. Given the proposed mitigation measures, it is unlikely the Project will result in invasive species becoming established in ornamental snake habitat.</p>
Introduce disease that may cause the species to decline?	<p>Unlikely</p> <p>Disease has not been identified as a potential threatening process to the species. However, biosecurity management will be carried out under current mine operations and will be extended to the project area.</p>
Interfere substantially with the recovery of the species?	<p>Unlikely</p> <p>No current recovery plan exists for the ornamental snake at the time of this report. The approved conservation advice for ornamental snake notes the following priority actions applicable to the species:</p> <ul style="list-style-type: none"> • Protect and monitor known populations and threats • Identify high conservation value populations • Minimise adverse impacts from land use at known sites • Control threatening pests in ornamental snake habitat <p>Given, the lack of records within the project area, impacts from the Project are considered unlikely to substantially interfere with the priority actions listed above or the recovery of the species.</p>



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LEGEND

- Project Area (ML700021)
- Mining leases
- Cadastre
- Watercourse (Water Act 2000)
- Ornamental Snake - Potential Habitat

**ORNAMENTAL SNAKE
 POTENTIAL HABITAT
 Grevillea Pit Continuation Project
 MNES - Significant Impact
 Assessment Report**



PROJECT ID 60712195
 CREATED BY Kate Brodie
 LAST MODIFIED 21 Dec 2023
 VERSION: 3

**Figure
 8**

8.9 *Dichanthium setosum*

8.9.1 Description and status under the EPBC Act

Dichanthium setosum is listed as Vulnerable under the EPBC Act.

D. setosum (bluegrass) is an upright perennial grass less than 1 m tall. It has mostly hairless leaves about 2–3 mm wide. The flowers are densely hairy and clustered together along a stalk in a cylinder shape and appear mostly during summer. The species can form pure swards or occur as scattered clumps (Department of Environment Water Heritage and the Arts, 2008).

8.9.2 Distribution

D. setosum occurs chiefly on the northern tablelands in the Saumarez area, west of Armidale, and 18–30 km east of Guyra. It is more rarely found on the north-western slopes, central western slopes and north-western plains of NSW, extending west to Narrabri (Ayers et al., 1996). In Queensland it has been reported from the Leichhardt, Morton, North Kennedy and Port Curtis regions. This species occurs in the Mistake Range, in Main Range National Park, and possibly in Glen Rock Regional Park, adjacent to the Main Range National Park.

D. setosum occurs within the Border Rivers–Gwydir, Central West, Namoi, Northern Rivers (NSW), South East and Fitzroy (Queensland) Natural Resources Management Regions.

8.9.3 Habitat requirements

D. setosum is associated with heavy basaltic black soils and stony red-brown hardsetting loam with clay subsoil and is found in moderately disturbed areas such as cleared woodland, grassy roadside remnants, grazed land and highly disturbed pasture (Department of Environment Water Heritage and the Arts, 2008). The extent to which this species tolerates disturbance is unknown.

The distribution of this species overlaps with the following EPBC Act-listed threatened ecological communities:

- semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions
- the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin
- bluegrass (*Dichanthium* spp.) dominant grasslands of the Brigalow Belt Bioregions (North and South)
- Brigalow (*Acacia harpophylla* dominant and co-dominant)
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland
- Upland Wetlands of the New England Tablelands and the Monaro Plateau.

8.9.4 Threats

The main identified threats to *D. setosum* according to the approved species Conservation Advice (Department of Environment Water Heritage and the Arts, 2008) 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 Coolatai grass (*Hyparrhenia hirta*), Lippia (*Phyla canescens*) and African Lovegrass (*Eragrostis curvula*)
- road widening.

8.9.5 Presence and survey effort

D. setosum was recorded approximately 600m south-east of the project area, to the south of Phillips Creek (Figure 7) and potential habitat for the species was mapped within the remnant RE 11.4.9 found in the project area (AECOM, 2016; BAAM Ecological Consultants, 2021).

8.9.6 Potential impacts and mitigation measures

A total of 3.1 ha of potential *D. setosum* habitat may be cleared as part of the Project. Other Project related potential indirect impacts relevant to the species include:

- weed incursion.

Refer to Section 7.0 of this report for species-specific and general avoidance, minimisation and mitigation measures.

8.9.7 Significant impact criteria assessment

An assessment of the significance of impacts to this species under the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (Department of the Environment, 2013b) is provided in Table 19. The outcome of this assessment is that the Project is unlikely to result in a significant impact on the species.

Table 19 Significant impact assessment – *Dichanthium setosum*

EPBC Act Criteria – is there a real possibility that the Proposed Action will:	Assessment of Significance
Lead to a long-term decrease in the size of an important population of a species?	<p>Unlikely</p> <p>No important populations for the species have been found within the project area.</p> <p>Mining is not listed as a main threat to the survival of the species, and the species has a conservation status of Least Concern under the Queensland <i>Nature Conservation Act 1992</i>, suggesting the species is considered stable in Queensland.</p> <p>No <i>D. setosum</i> were recorded within the project area, however approximately 3.1 ha of potential habitat within RE 11.4.9 for the species is proposed to be impacted for the Project.</p> <p>Due to the small area proposed to be impacted for the Project, and since populations for species may be considered stable in Queensland, the Project is unlikely to lead to a long-term decrease in the size of an important population of a species</p>
Reduce the area of occupancy of an important population?	<p>Unlikely</p> <p>No important populations for the species have been found within the project area.</p> <p>Since populations for the species may be considered stable in Queensland (Least Concern under the <i>Nature Conservation Act 1992</i>) and a small area (3.1 ha) of potential habitat is proposed to be impacted, the Project is unlikely to reduce the area of occupancy of an important population.</p>
Fragment an existing important population into two or more populations?	<p>Unlikely</p> <p>No important populations for the species have been found within the project area. It is noted populations for the species may be considered stable in Queensland (Least Concern under the <i>Nature Conservation Act 1992</i>).</p> <p>Targeted surveys to determine the occurrence and extent of populations for the species are yet to be undertaken for the Project. However, it is unlikely that 3.1 ha of potential habitat for the species will fragment an existing important population into two or more populations.</p>
Adversely affect habitat critical to the survival of a species?	<p>Unlikely.</p> <p>No habitat critical to the survival of the species is currently known within the project area. No observations of the species have been made within the project area.</p> <p>Therefore, the Project is unlikely to adversely affect habitat critical to the survival of a species.</p>

EPBC Act Criteria – is there a real possibility that the Proposed Action will:	Assessment of Significance
Disrupt the breeding cycle of an important population?	<p>Unlikely</p> <p>The Project proposes to impact 3.1 ha of potential habitat for the species. Since the breeding cycle for the species is primarily windborne and will occur despite proposed impacts, the Project is unlikely to disrupt/interfere with the breeding cycle (wind associated pollination and seed dispersal) of a population.</p>
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	<p>Unlikely</p> <p>While the Project proposes to impact 3.1 ha of potential habitat for the species, populations for the species may be considered stable in Queensland (Least Concern under the <i>Nature Conservation Act 1992</i>).</p> <p>As such and also due to the windborne pollination method of the species (which may able to recruit in other suitable habitat areas), the project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.</p>
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?	<p>Unlikely</p> <p>The species is known to be threatened by weeds, such as invasive grass invasion. However, provided appropriate weed management and rehabilitation measures are implemented as part of the PRCP for the Project, the Project is unlikely to result in invasive species that are harmful to the species becoming established in its habitat.</p>
Introduce disease that may cause the species to decline?	<p>Unlikely</p> <p>No diseases are known to affect the species. Provided rehabilitation measures are implemented as part of the PRCP for the Project, the Project is unlikely to introduce disease that may cause the species to decline.</p>
Interfere substantially with the recovery of the species?	<p>Unlikely</p> <p>The following themes to support the recovery of the species are outlined within its conservation advice:</p> <ul style="list-style-type: none"> • Habitat loss, disturbance and modification • Invasive weeds • Trampling, grazing and browsing • Fire • Conservation information • Enable recovery of additional sites and/or populations <p>Since the Project is unlikely to significantly cause habitat loss, disturbance and modification to an important population of the species and species-specific mitigation measures such as preclearing surveys, avoiding/minimising clearing to species habitat, weed and pathogen management and rehabilitation of disturbed habitat for the species will be implemented for the Project, the Project is unlikely to significant interfere with the abovementioned recovery themes of the species.</p>

8.10 Squatter pigeon (southern) (*Geophaps scripta scripta*)

8.10.1 Description and status under the EPBC Act

The squatter pigeon (southern) is listed as Vulnerable under the EPBC Act.

The squatter pigeon (southern) is a medium-sized, ground-dwelling pigeon that measures approximately 30 cm in length and weighs about 190-250 g. Adults are predominantly grey-brown, but have black and white stripes on the face and throat, blue-grey skin around the eyes, dark-brown (and some patches of iridescent green or violet) on the upper surfaces of the wings, blue-grey on the lower breast and belly, white on the lower region, flanks of the belly and extending onto the under surfaces of the wings, and a blackish-brown band along the trailing edge of the tail. They have black bills, dark-brown irises, and dull-purple legs and feet (Higgins & Davies, 1996; Threatened Species Scientific Committee, 2015).

8.10.2 Distribution

The squatter pigeon (southern) occurs on the inland slopes of the Great Dividing Range. Its current distribution extends from the Burdekin-Lynd Divide in central Queensland, west to Longreach and Charleville, east to the coast between Port Curtis and Proserpine, and south to New South Wales (NSW) north of 29° S (Cooper et al., 2014). There is a broad zone of hybridisation with the northern subspecies along the Burdekin-Lynd Divide (Higgins & Davies, 1996; Threatened Species Scientific Committee, 2015).

8.10.3 Habitat requirements

The squatter pigeon (southern) inhabits the grassy understorey of open eucalypt woodland, and less often savannas. It is nearly always found near permanent water such as rivers, creeks and waterholes. Sandy areas dissected by gravel ridges, which have open and short grass cover allowing easier movement, are preferred. It is less commonly found on heavier soils with dense grass. It often occurs in burnt areas and is sometimes found on tracks and roadsides (Garnett & Crowley, 2000; Higgins & Davies, 1996).

The subspecies nests on the ground, usually laying two eggs among or under vegetation. It forages for seeds among sparse and low grass, in improved pastures, and beside railway lines and with domestic fowl around settlements. It roosts in low trees at night. Its movements are poorly known but it appears to be locally dispersive or resident, with no long-distance seasonal movements recorded (Higgins & Davies, 1996). The generation time is estimated at 5 years (Garnett & Crowley, 2000; Threatened Species Scientific Committee, 2015).

8.10.4 Threats

The population declined rapidly during the late 19th and early 20th centuries and continued to decline in NSW and southern Queensland where it is now very rare. In NSW, the disappearance of the subspecies has been attributed to overgrazing at times of drought, followed by clearing of vegetation. Its original habitat in NSW is nearly all now grazed by sheep or is under cultivation. In Queensland, much of its original habitat has been replaced with improved pasture for cattle-grazing which, while decreasing the abundance of natural food plants, is not as destructive as grazing by sheep and may provide an important source of food (Garnett & Crowley, 2000; Higgins & Davies, 1996).

As per the species Conservation Advice (Threatened Species Scientific Committee, 2015), current threats include:

- ongoing vegetation clearance and fragmentation
- overgrazing of habitat by livestock and feral herbivores such as rabbits (*Oryctolagus cuniculus**)
- introduction of weeds
- inappropriate fire regimes
- thickening of understorey vegetation
- predation by feral cats (*Felis catus**) and foxes (*Vulpes vulpes**)
- trampling of nests by domestic stock

- illegal shooting.

8.10.5 Presence and survey effort

The species was detected in the neighbouring ML, 4 km from the project area during previous surveys in 2016 (AECOM, 2016). A total of 39 ha of potential squatter pigeon (southern) habitat was ground-truthed within the project area (BAAM Ecological Consultants, 2021).

As this species currently has no adopted recovery plan, important populations of squatter pigeon (southern) have been defined as per those listed in the SPRAT database (Department of Climate Change Energy the Environment and Water, 2023e):

- 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 New South Wales.

None of these populations exist within the project area. Important populations of vulnerable species are also defined by the (Department of the Environment, 2013) as those 'that are necessary for a species' long-term survival and recovery' and may include populations which are:

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

This species remains common in Central Queensland and is distributed as a single, continuous (i.e. inter-breeding) sub-population. Any population of squatter pigeon (southern) in the project area does not meet the definition of an important population.

8.10.6 Potential impacts and mitigation measures

A total of 39 ha of potential squatter pigeon (southern) habitat may be cleared as part of the Project. Other Project related potential indirect impacts relevant to the species includes:

- further weed and pest incursion
- fauna injury or mortality via strike from moving vehicles and machinery
- erosion and sedimentation
- water contamination
- altered hydrology
- noise and light disturbance.

Refer to Section 7.0 of this report for species-specific and general avoidance, minimisation and mitigation measures.

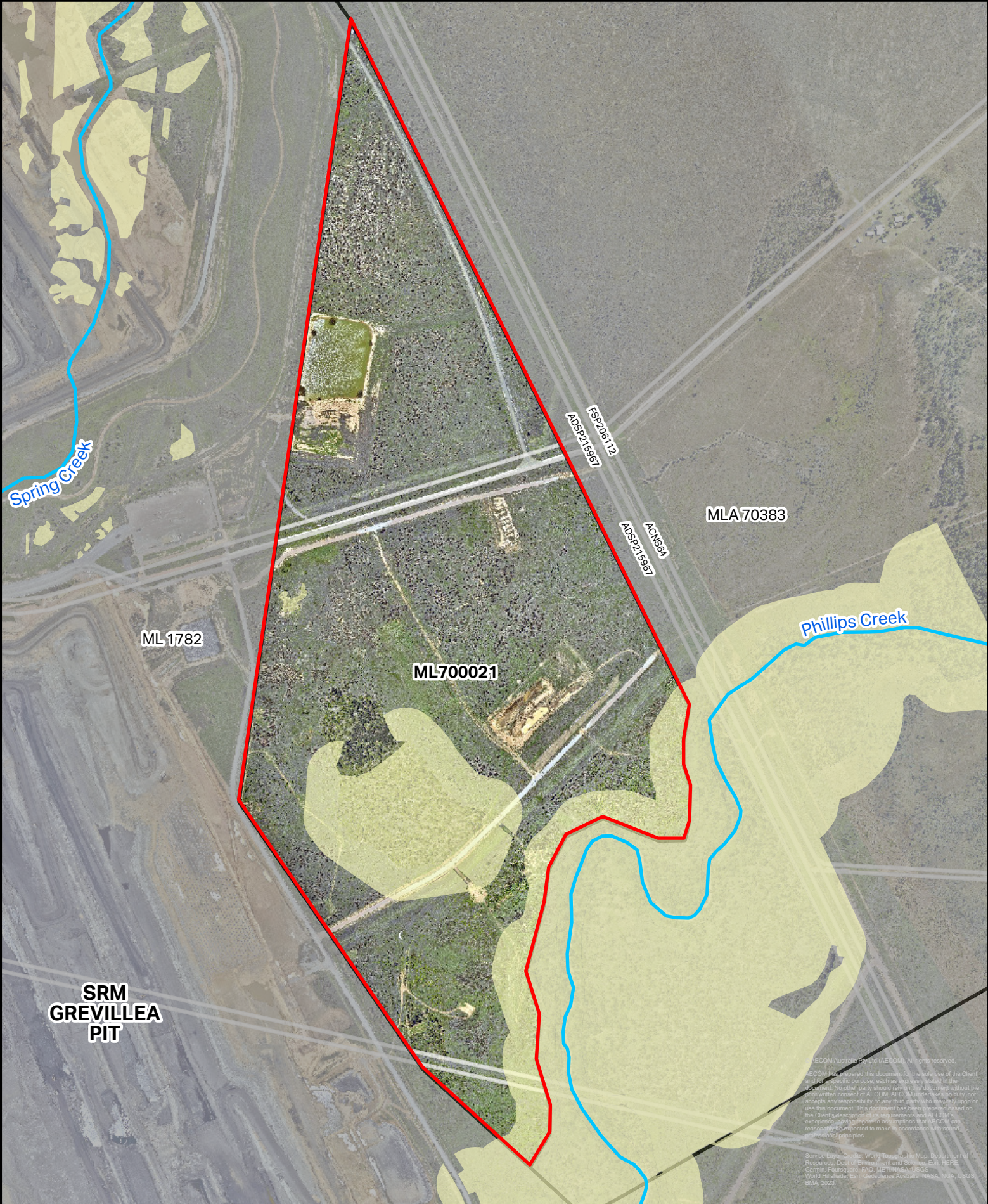
8.10.7 Significant impact criteria assessment

An assessment of the significance of impacts to this species under the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (Department of the Environment, 2013b) is provided in Table 20. The outcome of this assessment is that the Project is unlikely to result in a significant impact on the species.

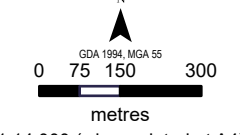
Table 20 Significant impact assessment – squatter pigeon (southern)

EPBC Act Criteria – is there a real possibility that the Proposed Action will:	Assessment of Significance
Lead to a long-term decrease in the size of an important population of a species?	<p>Unlikely</p> <p>The species occurs across a broad swathe of central Queensland extending into north Queensland. Across this area the species is considered as a single interbreeding population. The species was not recorded within the project area during previous targeted field surveys; however individuals were observed throughout the broader landscape. Nevertheless, the species is widespread in the region (although patchy in occurrence) and is considered likely to occur, however does not consist of an important population. It is therefore unlikely the Project will result in direct mortality of individuals that are considered part of an important population. Therefore, the Project is considered unlikely to result in a long-term decrease in the size of a local population of the species.</p>
Reduce the area of occupancy of an important population?	<p>Unlikely</p> <p>As identified above, an important population is not considered to occur within the project area. The species was not recorded within the project area during previous targeted field surveys; however individuals were observed throughout the broader landscape and suitable habitat was observed during previous field surveys. Given this, the Project is unlikely to reduce the area of occupancy of an important population.</p>
Fragment an existing important population into two or more populations?	<p>Unlikely</p> <p>No individuals were observed within the project area, and an important population is not considered to occur within the project area. The project area is impacted by historical clearing and exhibits fragmentation due to access tracks and current mining operations. The Project is considered unlikely to fragment any existing important populations within the area.</p>
Adversely affect habitat critical to the survival of a species?	<p>Unlikely</p> <p>Potential habitat for this species has identified areas categorised as breeding, foraging and/or dispersal habitat across the Project Site. Whilst these areas provide a sufficient availability of suitable resources for the species ecological requirements, they are still impacted by threatening processes that are a key contributor to the species ongoing threatened status. This includes the persistence of feral species, specifically feral cats. Therefore, habitat within the project area is not considered a refuge for squatter pigeon (southern) and is not considered to contain any unique characteristics or conditions that do not exist in other areas of habitat that occur in the region.</p> <p>In addition, a large extent of habitat for squatter pigeon (southern) occurs in the local area and across the region, some of which is considered better quality. This high availability of habitat for squatter pigeon (southern) in the region will allow the species to continue to persist within its current distribution regardless of the removal of habitat within the project area.</p> <p>Based on all of these factors, habitat within the project area is not considered critical to the survival of squatter pigeon (southern) and is not considered to play a critical role in the long-term maintenance of the species.</p> <p>Therefore, it is unlikely the Project will adversely affect habitat critical to the survival of the species.</p>
Disrupt the breeding cycle of an important population?	<p>Unlikely</p> <p>Squatter pigeon (southern)'s main breeding season is from mid-October to late January, but clutches have been inferred as early as late as August and as late as February. Vegetation clearance for operation phase may occur</p>

EPBC Act Criteria – is there a real possibility that the Proposed Action will:	Assessment of Significance
	<p>between October and January (wet season). Squatter pigeon (southern) tends to breed on stony rises and in shallow depressions in the ground within 1 km of a permanent water body and forage within 3 km of such a water body (Squatter Pigeon Workshop, 2011). As identified above, an important population is not considered to occur within the project area. Given the project area's proximity to Phillips Creek, it is possible the Project may disrupt the breeding cycle of individuals, however as an important population does not occur within the project area, the Project is unlikely to disrupt the breeding cycle of an important population. Implementation of a fauna spotter catcher during pre-clearing surveys and clearing events will mitigate the potential impacts to breeding individuals.</p>
<p>Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?</p>	<p>Unlikely The Project may result in removal of up to 39 ha of potential habitat within the project area that includes habitat likely to be utilised by the species for breeding, foraging and dispersal. Vast areas of potential habitat for the species will remain in the adjacent area following the development of the Project, which will continue to support any local population. Therefore, Project impacts (direct or indirect) are not considered to be of the magnitude that will contribute to the decline of the species.</p>
<p>Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?</p>	<p>Unlikely The proposed Project will not increase the presence of cats and foxes which are the main predators of squatter pigeon (southern) (Threatened Species Scientific Committee, 2015). Moreover, invasive weeds, pests and other disturbing factors such as fire will be managed, as these threats may modify the availability of foraging grasses.</p>
<p>Introduce disease that may cause the species to decline?</p>	<p>Unlikely Disease has not been identified as a potential threatening process to the species.</p>
<p>Interfere substantially with the recovery of the species?</p>	<p>Unlikely No current recovery plan exists for the squatter pigeon (southern) at the time of this report. The approved conservation advice for squatter pigeon (southern) notes the following priority actions applicable to the species:</p> <ul style="list-style-type: none"> • Monitor known populations to identify and manage key threats. • Identify populations of high conservation priority • Develop and implement a stock management plan to address trampling, browsing or grazing. <p>Given, the lack of records within the project area, impacts from the Project are considered unlikely to substantially interfere with the priority actions listed above or the recovery of the species.</p>



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LEGEND

- Project Area (ML700021)
- Mining leases
- Cadastre
- Watercourse (Water Act 2000)
- Squatter Pigeon - Potential Habitat

SQUATTER PIGEON POTENTIAL HABITAT
Grevillea Pit Continuation Project
 MNES - Significant Impact Assessment Report



PROJECT ID 60712195
 CREATED BY Kate Brodie
 LAST MODIFIED 21 Dec 2023
 VERSION: 3

Figure
9

9.0 Conclusions

This MNES assessment was developed to support referral of the Project under the EPBC Act. Using a combination of desktop information and field-validated data from past field surveys in the project area, the potential presence and extent of MNES values within the project area was determined. A total of twenty-two (22) MNES were considered known, likely or potentially occurring within the project area including two threatened flora species, 12 threatened fauna species, seven migratory species and one TEC.

An impact assessment for known, likely and potentially occurring MNES within the project area was completed via a two-step process. The first step involved a risk assessment, to determine if the likely consequences associated with potential impacts to individual MNES warrants further assessment via the significant impact assessment process. To make this determination, potential Project impacts were assessed against likelihood and consequence criteria, with the results applied to a risk matrix to identify risk level and further assessment outcomes (Section 8.0). MNES with a 'potential' risk rating triggered further assessment whilst MNES with a 'low' risk rating require no further assessment.

Based on the findings of the risk assessment, significant impact assessments were undertaken in accordance with the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines: Matters of National Environmental Significance* (Department of the Environment, 2013b) for seven MNES values:

- Brigalow TEC
- Koala
- Greater glider (southern and central)
- *Dichanthium queenslandicum* (king bluegrass)
- Ornamental snake
- *Dichanthium setosum* (bluegrass)
- Squatter pigeon (southern).

The precautionary principle was applied in the assessment of significant impacts. The findings of the assessment indicate that the Project may result in a significant impact on ornamental snake. The Project is unlikely to have a significant impact on Brigalow TEC, koala, greater glider (southern and central), *Dichanthium queenslandicum*, *Dichanthium setosum* or squatter pigeon (southern).

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Appendix A

Protected Matters Search Tool

Appendix A Protected Matters Search Tool



Australian Government

Department of Climate Change, Energy,
the Environment and Water

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 20-Dec-2023

[Summary](#)

[Details](#)

[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

Summary

Matters of National Environment Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar)	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	27
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	10
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities

[\[Resource Information \]](#)

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

Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area
Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin	Endangered	Community likely to occur within area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community likely to occur within area

Listed Threatened Species

[\[Resource Information \]](#)

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.

Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Neochmia ruficauda ruficauda Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area
Poephila cincta cincta Southern Black-throated Finch [64447]	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Stagonopleura guttata Diamond Firetail [59398]	Vulnerable	Species or species habitat may occur within area
MAMMAL		
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
Petauroides volans Greater Glider (southern and central) [254]	Endangered	Species or species habitat known to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
PLANT		
Aristida annua [17906]	Vulnerable	Species or species habitat likely to occur within area
Dichanthium queenslandicum King Blue-grass [5481]	Endangered	Species or species habitat may occur within area
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat may occur within area
Eucalyptus raveretiana Black Ironbox [16344]	Vulnerable	Species or species habitat may occur within area
Samadera bidwillii Quassia [29708]	Vulnerable	Species or species habitat may occur within area
REPTILE		
Denisonia maculata Ornamental Snake [1193]	Vulnerable	Species or species habitat known to occur within area
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
Elseya albagula Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat may occur within area
Furina dunmalli Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
Hemiaspis damelii Grey Snake [1179]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Lerista allanae Allan's Lerista, Retro Slider [1378]	Endangered	Species or species habitat may occur within area
Rheodytes leukops Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver [1761]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [[Resource Information](#)]

Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Migratory Terrestrial Species

Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area

Migratory Wetlands Species

Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area overfly marine area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat may occur within area overfly marine area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area overfly marine area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area overfly marine area

Extra Information

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Lake Vermont Meadowbrook Coal Mine Project, Qld	2019/8485		Assessment
Saraji East Mining Lease Project, Qld	2016/7791		Assessment
Controlled action			
Bowen Gas Project	2012/6377	Controlled Action	Post-Approval
install & operate gas pipeline	2005/2059	Controlled Action	Post-Approval
Lake Vermont open cut coal northern extension project, central Qld	2016/7701	Controlled Action	Post-Approval
New Saraji Coal Mine Project	2007/3845	Controlled Action	Completed
Norwich Park & Blackwater CSG Fields & supporting infrastructure Bowen Basin	2011/6032	Controlled Action	Completed
Spring Creek to Phillips Creek Diversion	2019/8576	Controlled Action	Post-Approval
Not controlled action			
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
Not controlled action (particular manner)			
Dysart East multi seam open cut coal mine project, Qld	2014/7224	Not Controlled Action (Particular Manner)	Post-Approval

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

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

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
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The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

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Appendix B

Likelihood of Occurrence Assessment

Appendix B Likelihood of Occurrence Assessment

Table 21 Likelihood of occurrence assessment

Common Name	Scientific Name	EPBC Act Status ¹	Preferred Habitat and Distribution	Likelihood of Occurrence in the Mining Lease
Birds				
Curlew sandpiper	<i>Calidris ferruginea</i>	CE, Mi	<p>This species mainly occurs on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They occur in both fresh and brackish waters.</p> <p>In Australia, curlew sandpipers occur around the coasts and are also quite widespread inland, though in smaller numbers (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Unlikely</p> <p>The species or suitable habitat was not recorded in the project area during field surveys (AECOM, 2016; BAAM Ecological Consultants, 2021).</p>
Red goshawk	<i>Erythrotriorchis radiatus</i>	E	<p>In northern and central Queensland, red goshawks are mainly associated with extensive, uncleared, mosaics of native vegetation, especially riparian vegetation, open forest and woodland that contain a mix of eucalypt, ironbark and bloodwood species. Permanent water (watercourses and wetlands) is usually present in close proximity, with tall emergent trees used for nesting. The red goshawk is thought to have a very large home range covering between 50 and 220 square.</p> <p>This species is sparsely distributed across coastal and sub-coastal Australia, from the western Kimberley to northern New South Wales. There appears to have been a contraction in range in recent years. Occasionally recorded from gorge country in central Australia and western Queensland kilometres (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Unlikely</p> <p>Suitable habitat was identified as unlikely to occur in the project area during field surveys due to distance from coast, and the species was not recorded during surveys (AECOM, 2016; BAAM Ecological Consultants, 2021).</p>
Grey falcon	<i>Falco hypoleucos</i>	V	<p>The grey falcon occurs at low densities across inland Australia, though the ecology of the grey falcon is known almost entirely from anecdotal and opportunistic observations. This species frequents timbered lowland plains, particularly Acacia shrublands that are crossed by tree-lined water courses. It has been observed hunting in treeless areas and frequents tussock grassland and open woodland, especially in winter.</p> <p>The grey falcon occurs in arid and semi-arid Australia, including the Murray-Darling Basin, Eyre Basin, central Australia and Western Australia. This species is mainly found where annual rainfall is less than 500 mm, except when wet years are followed by drought, when the species becomes more widespread (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Potential</p> <p>Potential habitat has been mapped as occurring adjacent to the project area at Phillips Creek during field surveys, and the species was recorded in the broader SRM in 2005 (BAAM Ecological Consultants, 2021).</p>
Squatter pigeon (southern subspecies)	<i>Geophaps scripta scripta</i>	V	<p>The squatter pigeon (southern) occurs in dry grassy woodland and open forest, mostly in sandy areas close to water (generally within 3 km). In Queensland, squatter pigeon (southern) foraging and breeding habitat is known to occur on well-draining, sandy or loamy soils on low, gently sloping, flat to undulating plains and foothills (i.e. Queensland Regional Ecosystem Land Zone 5), and lateritic (duplex) soils on low 'jump-ups' and escarpments (i.e. Queensland Regional Ecosystem Land Zone 7).</p> <p>This sub-species is now largely (if not wholly) restricted to Queensland, from the New South Wales border, north to the Burdekin River, west to Charleville and Longreach, and east to the coast to Townsville and Proserpine. In southern Queensland, only small, isolated and sparsely distributed sub-populations of the sub-species occur in this part of its range (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Likely</p> <p>Recorded in the surrounding lots during field surveys in the area (within MLA 70383, and on SRM) (AECOM, 2016) and preferred and suitable habitat has been mapped within the project area (BAAM Ecological Consultants, 2021).</p>

Common Name	Scientific Name	EPBC Act Status ¹	Preferred Habitat and Distribution	Likelihood of Occurrence in the Mining Lease
Painted honeyeater	<i>Grantiella picta</i>	V	<p>The species inhabits mistletoes in eucalypt forests/woodlands, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands, acacia-dominated woodlands, paperbarks, casuarinas, callitris, and trees on farmland or gardens. The species prefers woodlands which contain a higher number of mature trees, as these host more mistletoes. It is more common in wider blocks of remnant woodland than in narrower strips (Garnett et al., 2011), although it breeds in quite narrow roadside strips if ample mistletoe fruit is available (BirdLife International, n.d.).</p> <p>The species is sparsely distributed from south-eastern Australia to north-western Queensland and eastern Northern Territory. The greatest concentrations and almost all records of breeding come from south of 26°S, on inland slopes of the Great Dividing Range between the Grampians, Victoria and Roma, Queensland (Higgins et al., 2001) (Threatened Species Scientific Committee, 2015).</p>	<p>Potential</p> <p>The species was considered having potential to occur during field surveys due to suitable habitat occurring in the project area (AECOM, 2016; BAAM Ecological Consultants, 2021).</p>
White-throated needletail	<i>Hirundapus caudacutus</i>	V, Mi	<p>In Australia, the white-throated needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Due to their aerial nature, it has been stated that conventional habitat descriptions are inapplicable (Cramp 1985), but there are, nevertheless, certain preferences exhibited by the species. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland.</p> <p>This species is widespread in eastern and south-eastern Australia. In eastern Australia, it is recorded in all coastal regions of Queensland and New South Wales, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Potential (flyover only)</p> <p>Field surveys identified the species occurring in the broader SRM. Aerial habitat may occur in the project area (AECOM, 2016).</p>
Star finch (eastern)	<i>Neochmia ruficauda ruficauda</i>	E	<p>The star finch (eastern) occurs mainly in grasslands and grassy woodlands that are located close to bodies of fresh water. It also occurs in cleared or suburban areas such as along roadsides and in towns. Studies at nine former sites of the star finch (eastern) found that the habitat consisted mainly of woodland. These habitats are dominated by trees that are typically associated with permanent water or areas that are regularly inundated; the most common species are <i>Eucalyptus coolabah</i>, <i>Eucalyptus tereticornis</i>, <i>Eucalyptus tessellaris</i>, <i>Melaleuca leucadendra</i>, <i>Eucalyptus camaldulensis</i> and <i>Casuarina cunninghamiana</i>.</p> <p>Based on the small number of accepted records, the distribution of this subspecies formerly extended from Bowen in central Queensland, south to the Namoi River in northern New South Wales, and west to the Blackall Range. Recent records have been obtained only from scattered sites in central Queensland (i.e. between 21°S and 25°S, and 141°E and 150°E) and, consequently, the star finch (eastern) now appears to be extinct in both south-eastern Queensland and northern New South Wales (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Potential</p> <p>The species was not recorded but suitable habitat was identified as occurring within and adjacent to the project area associated with Phillips Creek (AECOM, 2016; BAAM Ecological Consultants, 2021). However, the vegetation patch is degraded and fragmented from other habitat values for the species.</p>
Black-throated finch (southern)	<i>Poephila cincta cincta</i>	E	<p>The black-throated finch (southern) occurs mainly in grassy, open woodlands and forests, typically dominated by <i>Eucalyptus</i>, <i>Corymbia</i> and <i>Melaleuca</i>, and occasionally in tussock grasslands or other habitats (for example freshwater wetlands), often along or near watercourses, or in the vicinity of water. Almost all recent records of the finch from south of the tropics have been in riparian habitat. The subspecies is thought to require a mosaic of different habitats in which it can find seed during the wet season.</p> <p>The black-throated finch (southern) occurs at two general locations: in the Townsville region, where it is considered locally common at a few sites around Townsville and Charters Towers; and at scattered sites in central-eastern Queensland (between Aramac and Great Basalt Wall National Park) (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Unlikely</p> <p>The species was not recorded close to the project area (AECOM, 2016). Suitable habitat may occur in the broader SRM (BAAM Ecological Consultants, 2021)</p>

Common Name	Scientific Name	EPBC Act Status ¹	Preferred Habitat and Distribution	Likelihood of Occurrence in the Mining Lease
Australian painted snipe	<i>Rostratula australis</i>	E	<p>Preferred habitat includes shallow inland wetlands, brackish or freshwater, that are permanently or temporarily inundated. Breeding habitat requirements may be quite specific: shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby.</p> <p>The Australian painted snipe has been recorded from wetlands in all Australian states, however is most common in eastern Australia, especially the Murray-Darling Basin. Individuals are nomadic, and there is some evidence of partial migration from south-eastern wetlands to coastal central and northern Queensland in autumn and winter (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Potential</p> <p>The species was recorded during field surveys in the adjacent lot MLA 70383 located 5km from project area. Whilst no naturally occurring wetlands are present within the project area, artificial dams with fringing vegetation occur and may provide potential foraging habitat (AECOM, 2016a; BAAM Ecological Consultants, 2021a). The species has the potential to occur within the project area temporarily.</p>
Diamond firetail	<i>Stagonopleura guttata</i>	V	<p>Diamond firetails occur in eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats, including farmland and grassland with scattered trees (Higgins et al. 2007). They prefer areas with relatively low tree density, few large logs, and little litter cover but high grass cover (Antos et al. 2008). Diamond firetails feed predominantly at ground level, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially during the breeding season) (Blakers et al. 1984; Read 1994). As such, birds are often observed hopping around on the ground (Higgins et al. 2007). In the Mt Lofty Ranges, birds also rely on seeds of drooping she-oak (<i>Allocasuarina verticillata</i>) in winter in areas where perennial grasses have been replaced by exotic annuals (Hodder 2019).</p> <p>Diamond firetails occur on the south-east mainland of Australia from south-east Queensland to Eyre Peninsula, South Australia, and about 300 km inland from the sea (Higgins et al. 2007). Their range once extended to north Queensland inland from Cardwell, but they now occur only in the very south of the state (Hodder et al. 2021) (Department of Climate Change Energy the Environment and Water, 2023a).</p>	<p>Unlikely</p> <p>Species records do not occur within 10 km of the project area. Records within 200 km are from the year 2000 (Atlas of Living Australia, 2023).</p>
Migratory Birds				
Common sandpiper	<i>Actitis hypoleucos</i>	Mi	<p>The common sandpiper is known to occur in a range of wetland environments, both coastal and inland, with varying levels of salinity. Their primary habitat is rocky shorelines and narrow muddy margins of billabongs, lakes, estuaries and mangroves. The species has also been recorded on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties.</p> <p>Found along all coastlines of Australia and in many areas inland, the common sandpiper is widespread in small numbers. The population when in Australia is concentrated in northern and western Australia (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Unlikely</p> <p>The species was not found during field surveys of the project area and the broader SRM, and the habitat was considered unsuitable for the species to occur (BAAM Ecological Consultants, 2021).</p>
Fork-tailed swift	<i>Apus pacificus</i>	Mi	<p>The fork-tailed swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. This species mostly occurs over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. They often occur over cliffs and beaches and over islands and sometimes well out to sea.</p> <p>This species is generally recorded east of the Great Dividing Range from Cooktown to the New South Wales border, but extends further west in southern Queensland (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Potential (flyover only)</p> <p>The species was found to occur in the broader SRM during field surveys and may utilise the aerial habitat above the project area (AECOM, 2016; BAAM Ecological Consultants, 2021).</p>
Sharp-tailed sandpiper	<i>Calidris acuminata</i>	Mi	<p>In Australasia, the Sharp-tailed Sandpiper prefers 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, salt pans and hypersaline salt lakes inland. They also occur in saltworks and sewage farms. In Queensland, the sharp-tailed sandpiper is recorded in most regions, being widespread along much of the coast and are very sparsely scattered inland, particularly in the centre and south-west (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Potential</p> <p>The species has been assessed as potentially frequenting artificial dams within the broader SRM area (BAAM Ecological Consultants, 2021). The species has been assessed as having potential to occur due to the presence of water bodies adjacent to the project area.</p>

Common Name	Scientific Name	EPBC Act Status ¹	Preferred Habitat and Distribution	Likelihood of Occurrence in the Mining Lease
Pectoral sandpiper	<i>Calidris melanotos</i>	Mi	<p>In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. This species is usually found in coastal or near coastal habitat but very occasionally found further inland.</p> <p>In Queensland, most records for the pectoral sandpiper occur around Cairns. There are scattered records elsewhere, mainly from east of the Great Divide between Townsville and Yeppoon. Records also exist in the south-east of the state as well as a few inland records at Mount Isa, Longreach and Oakley (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Potential</p> <p>The species has been assessed as potentially frequenting artificial dams within the broader SRM area (BAAM Ecological Consultants, 2021). The species has the potential to occur due to the presence of water bodies adjacent to the project area.</p>
Oriental cuckoo	<i>Cuculus optatus</i>	Mi	<p>This species uses a range of vegetated habitats such as monsoon rainforest, wet sclerophyll forest, open woodlands and appears quite often along edges of forests, or ecotones between forest types. It mainly inhabits coniferous, deciduous and mixed forests. It feeds mainly on insects and their larvae, foraging for them in trees and bushes as well as on the ground. The oriental cuckoo is a regular migrant to Australia, where it spends the non-breeding season (Sept- May) in coastal regions across northern and eastern Australia as well as offshore islands (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Potential</p> <p>Potential habitat may occur within the broader SRM although it is uncertain where this habitat may occur. (BAAM Ecological Consultants, 2021).</p>
Latham's snipe	<i>Gallinago hardwickii</i>	Mi	<p>In Australia, Latham's snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies).</p> <p>However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity. Latham's snipe is a non-breeding visitor to south-eastern Australia and is a passage migrant through northern Australia. This species has been recorded along the east coast of Australia from Cape York Peninsula through to south-eastern South Australia. In Queensland, the range extends inland over the eastern tablelands in south-eastern Queensland (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Potential</p> <p>Whilst no naturally occurring wetlands are present within the project area, artificial dams with fringing vegetation are present and may provide potential foraging habitat (AECOM, 2016; BAAM Ecological Consultants, 2021). The species has the potential to occur within the project area temporarily and has been recorded within SRM during field surveys (AECOM, 2016a).</p>
Caspian tern	<i>Hydroprogne caspia</i>	Mi	<p>The Caspian tern is mostly found in sheltered coastal embayments (harbours, lagoons, inlets, bays, estuaries and river deltas) and those with sandy or muddy margins are preferred. They also occur on near-coastal or inland terrestrial wetlands that are either fresh or saline, especially lakes (including ephemeral lakes), waterholes, reservoirs, rivers and creeks. They also use artificial wetlands, including reservoirs, sewage ponds and saltworks. In offshore areas the species prefers sheltered situations, particularly near islands, and is rarely seen beyond reefs (Higgins & Davis 1996).</p> <p>In Queensland, Caspian tern are widespread in coastal regions from the southern Gulf of Carpentaria to the Torres Strait, and along the eastern coast. Recorded in the western districts, especially the Lake Eyre Drainage Basin, north-west to the Gulf Country north of Mt Isa and Cloncurry, there are also scattered records for central Queensland (Higgins & Davies 1996) (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Unlikely</p> <p>While the species was recorded in the broader SRM area during field surveys, the species or suitable habitat was not found within the project area (AECOM, 2016; BAAM Ecological Consultants, 2021).</p>
Black-faced monarch	<i>Monarcha melanopsis</i>	Mi	<p>The black-faced monarch is a wet forest specialist, occurring mainly in rainforests and riparian vegetation. This species mainly occurs in rainforest ecosystems, including semi-deciduous vine-thickets, complex notophyll vine-forest, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf) thicket/shrub land, warm temperate rainforest, dry (monsoon) rainforest and (occasionally) cool temperate rainforest. The species is occasionally found in eucalypt forest (mainly wet sclerophyll forest) nearby preferred rainforest habitat, particularly in gullies with a dense, shrubby understorey as well as in dry sclerophyll forests and woodlands often with a patchy understorey. The species is more likely to be found in these marginal habitats when on passage (Australian winter).</p> <p>In Queensland, the black-faced monarch is widespread from the islands of the Torres Strait and on Cape York Peninsula, south along the coasts (occasionally including offshore islands) and the eastern slopes of the Great Divide, to the New South Wales border (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Unlikely</p> <p>The species or suitable habitat were not found to occur in the project area or the broader SRM during field survey efforts (AECOM, 2016; BAAM Ecological Consultants, 2021).</p>

Common Name	Scientific Name	EPBC Act Status ¹	Preferred Habitat and Distribution	Likelihood of Occurrence in the Mining Lease
Yellow wagtail	<i>Motacilla flava</i>	Mi	<p>The yellow wagtail is considered one of five 'extremely uncommon migrants' to Australia. When in Australia it is a regular wet season visitor to northern Australia. In Queensland this species has been recorded from Mossman south to Townsville. Habitat requirements for the yellow wagtail are highly variable, but typically include open grassy flats near water. Habitats include open areas with low vegetation such as grasslands, airstrips, pastures, sports fields; damp open areas such as muddy or grassy edges of wetlands, rivers, irrigated farmland, dams, waterholes; sewage farms, sometimes utilise tidal mudflats and edges of mangroves.</p> <p>The yellow wagtail is a regular wet season visitor to northern Australia. In Queensland this species is a regular visitor from Mossman south to Townsville. The species is a vagrant further south and on Heron Island (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Unlikely The species or suitable habitat were not found to occur in the project area or the broader SRM during field survey efforts (AECOM, 2016; BAAM Ecological Consultants, 2021).</p>
Satin flycatcher	<i>Myiagra cyanoleuca</i>	Mi	<p>Satin flycatchers are eucalypt forest and woodland inhabitants. They are particularly common in tall wet sclerophyll forest, often in gullies or along water courses. In woodlands they prefer open, grassy woodland. The diversity of occupied habitats expands during migration, with the species recorded in most wooded habitats. Wintering birds in northern Queensland will use rainforest – gallery forests interfaces, and birds have been recorded wintering in mangroves and paperbark swamps.</p> <p>In Queensland, this species is widespread but scattered in the east, being recorded on passage on a few islands in the western Torres Strait. Satin flycatchers are also found extensively along the Great Dividing Range (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Potential Potential habitat has been assessed during field surveys as occurring in eucalypt and riparian woodlands abutting the project area (AECOM, 2016). However, the vegetation patch is degraded and fragmented from other habitat values for the species.</p>
Osprey	<i>Pandion haliaetus</i> (syn. <i>Pandion cristatus</i>)	Mi	<p>Eastern ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia. They require extensive areas of open fresh, brackish or saline water for foraging.</p> <p>The breeding range of the osprey extends around the northern coast of Australia (including many offshore islands) from Albany in Western Australia to Lake Macquarie in New South Wales; with a second isolated breeding population on the coast of South Australia, extending from Head of Bight east to Cape Spencer and Kangaroo Island (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Unlikely The species or suitable habitat were not found to occur in the project area or the broader SRM during field survey efforts (AECOM, 2016; BAAM Ecological Consultants, 2021).</p>
Rufous fantail	<i>Rhipidura rufifrons</i>	Mi	<p>In east and south-east Australia, the rufous fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts, usually with a dense shrubby understorey often including ferns.</p> <p>The rufous fantail is found in northern and eastern coastal Australia, being more common in the north. This species migrates to south-east Australia in October-April to breed, mostly in or on the coastal side of the Great Dividing Range (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Potential The species was recorded during field survey efforts as occurring within the adjacent MLA 70383 and is considered to potentially occur across the project area during winter months (AECOM, 2016). However, the vegetation patch is degraded and fragmented from other habitat values for the species.</p>
Common greenshank	<i>Tringa nebularia</i>	Mi	<p>The common greenshank is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms.</p> <p>In Queensland, this species is widespread in the Gulf country and eastern Gulf of Carpentaria. It has been recorded in most coastal regions, possibly with a gap between north Cape York Peninsula and Cooktown. Inland, there have been a few records south of a line from near Dalby to Mount Guide, and sparsely scattered records elsewhere (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Unlikely While marginal habitat has been found to occur in the broader SRM during field surveys (BAAM Ecological Consultants, 2021), suitable habitat was not found within the project area (AECOM, 2016).</p>
Mammals				
Northern quoll	<i>Dasyurus hallucatus</i>	E	<p>The northern quoll occupies a diversity of habitats across its range which includes rocky areas, eucalypt forest and woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert. Northern quolls are also known to occupy non rocky lowland habitats such as beachscrub communities in central Queensland. Northern quoll habitat generally encompasses</p>	<p>Unlikely Suitable rocky and eucalypt forest habitat was not found to occur during field surveys in the project area and the broader SRM (AECOM, 2016; BAAM Ecological Consultants, 2021)</p>

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			<p>some form of rocky area for denning purposes with surrounding vegetated habitats used for foraging and dispersal.</p> <p>In Queensland, the northern quoll is known to occur as far south as Gracemere and Mount Morgan, south of Rockhampton, as far north as Weipa in Queensland and extends as far west into central Queensland to the vicinity of Carnarvon Range National Park (Department of Climate Change Energy the Environment and Water, 2023e).</p>	
Ghost bat	<i>Macroderma gigas</i>	V	<p>Regional populations of ghost bat are centred on permanent maternity roosts that are genetically isolated from each other. Roost sites are deep natural caves or disused mines with a specific microclimate, which is a relatively stable temperature (23°C to 28°C) with moderate to high (50-90 %) relative humidity, and the ceiling at least 2 m above the floor. Individuals aggregate in these maternity roosts during spring and summer.</p> <p>Ghost bat is endemic to Australia. In Queensland this species is currently distributed in only 4-5 highly disjunct populations along the coast and inland from the Mcllwraith Range in Cape York to Rockhampton. The major colony of <i>M. gigas</i> occurs at Mount Etna. <i>Macroderma gigas</i> also occurs in the northern Pilbara and Kimberley in Western Australia, and the top end of the Northern Territory (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Potential Suitable roosting habitat was not found to occur within the project area during field surveys, however was considered to potentially occur within pits from adjacent mines and rocky outcrops to the west of ML 1775. As this species is known to forage up to several kilometres from roost sites, the project area is considered potential foraging habitat (AECOM, 2016).</p>
Corben's long-eared bat	<i>Nyctophilus corbeni</i>	V	<p>Corben's long-eared bat inhabits a variety of vegetation types, including mallee, bulloak <i>Allocasuarina luehmannii</i> and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland.</p> <p>Overall, the distribution of the south-eastern form coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species (Office of Environment and Heritage, 2017).</p>	<p>Potential Suitable poplar box/silver-leaf ironbark woodland habitat (RE 11.5.3) was assessed as occurring adjacent to the project area during field surveys (AECOM, 2016).</p>
Greater glider (southern and central)	<i>Petauroides volans</i> , (syn. <i>P. armillatus</i> , <i>P. v. volans</i> , <i>Schoinobates volans</i>)	E	<p>During the day, this species spends most of its time denning in hollowed trees, with each animal inhabiting up to twenty different dens within its home range. It is primarily folivorous, with a diet mostly comprising the leaves and flowers of Myrtaceae (e.g., eucalypt) trees. The greater glider is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows.</p> <p>The greater glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria, with an elevational range from sea level to 1200 m above sea level. An isolated inland subpopulation occurs in the Gregory Range west of Townsville, and another in the Einasleigh (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Likely The species was recorded during field surveys as occurring at Phillips Creek immediately south and south-east of the project area (AECOM, 2016; BAAM Ecological Consultants, 2021). Suitable roosting and foraging habitat was mapped within Phillips Creek during field surveys (AECOM, 2016).</p>
Koala	<i>Phascolarctos cinereus</i>	E	<p>Koalas inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities. Koalas eat a variety of eucalypt leaves and a few other related tree species, including <i>Lophostemon</i>, <i>Melaleuca</i> and <i>Corymbia</i> species. Koalas are found in higher densities where food trees are growing on more fertile soils and along watercourses. They do, however, remain in areas where their habitat has been partially cleared and in urban areas.</p> <p>In Queensland, the koala's distribution extends inland from the east coast: from the Wet Tropics bioregion, into the Einasleigh Uplands bioregion in the north of the state; from the Central Mackay Coast bioregion, through the Brigalow Belt North bioregion to the Desert Uplands and Mitchell Grass Downs bioregions, and from the Southeast Queensland bioregion, through the Brigalow Belt to the Mulga Lands and Channel Country bioregions in the southwest of the state (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Likely The species and its scat have been recorded within the project area and adjacent along Phillips Creek during field surveys. Preferred habitat has been mapped adjacent to the project area along Phillips Creek (AECOM, 2016; BAAM Ecological Consultants, 2021).</p>
Grey-headed flying-fox	<i>Pteropus poliocephalus</i>	V	<p>The grey-headed flying-fox is a canopy-feeding frugivore and nectarivore, which uses vegetation communities including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. It also feeds on commercial fruit crops and on introduced tree species in urban areas. The primary food source is blossom from <i>Eucalyptus</i> and related genera but in some areas, it also uses a wide range of rainforest fruits. Since none of the vegetation communities used</p>	<p>Unlikely The species or suitable habitat were not found to occur in the broader SRM during field surveys (BAAM Ecological Consultants, 2021). Recent species records (2011-2019) occur >140 km north at Eungella National Park (Atlas of Living Australia, 2023).</p>

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			<p>by the grey-headed flying-fox produce continuous foraging resources throughout the year, the species has adopted complex migration traits in response to ephemeral and patchy food resources.</p> <p>The grey-headed flying-fox is Australia's only endemic flying-fox and occurs in the coastal belt from Rockhampton in central Queensland to Melbourne in Victoria. However, only a small proportion of this range is used at any one time, as the species selectively forages where food is available. As a result, patterns of occurrence and relative abundance within its distribution vary widely between seasons and between years. Whilst Brisbane, Newcastle, Sydney and Melbourne are occupied continuously, elsewhere, during spring, grey-headed Flying-foxes are uncommon south of Nowra and widespread in other areas of their range. (Department of Climate Change Energy the Environment and Water, 2023e).</p>	
Reptiles				
Ornamental snake	<i>Denisonia maculata</i>	V	<p>The ornamental snake's preferred habitat is 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 Queensland Regional Ecosystem Land Zone 4, but also lake margins and wetlands. Gilgai formations are found where deep-cracking alluvial soils with high clay contents occur (Brigalow Belt Reptiles Workshop 2010).</p> <p>The species is known only from the Brigalow Belt North and parts of the Brigalow Belt South biogeographical regions. The core of the species' distribution occurs within the drainage system of the Fitzroy and Dawson Rivers (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Potential</p> <p>Previous field surveys recorded this species from small waterways fringed by riparian woodland, brigalow regrowth and belah woodland within adjacent MLA 70383. On SRM records exist from brigalow/belah woodlands and brigalow gulgais on the eastern section of ML 1775 (AECOM, 2016; BAAM Ecological Consultants, 2021). There is marginal habitat in remnant vegetation and also non-remnant gilgai formations within the project area.</p>
Yakka skink	<i>Egernia rugosa</i>	V	<p>Habitat requirements are poorly known; however, this species is known from rocky outcrops, sand plain areas and dense ground vegetation, in association with open dry sclerophyll forest (ironbark) or woodland, brigalow forest and open shrubland. In the Brigalow Belt bioregion, core habitat includes: poplar box (<i>Eucalyptus populnea</i>) woodland, mulga (<i>Acacia aneura</i>) woodland, white cypress pine (<i>Callitris glaucophylla</i>); usually in association with eucalypt species such as <i>E. populnea</i>, <i>E. melanophloia</i> or <i>Corymbia tessellaris</i>, ironbark (typically <i>E. melanophloia</i>) woodland, and disturbed, treated and cleared areas of suitable habitat, grazed or ungrazed, where suitable microhabitat features still remain. Colonies have been found in large hollow logs, cavities or burrows under large fallen trees, tree stumps, logs, stick-raked piles, large rocks and rock piles, dense ground-covering vegetation, and deeply eroded gullies, tunnels and sinkholes.</p> <p>The known distribution of the Yakka skink extends from the coast to the hinterland of sub-humid to semi-arid eastern Queensland. This vast area covers portions of the Brigalow Belt, Mulga Lands, South-east Queensland, Einasleigh Uplands, Wet Tropics and Cape York Peninsula Biogeographical Regions (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Potential</p> <p>The species was identified as potentially occurring in poplar box woodland (RE 11.5.3) present adjacent to the project area during previous survey efforts (AECOM, 2016). This vegetation also occurs within the project area and therefore the species has potential to occur.</p>
Southern snapping turtle	<i>Elseya albagula</i>	CE	<p>The white-throated snapping turtle is recognised as a habitat specialist (Todd et al., 2013). Within the river system the white throated snapping turtle prefers clear, flowing, well-oxygenated waters (Mathie and Franklin, 2006; Clark et al., 2008).</p> <p>Found only in Queensland in the Fitzroy, Mary and Burnett Rivers and associated smaller drainages in south-eastern Queensland (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Unlikely</p> <p>The species or suitable habitat were not found within the project area during field surveys (AECOM, 2016; BAAM Ecological Consultants, 2021).</p>
Dunmall's snake	<i>Furina dunmali</i>	V	<p>Dunmall's snake has been found in a broad range of habitats, including forests and woodlands on black alluvial cracking clay and clay loams dominated by Brigalow and various Blue Spotted Gum, Ironbark, White Cypress Pine and Bulloak open forests on sandstone derived soils.</p> <p>Dunmall's snake occurs primarily in the Brigalow Belt region in the south-eastern interior of Queensland. Records indicate sites at elevations between 200–500 m above sea level. The snake is very rare or secretive with limited records existing. It has been recorded at Archokoora, Oakey, Miles, Glenmorgan, Wallaville, Gladstone, Lake Broadwater, Mount Archer, Exhibition Range</p>	<p>Unlikely</p> <p>The species or suitable habitat were not found within the project area during field surveys (AECOM, 2016; BAAM Ecological Consultants, 2021).</p>

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			National Park, roadside reserves between Inglewood and Texas, Rosedale, Yeppoon and Lake Broadwater Conservation Park (Cogger et al. 1993; Covacevich et al. 1988; Covacevich et al. 1996a; McDonald et al. 1991). The species has also been recorded near the Bruxner Highway, approximately 5 km north-west of the Texas Road intersection, in October 2007 (Stephenson and Schmida 2008) (Department of Climate Change Energy the Environment and Water, 2023e).	
Grey snake	<i>Hemiaspis damelii</i>	E	<i>Hemiaspis damelii</i> favours woodlands (typically brigalow <i>Acacia harpophylla</i> and belah <i>Casuarina cristata</i>), usually on heavier, cracking clay soils, particularly in association with water bodies or in areas with small gullies and ditches (gilgai). Distributed throughout the eastern interior, from central inland New South Wales, north to coastal areas near Rockhampton in Queensland. Within Queensland, records are known from near Goondiwindi and the adjacent Darling-Riverine Plain, from the Darling Downs and from the Lockyer Valley. The core area for the grey snake in the Brigalow Belt is south of the Great Dividing Range between Dalby and Glenmorgan (Rowland, 2012).	Unlikely Marginal habitat may occur in the broader area but species records do not occur within 100 km of the project area (Atlas of Living Australia, 2023).
Allan's lerista	<i>Lerista allanae</i>	E	Allan's lerista is known only from black soil downs (undulating plains formed on basalt, shale, sandstone and unconsolidated sediments) of the Oxford land system in the Brigalow Belt North Biogeographic Region. Early specimens were found several centimetres under the surface of black-red soil, under tussocks of grass on farmland in association with <i>Eucalyptus orgadophila</i> / <i>E. erythrophloia</i> open woodlands, <i>Melaleuca bracteata</i> closed scrub to low closed-forest gravelly hills, ridges and gullies, and scattered <i>Bauhinia</i> spp. on plains (Queensland Department of Lands as cited in Covacevich et al. 1996b). Recent records were from leaf litter and friable soils beneath trees and shrubs (Borsboom et al. in prep.). The soils for these records were described as chocolate to dark chocolate-coloured, non-cracking clay-based soils (30–64% clay content) in Queensland Regional Ecosystems (REs) 11.8.5 and 11.8.11/11.8.5 or were from sites where these REs were mapped as cleared (Borsboom et al. 2010; Brigalow Belt Reptiles Workshop 2010). The retro slider's range is believed to occur within the Brigalow Belt North Bioregion (Interim Biogeographic Regionalisation of Australia) in eastern Central Queensland (Department of Climate Change Energy the Environment and Water, 2023e).	Unlikely The species or suitable habitat were not found within the project area during field surveys (AECOM, 2016; BAAM Ecological Consultants, 2021).
Fitzroy River turtle	<i>Rheodytes leukops</i>	V	The Fitzroy River turtle is found in rivers with large deep pools with rocky, gravelly or sandy substrates, connected by shallow riffles. Preferred areas have high water clarity, and are often associated with Ribbonweed (<i>Vallisneria</i> sp.) beds (Cogger et al. 1993). Common riparian vegetation associated with the Fitzroy River turtle includes Blue Gums (<i>Eucalyptus tereticornis</i>), River Oaks (<i>Casuarina cunninghamiana</i>), Weeping Bottlebrushes (<i>Callistemon viminalis</i>) and Paperbarks (<i>Melaleuca linariifolia</i>) (Tucker et al. 2001) (Department of Climate Change Energy the Environment and Water, 2023e).	Unlikely The species is only found in the drainage of the Fitzroy River in creeks and rivers with large deep pools with rocky, gravelly or sandy substrates. Suitable habitat was not mapped within the project area during the field survey (AECOM, 2016; BAAM Ecological Consultants, 2021).
Plants				
-	<i>Aristida annua</i>	V	<i>Aristida annua</i> occurs in eucalypt woodland. It is restricted to black clay soils, basalt soils and possibly disturbed sites. The species occurs in the Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin ecological community, which is listed as Endangered under the EPBC Act. <i>Aristida annua</i> is restricted to central Queensland in Emerald and Springsure districts. The species is very poorly understood and there appears to be no survey data (Department of Climate Change, Energy, the Environment and Water, 2023f).	Unlikely The species was not recorded within the project area or the broader SRM during surveys, and suitable habitat was not found to occur (BAAM Ecological Consultants, 2021).
King bluegrass	<i>Dichanthium queenslandicum</i>	E	<i>Dichanthium queenslandicum</i> occurs on 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. It is mostly confined to natural grassland on the heavy black clay soils (basalt downs, basalt cracking clay, open downs) on undulating plains. Other species recorded in the grasslands include <i>Aristida leptopoda</i> , <i>Bothriochloa erianthoides</i> , <i>Moorochloa eruciformis</i> , <i>Corchorus trilocularis</i> , <i>Cyperus bifax</i> , <i>Dichanthium sericeum</i> , <i>Digitaria brownii</i> , <i>Digitaria divaricatissima</i> , <i>Eulalia fulva</i> , <i>Ipomoea lonchophylla</i> , <i>Iselema vaginiflorum</i> ,	Potential Although the species was not detected during ecological surveys in the project area, potential habitat has been mapped as occurring since the species presence and extent may fluctuate seasonally, or the species may be difficult to detect (AECOM, 2016; BAAM Ecological Consultants, 2021). The nearest species records are 35 km to the west of the project area from 2011, and 27 km north from 2022.

Common Name	Scientific Name	EPBC Act Status ¹	Preferred Habitat and Distribution	Likelihood of Occurrence in the Mining Lease
			<p><i>Panicum decompositum</i>, <i>Panicum queenslandicum</i>, <i>Paspalidium globoideum</i>, <i>Parthenium hysterophorus</i> and <i>Thellungia advena</i>. Other communities where <i>Dichanthium queenslandicum</i> can be found include <i>Acacia salicina</i> thickets in grassland and eucalypt woodlands (i.e., <i>Corymbia dallachiana</i>, <i>C. erythrophloia</i>, <i>E. orgadophila</i>).</p> <p><i>Dichanthium queenslandicum</i> occurs from near Dalby north to about 90 km north of Hughenden and west as far as Clermont. The main concentration of populations in central Queensland in the Emerald region. It is found in Gemini Peaks NP north east of Clermont and Alpinia NP near Rolleston (Department of Environment and Science, 2022).</p>	
Bluegrass	<i>Dichanthium setosum</i>	V	<p><i>Dichanthium setosum</i> is associated with heavy basaltic black soils and red-brown loams with clay subsoil (NSW OEH 2013a). Associated species include White Box (<i>Eucalyptus albens</i>), Silver-leaved Ironbark (<i>Eucalyptus melanophloia</i>), Yellow Box (<i>Eucalyptus melliodora</i>), Manna Gum (<i>Eucalyptus viminalis</i>), Amulla (<i>Myoporum debile</i>), Purple Wire-grass (<i>Aristida ramosa</i>), Kangaroo Grass (<i>Themeda triandra</i>), Fine-leaved Tussock-grass (<i>Poa sieberiana</i>), Red-leg Grass (<i>Bothriochloa ambigua</i>), Pitted Blue-grass (<i>Bothriochloa decipiens</i>), <i>Macrozamia stenomera</i>, Small Woolly Burr-medic (<i>Medicago minima</i>), Scaly Buttons (<i>Leptorhynchos squamatus</i>), <i>Lomandra aff. longifolia</i>, Australian Bugle (<i>Ajuga australis</i>), Bogan-flea (<i>Calotis hispidula</i>) and <i>Austrodanthonia spp.</i>, <i>Dichopogon spp.</i>, <i>Brachyscome spp.</i>, <i>Vittadinia spp.</i>, <i>Wahlenbergia spp.</i> and <i>Psoralea spp.</i> (Ayers et al. 1996; NSW OEH 2013a).</p> <p><i>Dichanthium setosum</i> has been reported from inland NSW and Queensland (ALA 2013). There are also reports from Western Australia (NSW OEH 2013a) and Tasmania (Henderson 1997) although other sources do not support similar claims (CHAH 2012) (Department of Climate Change Energy the Environment and Water, 2023e).</p>	<p>Likely The species was recorded during ecological surveys adjacent to the project area south of Phillips Creek, and potential habitat has been mapped as potentially occurring within the project area (AECOM, 2016; BAAM Ecological Consultants, 2021).</p>
Black ironbox	<i>Eucalyptus raveretiana</i>	V	<p><i>Eucalyptus raveretiana</i> grows along watercourses and occasionally on river flats. It occurs in open forest or woodland communities. The species prefers sites with moderately fertile soil and adequate sub-soil moisture. The alluvial soils in which it grows are sands, loams, light clays or cracking clays. (Halford 1997)</p> <p><i>Eucalyptus raveretiana</i> occurs in scattered and disjunct populations in central coastal and sub-coastal Queensland, from Charters Towers and Ayr, and south to Rockhampton. (Halford 1997; Herbrecs 2008) (Bean, 2009)</p>	<p>Unlikely This species occurs in riparian areas and has not been recorded along Phillips Creek despite multiple field surveys. Preferred habitat is not present within the project area. The nearest species record (2015) is found 66 km north-east at Dipperu National Park (Atlas of Living Australia, 2023).</p>
Quassia	<i>Samadera bidwillii</i>	V	<p><i>Samadera bidwillii</i> commonly occurs in lowland rainforest often with <i>Araucaria cunninghamii</i> or on rainforest margins, but it can also be found in other forest types, such as open forest and woodland, it is commonly found in areas adjacent to both temporary and permanent watercourses up to 510 m altitude. Commonly associated trees in the open forest and woodlands include spotted gum (<i>Corymbia citriodora</i>), grey gum (<i>Eucalyptus propinqua</i>), white mahogany (<i>E. acmenoides</i>), forest red gum (<i>E. tereticornis</i>), pink bloodwood (<i>Corymbia intermedia</i>), ironbark (<i>E. siderophloia</i>), gum topped box (<i>E. moluccana</i>), Gympie messmate (<i>E. cloeziana</i>) and broad-leaved ironbark (<i>E. fibrosa</i>).</p> <p><i>Samadera bidwillii</i> has been collected from Scawfell Island, east of Mackay, to as far south as Bauple and west to Biloela. The species is distributed within Byfield National Park, Goomboorian National Park, Mount Bauple National Park, Mount Walsh National Park, South Cumberland National Park, Byfield State Forest, Cordalba State Forest Tiaro State Forest, Tuan State Forest, Young State Forest 3 and Callide Timber Reserve (Department of Environment and Science, 2023c).</p>	<p>Unlikely The species or preferred habitat have not been found within the project area or the broader SRM during previous ecological surveys (BAAM Ecological Consultants, 2021). The nearest records occur 120 km east of the project area (Atlas of Living Australia, 2023).</p>

Table 22 Likelihood of occurrence of TECs in the project area

Threatened Ecological Communities (TECs)	EPBC Act Status	Habitat, distribution and analogous REs	Analogous REs occurring in the project area	Likelihood of occurrence in the project area
Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant)	E	<p>In Queensland, the listed Brigalow ecological community comprises the following 16 regional ecosystems (REs): 6.4.2, 11.3.1, 11.4.3, 11.4.7, 11.4.8, 11.4.9, 11.4.10, 11.5.16, 11.9.1, 11.9.5, 11.11.14, 11.12.21, 12.8.23, 12.9-10.6, 12.12.26.</p> <p>The listed Brigalow ecological community extends from south of Charters Towers in Queensland, in a broad swathe east of Blackall, Charleville and Cunnamulla, south to northern New South Wales. In Queensland, the listed ecological community occurs predominantly within the Brigalow Belt North, Brigalow Belt South, Darling Riverine Plains and Southeast Queensland bioregions, with smaller amounts in the Mitchell Grass Downs, Mulga Lands and Einasleigh Uplands bioregions. This community occurs roughly within the 500-750 mm annual rainfall belt. In Queensland, most of the community remnants occur on flat to undulating Cainozoic clay plains not associated with current alluvium, and on gently undulating landscapes with fine grained sedimentary rocks. The remainder is associated with river and creek flats, old loamy and sandy plains, basalt plains, hills and lowlands on metamorphic or granitic rock (Department of Climate Change Energy the Environment and Water, 2023c).</p>	11.4.9	<p>Likely</p> <p>One analogous RE associated with this TEC has been mapped as a GTRE within the project area during field surveys (BAAM Ecological Consultants, 2021). This patch of vegetation is isolated, connected only to a small patch of RE 11.5.3, however it occurs within a non-remnant paddock adjacent to active mining operations and is functionally disconnected from other Brigalow TEC vegetation in the surrounding area.</p>
Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin	E	<p>The Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin are native grasslands typically composed of perennial native grasses. They are found on soils that are fine textured (often cracking clays) derived from either basalt or fine-grained sedimentary rocks, on flat or gently undulating rises. These grasslands occur in areas with relatively high summer rainfall and a tree canopy usually absent, but when present projective crown cover is no more than 10%. The ecological community occurs entirely within Queensland. It extends from Collinsville in the north to Carnarvon National Park in the south. This ecological community occurs within the Brigalow Belt North and Brigalow Belt South IBRA bioregions and within the Fitzroy Basin, Burdekin, South West Qld, Border Rivers Maranoa-Balonne and Desert Channels Natural Resource Management regions (Threatened Species Scientific Committee, 2008).</p> <p>In Queensland, the following analogous REs are associated with this listed ecological community: 11.3.21, 11.4.4, 11.4.11, 11.8.11, 11.9.3, 11.9.12, 11.11.17 (Threatened Species Scientific Committee, 2009).</p>	None	<p>Unlikely</p> <p>Analogous REs associated with this TEC have not been mapped within the project area during field surveys.</p>
Poplar Box Grassy Woodland on Alluvial Plains	E	<p>The ecological community typically occurs on palaeo and recent depositional soils in flat terrain and occasionally along watercourses in undulating country (Webb et al. 1980). The woodland is mainly associated with active and relictual depositional plains and flats including back plains, higher terraces, levees along rivers (particularly in Queensland) and stagnant alluvial plain landscapes (particularly in NSW) (Beeston et al. 1980). The Poplar Box Grassy Woodland is sometimes found in close proximity to ephemeral watercourses and depressions. The vegetation of the ecological community varies from a grassy woodland to grassy open woodland structure but may occasionally exhibit an open forest structure with an overstorey dominated by <i>Eucalyptus populnea</i> (Poplar Box) and an understorey predominantly composed of perennial forbs and grasses (Specht 1970; Beeston et al. 1980; Sivertsen and Clarke 2000; Metcalfe et al. 2003; Benson et al. 2010). The Poplar Box Grassy Woodland may include a low density of shrubs (Department of the Environment and Energy, 2019).</p> <p>The ecological community occurs within the Brigalow Belt North, Brigalow Belt South, Southeast Queensland, Cobar Peneplain, Darling Riverine Plains, NSW South Western Slopes and Riverina IBRA bioregions. In Queensland, the following analogous REs are associated with this listed ecological community: 11.3.2, 11.3.17, 11.4.7, 11.4.12, 12.3.10.</p>	None	<p>Unlikely</p> <p>Analogous REs associated with this TEC have not been mapped within the project area during field surveys.</p>