Vertebrate fauna risk assessment

Mt Ida - Sandstone Road realignment

Prepared for: Mt Ida Gold Pty Ltd

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EXECUTIVE SUMMARY

Mt Ida Gold Pty Ltd (Mt Ida Gold) is a subsidiary company of Red Dirt Metals Ltd (ASX: RDT) who is focused on the evaluation and development of the recently discovered Mt Ida Lithium province in Western Australia's Eastern Goldfields region and is the owner of its Mt Ida Lithium Gold Project.

To enable the development of the Mt Ida Lithium project, Mt Ida Gold is planning to realign a portion of the Mt Ida and Sandstone roads near the proposed mining area (Figure 1). The project area is ~46ha is east of the proposed mining area.

Terrestrial Ecosystems was commissioned by Mt Ida Gold to undertake a Basic fauna risk assessment of the proposed road realignment. The purpose of this fauna assessment was to provide information on the potential impacts on the vertebrate fauna assemblage in the project area to enable the proposed development to be adequately assessed. The methodology broadly follows that described in the Environmental Protection Authority (EPA; 2020) *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment*.

The project area contains one broad fauna habitat of mixed mulga, acacia and chenopod shrubland. As with most areas in the Goldfields the density of trees and shrubs varies appreciably across the project area with denser vegetation along the drainage lines. Some of the project area is highly disturbed or cleared and is therefore devoid of terrestrial vertebrate fauna.

Clearing native vegetation and constructing a road is likely to result in the loss of a small number of vertebrate fauna that are unable to move away during the clearing process. The few larger animals, such as goannas, and most of the birds will move into adjacent areas once clearing commences.

Impacts on vertebrate fauna associated with clearing vegetation and development in a local context will be low and, in a landscape, or bioregional context are very low.

There are no threatened species of fauna in the project area. As the proposed project is unlikely to significantly impact on a conservation significant vertebrate fauna a referral under the *EPBC Act 1999* is not recommended.

1. INTRODUCTION

1.1 BACKGROUND

Mt Ida Gold Pty Ltd (Mt Ida Gold) is planning to realign a portion of the Mt Ida and Sandstone roads near the proposed mining area (Figure 1). The project area is ~85km north-west of Menzies and ~85km west of Leonora and ~46ha.

1.2 PROJECT OBJECTIVES AND SCOPE OF WORKS

Terrestrial Ecosystems was commissioned by Mt Ida Gold to undertake a Basic fauna risk assessment of the proposed road realignment. The purpose of this fauna assessment was to provide information on the potential impacts on the vertebrate fauna assemblage in the project area to enable the proposed development to be adequately assessed. The methodology broadly follows that described in the Environmental Protection Authority (EPA; 2020) *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment*.

A Basic fauna risk assessment involves undertaking a desktop review and site visit. The objectives of this fauna risk assessment were to:

- provide an indication of the vertebrate fauna assemblage (reptiles, amphibians, mammals and birds) on and near the project area so that potential impacts on the fauna and fauna assemblage might be adequately assessed;
- identify the presence and/or potential risk of impacts on species of conservation significance that are present or likely to be present in the project area;
- assess the impact and environmental risks associated with the proposed development on the fauna assemblage;
- determine if any additional surveys are required to assess the potential impact on fauna assemblages in the project area, in particular, impacts on species of conservation significance; and
- make recommendations that avoid, mitigate or minimise potential impacts on resident fauna.

To achieve these objectives, Terrestrial Ecosystems:

- searched the Commonwealth Government's online database of matters of national environmental significance (MNES) to identify species potentially occurring within the area that are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC 1999*) or international migratory bird agreements (JAMBA/CAMBA);
- searched Terrestrial Ecosystems' database (which includes data from the Atlas of Living Australia and Western Australian Museum (WAM) collection) to identify potential vertebrate fauna within the area;
- reviewed previous fauna surveys conducted near the project area;
- undertook a review of the available fauna habitat types;
- discussed the likelihood of species listed under the *EPBC Act* and the Western Australian *Biodiversity Conservation Act 2016* (*BC Act 2016*) being present in the project area; and
- provided management recommendations to avoid, mitigate and minimise potential impacts on the fauna in the project area.

2. EXISTING ENVIRONMENT

2.1 LOCATION OF PROJECT AREA

The project area is in the Murchison 1 (MUR1 – East Murchison subregion) IBRA bioregion. Cowan (2001) described the East Murchison IBRA subregion as internally draining, with extensive areas of elevated red desert sandplains with minimal dune development. The bioregion includes broad plains with red-brown soils and breakaway complexes as well as red sandplains. Vegetation is dominated by Mulga woodlands often with ephemerals, hummock grasslands, saltbush shrublands and halosarcia shrublands.

The threatening processes for conservation significant fauna were listed by Cowan (2001) as foxes and cats. In addition, cattle grazing and mining activity over many years have significantly degraded small parcels of land dotted throughout the landscape.

2.2 LAND USE HISTORY

The dominant land uses for the bioregion are native pasture to support grazing on native pasture, unallocated crown land, and to a much lesser extent mining (Cowan 2001).

2.3 CLIMATE

The project area is characterised as semi-arid. Menzies, which is 85km to the southeast, has an annual rainfall of 254mm, although this varies considerably from year-to-year. The highest mean maximum and minimum temperatures in Menzies are in January with an average of 35.1°C and 19.7°C, respectively (Bureau of Meteorology 2022). The lowest mean daily maximum and minimum temperatures occur in July (Chart 1). Rainfall is spread over the year with summer thunderstorms and winter rains resulting from low pressure cells moving in an easterly direction.

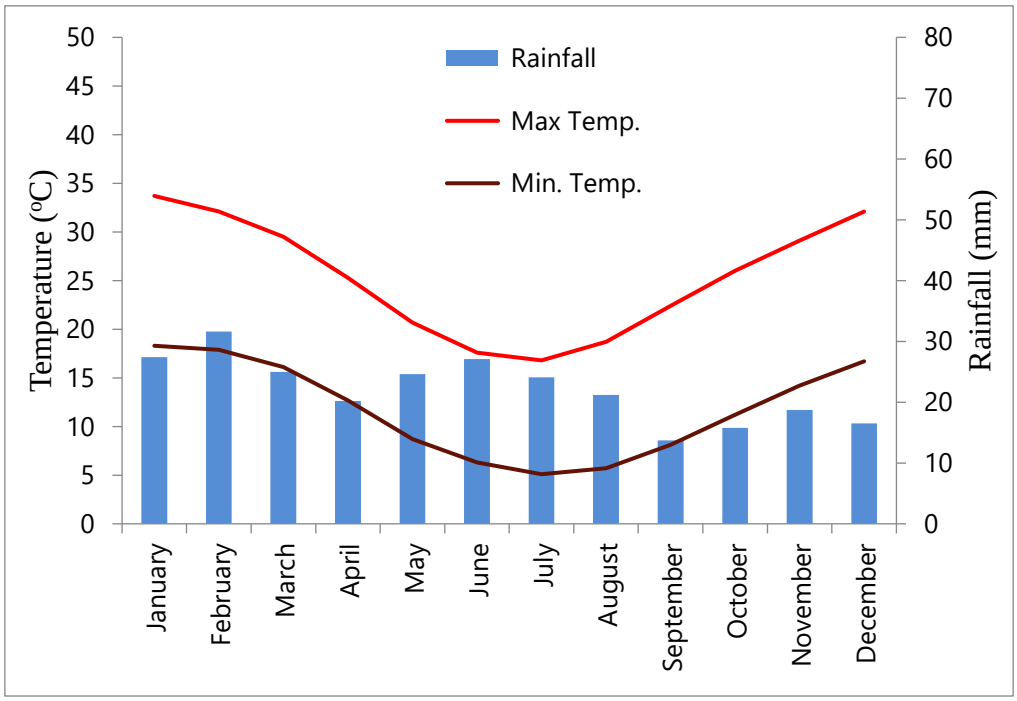


Chart 1. Monthly weather for Menzies

2.4 REGIONAL BIOLOGICAL FAUNA CONTEXT OF PROJECT AREA

Numerous vertebrate fauna surveys have been undertaken near the project area. These include:

- Bell, D.T., Bell, R.C. and Loneragan, W.A. (2007) Winter bird assemblages across an arid gradient in south-west Western Australia. *Journal of the Royal Society of Western Australia* 90, 219-227.
- Cowan, M.A. and How, R.A. (2004) Comparisons of ground vertebrate assemblages in arid Western Australia in different seasons and decades. *Records of the Western Australian Museum*, 22, 91-100.
- Dell, J and How, R.A. (1988) Vertebrate fauna. In: The biological Survey of the Eastern Goldfields of Western Australia, Part 5, Edjudina - Menzies Study Area. *Records of the Western Australian Museum*, Supplement No 31., pp. 38-77.
- Keith Lindbeck and Associates (2012) *Central Yilgarn Iron Project (CYIP) Fauna Assessment Mt Mason*, Unpublished report for Jupiter Mines Ltd, Perth.
- Keith Lindbeck And Associates (2013) *Mt Mason Project and Proposed Haul Rd Targeted EPBC Fauna Survey*, unpublished report for Jupiter Mines Ltd, Perth.
- Ninox Wildlife Consulting (2006) *A vertebrate fauna assessment of the Tarmoola area*. Unpublished report for St Barbara Limited, Lower King WA.
- Terrestrial Ecosystems (2023) *Vertebrate fauna reconnaissance survey and risk assessment for the Mt Ida Lithium Project*. Unpublished report for Mt Ida Gold Pty Ltd, Perth.

Data in the Atlas of Living Australia, which includes data from the Western Australian Museum collection, have also been added to the information contained in Appendix B, and the compilation of the species lists for the project area.

The most useful and representative data for the project area is the information in the Cowan and How (2004) and Dell and How (1988) reports. The Cowan and How (2004) data come from two surveys in the Goongarrie National Park and the data from Dell and How (1988) are part of the WAM series of surveys of the Goldfields, and in this case the Edjudina – Menzies area. The data from the Atlas of Living Australia is more comprehensive, but includes historical inforamtion, therefore species that are locally extinct.

2.4.1 Fauna species at risk

In the now dated Cowan (2001) report, fauna species identified as being at risk in the East Murchison subregion as Bilby (*Macrotis lagotis*), Marsupial Mole (*Notoryctes typhlops*), Mulgara (*Dasycercus cristicauda*), Malleefowl (*Leipoa ocellata*), Princess Parrot (*Polytelis alexandrae*), Slender-billed Thornbill (*Acanthiza iredalei iredalei*), Giant Desert Skink (*Liopholis kintorei*) and Peregrine Falcon (*Falco peregrinus*).

Since then, the Grey Falcon (*Falco hypoleucos*), Night Parrot (*Pezoporus occidentalis*) and Sandhill Dunnart (*Sminthopsis psammophila*) have been added to the list.

This report assesses the potential for these species to be found in the project area and the potential impact that any proposed development might have on these species, and other conservation significant fauna.

3. METHODOLOGY

3.1 DATABASE SEARCHES

A search of the *EPBC Act 1999* online list of threatened species was undertaken to identify species of conservation interest to the Commonwealth Government under *EPBC Act* in the vicinity of the project area. In addition, a desktop search of the Terrestrial Ecosystems' fauna survey database was used to develop an appreciation of the vertebrate fauna assemblages near the project area.

Other more general texts were also used to provide supplementary information on vertebrates in the bioregion, including Tyler et al. (2000) for frogs; Storr et al. (1983, 1990, 1999, 2002) and Thompson and Thompson (2010) for reptiles; Johnstone and Storr (1998, 2004) for birds; and Van Dyck and Strahan (2008) for mammals.

Collectively these sources of information were used to create lists of species expected to utilise the project and adjacent areas. It should be noted that these lists will include species that have been recorded in the general region but are possibly vagrants and they will not generally be found in the project area due to a lack of suitable habitat. Vagrants can be recorded anywhere. Many of the bird, mammal, reptile and amphibian species have specific habitat requirements that may be present in the general area but not in the project area. Also, the ecology of many of these species is often not well understood and it can sometimes be difficult to indicate those species whose specific habitat requirements are not present in the project area. Consequently, many species will be included in the lists produced from database searches but will not be present in the actual project area.

There are errors in most databases, including Dandjoo, Atlas of Living Australia and the WA Museum (WAM) collection. These errors occur because of a misidentification of individuals, taxonomic name changes and incorrect coordinates being entered into the database. Terrestrial Ecosystems was unable to verify the primary records, so it has used the information provided. Readers should therefore appreciate that species lists and fauna surveys reported in the appendices may include these errors. These databases also contain historical records and therefore include species that are no longer present in the area (e.g. *Myrmecobius fasciatus*, *Bettongia lesueur* and *Macrotis lagotis*).

Because the project area is within 40km of Lake Ballard, numerous water birds are likely to be present in database searches, even though there is no available habitat for these species in the project area.

3.2 FAUNA HABITAT ASSESSMENT

Fauna habitat assessments have been undertaken on the project area and near vicinity on 9 May 2022 and 11 April 2023. As the project design was modified slightly after the site assessment some additional areas were assessed using aerial photography and the flora and vegetation mapping provided by Native Vegetation Solutions. The 2022 and 2023 field assessments had two foci:

- assessing fauna habitat types and their condition; and
- assessing the possible presence of and recording evidence of conservation significant fauna so that projecty planning can minimise potential impacts and mitigation and management strategies can be developed and implemented to reduce potential impacts.

The fauna habitat assessor stopped at multiple locations within the project area and recorded a suite of data about the fauna habitat and its condition. This information included a description of the habitat structure, habitat condition, landform, soils and vegetation and time since last fire. The following data were recorded at each location as part of the habitat assessment:

Observer's Name:	
Coordinates of the location as UTM (GDA94):	

Fire history – options	
☐ > 5 years	
☐ 1-5 years	
☐ < 1 year	

Landform – options			
☐	Beach	☐	Lower slope
☐	Clay plain	☐	Mid slope
☐	Cliff	☐	Ridge
☐	Creek line	☐	River
☐	Dam	☐	Rocky outcrop / breakaway
☐	Drainage line	☐	Salt lake
☐	Dune crest	☐	Sand dune
☐	Dune slope	☐	Sand plain
☐	Dune swale	☐	Stony plain
☐	Escarpment	☐	Swamp
☐	Flat	☐	Undulating
☐	Gorge	☐	Upper slope
☐	Gully	☐	Wetland
☐	Intertidal / mangrove	☐	Water hole
☐	Lake / lake edge		

Habitat quality – options	
☐	*High quality fauna habitat* – These areas closely approximate the vegetation mix and quality that would have been in the area prior to any disturbance. The habitat has connectivity with other habitats and is likely to contain the most natural vertebrate fauna assemblage.
☐	*Very good fauna habitat* - These areas show minimal signs of disturbance (e.g. grazing, clearing, fragmentation, weeds) and generally retain many of the characteristics of the habitat if it had not been disturbed. The habitat has connectivity with other habitats and fauna assemblages in these areas are likely to be minimally effected by disturbance.
☐	*Good fauna habitat* – These areas showed signs of disturbance (e.g. grazing, clearing, fragmentation, weeds) but generally retain many of the characteristics of the habitat if it had not been disturbed. The habitat has connectivity with other habitats and fauna assemblages in these areas are likely to be affected by disturbance.
☐	*Disturbed fauna habitat*– These areas showed signs of significant disturbance. Many of the trees, shrubs and undergrowth are cleared. These areas may be in the early succession and regeneration stages. Areas may show signs of significant grazing, containing weeds or have been damaged by vehicle or machinery. Habitats are fragmented or have limited connectivity with other fauna habitats. Fauna assemblages in these areas are likely to differ significantly from what might be expected in the area had the disturbance not occurred.
☐	*Highly degraded fauna habitat* – These areas often have a significant loss of vegetation, an abundance of weeds, and a large number of vehicle tracks or are completely cleared. Limited or no fauna habitat connectivity. Fauna assemblages in these areas are likely to be significantly different to what might have been in the area pre-disturbance.

Habitat structure – combined into habitat description			
Upper stratum			
☐	Tall open woodland	☐	Scattered tall trees
☐	Tall woodland	☐	Scattered trees
☐	Open woodland	☐	Scattered low trees
☐	Woodland	☐	Low closed forest
☐	Open forest	☐	Low open forest
☐	Closed forest	☐	Low woodland
☐	Tall closed forest	☐	Low open woodland
☐	Tall open forest		
Middle stratum			
☐	Shrubland	☐	Open heath
☐	Tall shrubland	☐	Low closed heath
☐	Tall open shrubland	☐	Low open heath
☐	Low shrubland	☐	Tall closed scrub
☐	Scattered low shrubs	☐	Tall open scrub
☐	Low open shrubland	☐	Scattered tall shrubs
☐	Scattered tall shrubs	☐	Open shrubland
☐	Closed heath	☐	Scattered shrubs
Lower stratum			
☐	Closed hummock grassland	☐	Closed tussock grassland / sedgeland / herbland
☐	Mid-dense hummock grassland	☐	Tussock grass land / sedgeland / herbland
☐	Hummock grassland	☐	Open tussock grassland / sedgeland / herbland
☐	Open hummock grassland	☐	Scattered tussock / grasses / sedges / herbs
☐	Scattered hummock grassland	☐	Very open tussock grassland / herbland
Soil Type – options			
☐	Sand	☐	Silty loam
☐	Loamy sand	☐	Sand clay loam
☐	Clayey sand	☐	Clay
☐	Clay loam	☐	Peat / organic
☐	Silty clay loam	☐	Stony
☐	Sandy loam		
Soil colour - options			
☐	Black	☐	Red
☐	Brown	☐	White
☐	Grey	☐	Yellow
☐	Orange		

Surface stones – options			
☐	None	☐	Boulders (>250mm)
☐	Pebbles (0-50mm)	☐	Rocks
☐	Cobbles (51-250)		

3.3 SURVEY AND REPORTING STAFF

Dr Scott Thompson undertook the site investigations, fauna habitat assessment and search for Malleefowl and their mounds. The survey was undertaken with the support from Eren Reid from Native Vegetation Solutions. Dr Graham Thompson drafted the report and Dr Scott Thompson reviewed the report before it was sent to the client. Both senior scientists have appropriate relevant post-graduate qualifications, extensive experience in conducting fauna assessments in the Goldfields, have published research articles on biodiversity, fauna assemblages, conservation significant species, survey strategies for Malleefowl, trapping techniques and temporal variations in trapped fauna assemblages based on Goldfields surveys and are therefore appropriately trained and experienced for the task of preparing this assessment (Table 1).

Table 1. Staffing

Name	Experience and qualifications	Tasks
Dr Scott Thompson	PhD, Certified Environmental Practitioner (Ecology Specialist), 20+ years of experience and a good familiarity with the vertebrate fauna in the Goldfields	Field work, fauna habitat mapping and reporting
Dr Graham Thompson	PhD, 20+ years of experience and a good familiarity with the vertebrate fauna in the Goldfields	Reporting

3.4 LIMITATIONS

This Basic vertebrate fauna risk assessment is based on information contained in the Commonwealth Government's online EPBC MNES online database and other published and unpublished fauna survey data for the bioregion and a site visit. It is acknowledged that multiple surveys conducted in different seasons, repeated over several years are necessary to fully appreciate the fauna assemblage in the project area.

The (EPA; 2020) *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* suggested that fauna surveys may be limited by many variables. Limitations associated with each of these variables are assessed in Table 2.

Table 2. Fauna survey limitations and constraints

Possible limitations	Constraint (yes/no); significant, moderate or negligible	Comment
Competency and experience of the consultant carrying out this assessment	No	The environmental scientists that undertook the site assessment, drafted, and reviewed this report are familiar with the vertebrate fauna of this bioregion.
Scope	No	All aspects of the scope of works have been addressed.
Proportion of fauna identified, recorded and/or collected	No	Not applicable.
Accuracy of previous survey work	Yes, negligible	Terrestrial Ecosystems has reported fauna survey data recorded by various authors but is not able to vouch for the accuracy of much of this information. It is acknowledged that the taxonomy of Western Australian vertebrates is continually being revised and the nomenclature of some of the species listed in the appendices may have changed since publication by the authors.
Sources of information	Yes, negligible	Vertebrate fauna information was available from on-line databases and unpublished and published reports of surveys conducted in the bioregion in a variety of habitat types. Many of these surveys employed a low level of trapping effort which significantly impacts on the capacity of these data to represent the fauna assemblages in the areas surveyed.
Proportion of the task achieved	No	All tasks completed.
Timing/weather/ season/ cycle	N/A	Weather was suitable for a site investigation.
Disturbances which affected results of the survey	No	Disturbance areas throughout the project area have been factored into this assessment.
Intensity of survey effort	N/A	
Completeness	No	All aspects of this assessment have been completed.
Resources	No	Adequate resources were available.
Remoteness and/or access problems	No	All areas could be accessed.
Availability of contextual information on the region	No	There are limited fauna survey data for areas around the project area, but the data from further afield is adequate to provide a list of species potentially in the project area.

4. RESULTS

4.1 FAUNA HABITAT

The project area supports one broad fauna habitat of mixed mulga, acacia and chenopod shrubland. As with most areas in the Goldfields the density of trees and shrubs varies appreciably across the project area with denser vegetation along the drainage lines. Some of the study area is highly disturbed or cleared and is therefore largely devoid of terrestrial vertebrate fauna. Plates 1-6 provide representative images of the fauna habitat types and disturbance.

Plate 1. Mixed mulga, acacia and chenopod shrubland

Plate 2. Mixed mulga, acacia and chenopod shrubland

Plate 3. Mixed mulga, acacia and chenopod shrubland

Plate 4. Mixed mulga, acacia and chenopod shrubland

Plate 5. Disturbed area

Plate 6. Disturbed area

4.2 BIOREGIONAL VERTEBRATE FAUNA

Appendix B provides a summary of the fauna survey data that are available near the project area. There are appreciable differences in the recorded fauna assemblages within and among fauna surveys shown in Appendix B. These differences are partially due to the low survey effort often deployed and they also reflect variations in soils and vegetation as well as temporal variations in the fauna assemblages.

Tables 3-7 provide a list of vertebrate species potentially found near the project area that have been compiled based on the fauna survey report results shown in Appendix B.

Table 3. Birds potentially found near the project area

Family	Species	Common Name
Casuariidae	*Dromaius novaehollandiae*	Emu
Anatidae	*Chenonetta jubata*	Australian Wood Duck
Megapodiidae	*Leipoa ocellata*	Malleefowl
Columbidae	*Phaps chalcoptera*	Common Bronzewing
	Ocyphaps lophotes	Crested Pigeon
	Geopelia cuneata	Diamond Dove
Cuculidae	*Chrysococcyx basalis*	Horsfield's Bronze-Cuckoo
Cuculidae	*Chrysococcyx osculans*	Black-eared Cuckoo
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar
Podargidae	*Podargus strigoides*	Tawny Frogmouth
Turnicidae	*Turnix velox*	Little Buttonquail
Ardeidae	*Egretta novaehollandiae*	White-faced Heron
Accipitridae	*Hieraaetus morphnoides*	Little Eagle
	Aquila audax	Wedge-tailed Eagle
	Circus assimilis	Spotted Harrier
	Accipiter fasciatus	Brown Goshawk
	Accipiter cirrocephalus	Collared Sparrowhawk
	Haliastur sphenurus	Whistling Kite
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo
Strigidae	*Ninox boobook*	Southern Boobook
Alcedinidae	*Dacelo novaeguineae*	Laughing Kookaburra
Alcedinidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher
Meropidae	*Merops ornatus*	Rainbow Bee-eater
Falconidae	*Falco cenchroides*	Nankeen Kestrel
	Falco longipennis	Australian Hobby

Family	Species	Common Name
	Falco berigora	Brown Falcon
Cacatuidae	*Eolophus roseicapilla*	Galah
	Nymphicus hollandicus	Cockatiel
Psittaculidae	*Neopsephotus bourkii*	Bourke's Parrot
	Barnardius zonarius	Australian Ringneck
	Psephotus varius	Mulga Parrot
	Melopsittacus undulatus	Budgerigar
Ptilonorhynchidae	*Chlamydera guttata*	Western Bowerbird
	Ptilonorhynchus maculata	Spotted Bowerbird
Climacteridae	*Climacteris affinis*	White-browed Treecreeper
	Climacteris rufus	Rufous Treecreeper
Maluridae	*Malurus pulcherrimus*	Blue-breasted Fairywren
	Malurus splendens	Splendid Fairywren
	Malurus leucopterus	White-winged Fairywren
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater
	Purnella albifrons	White-fronted Honeyeater
	Manorina flavigula	Yellow-throated Miner
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater
	Anthochaera carunculata	Red Wattlebird
	Gavicalis virescens	Singing Honeyeater
	Ptilotula ornata	Yellow-plumed Honeyeater
	Ptilotula plumula	Grey-fronted Honeyeater
	Conopophila whitei	Grey Honeyeater
	Epthianura tricolor	Crimson Chat
	Epthianura aurifrons	Orange Chat
	Epthianura albifrons	White-fronted Chat
	Sugomel nigrum	Black Honeyeater
	Lichmera indistincta	Brown Honeyeater
	Nesoptilotis leucotis	White-eared Honeyeater
	Melithreptus brevirostris	Brown-headed Honeyeater

Family	Species	Common Name
Pardalotidae	*Pardalotus striatus*	Striated Pardalote
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat
	Calamanthus campestris	Rufous Fieldwren
	Acanthiza iredalei	Slender-billed Thornbill
	Acanthiza apicalis	Inland Thornbill
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill
	Acanthiza uropygialis	Chestnut-rumped Thornbill
	Acanthiza robustirostris	Slaty-backed Thornbill
	Smicrornis brevirostris	Weebill
	Gerygone fusca	Western Gerygone
	Aphelocephala leucopsis	Southern Whiteface
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler
Cinclosomatidae	*Cinclosoma castanotum*	Chestnut Quail-thrush
	Cinclosoma castaneothorax	Chestnut-breasted Quail-thrush
Campephagidae	*Coracina maxima*	Ground Cuckooshrike
	Coracina novaehollandiae	Black-faced Cuckooshrike
	Lalage tricolor	White-winged Triller
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella
Oreoicidae	*Oreoica gutturalis*	Crested Bellbird
Pachycephalidae	*Colluricincla harmonica*	Grey Shrikethrush
	Pachycephala inornata	Gilbert's Whistler
	Pachycephala pectoralis	Golden Whistler
	Pachycephala rufiventris	Rufous Whistler
Artamidae	*Artamus personatus*	Masked Woodswallow
	Artamus superciliosus	White-browed Woodswallow
	Artamus cinereus	Black-faced Woodswallow
	Artamus cyanopterus	Dusky Woodswallow
	Cracticus torquatus	Grey Butcherbird
	Cracticus nigrogularis	Pied Butcherbird

Family	Species	Common Name
	Gymnorhina tibicen	Australian Magpie
	Strepera versicolor	Grey Currawong
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail
	Rhipidura albiscapa	Grey Fantail
Monarchidae	*Grallina cyanoleuca*	Magpie-lark
Corvidae	*Corvus orru*	Torresian Crow
	Corvus bennetti	Little Crow
	Corvus coronoides	Australian Raven
Petroicidae	*Microeca fascinans*	Jacky Winter
	Petroica goodenovii	Red-capped Robin
	Melanodryas cucullata	Hooded Robin
	Drymodes brunneopygia	Southern Scrub-Robin
Locustellidae	*Cincloramphus cruralis*	Brown Songlark
	Cincloramphus mathewsi	Rufous Songlark
Hirundinidae	*Hirundo neoxena*	Welcome Swallow
	Petrochelidon ariel	Fairy Martin
	Petrochelidon nigricans	Tree Martin
	Cheramoeca leucosterna	White-backed Swallow
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird
Estrildidae	*Taeniopygia guttata*	Zebra Finch
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit

Table 4. Amphibians potentially found near the project area

Family	Species	Common Name
Limnodynastidae	*Neobatrachus kunapalari*	Wheatbelt Frog
	Neobatrachus sudelli	Sudell's Frog
	Neobatrachus sutor	Shoemaker Frog
	Neobatrachus wilsmorei	Plonking Frog
	Platyplectrum spenceri	Spencer's Burrowing Frog
Myobatrachidae	*Pseudophryne occidentalis*	Western Toadlet
Pelodryadidae	*Cyclorana maini*	Main's Frog
	Cyclorana occidentalis	Western Water-holding Frog
	Litoria moorei	Motorbike Frog

Table 5. Mammals potentially found near the project area

Family	Species	Common Name
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna
Bovidae	*Bos taurus*	Cow
	Capra hircus	Goat
	Ovis aries	Sheep
Camelidae	*Camelus dromedarius*	Dromedary
Suidae	*Sus scrofa*	Pig
Canidae	*Canis lupus*	Dingo
	Vulpes vulpes	Red Fox
Felidae	*Felis catus*	Cat
Molossidae	*Austronomus australis*	White-striped Freetail Bat
	Mormopterus planiceps	Southern Free-tail Bat
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat
	Nyctophilus geoffroyi	Lesser Long-eared Bat
	Nyctophilus major	Greater Long-eared Bat
	Scotorepens balstoni	Inland Broad-nosed Bat
	Vespadelus baverstocki	Inland Forest Bat
	Vespadelus finlaysoni	Finlayson's Cave Bat
Dasyuridae	*Antechinomys laniger*	Kultarr
	Ningaui ridei	Wongai Ningaui

Family	Species	Common Name
	Ningaui yvonneae	Mallee Ningaui
	Pseudantechinus woolleyae	Woolley's False Antechinus
	Sminthopsis crassicaudata	Fat-tailed Dunnart
	Sminthopsis dolichura	Little Long-tailed Dunnart
	Sminthopsis hirtipes	Hairy-footed Dunnart
	Sminthopsis longicaudata	Long-tailed Dunnart
	Sminthopsis ooldea	Ooldea Dunnart
Macropodidae	*Osphranter robustus*	Euro
	Osphranter rufus	Red Kangaroo
Leporidae	*Oryctolagus cuniculus*	Rabbit
Muridae	*Mus musculus*	House Mouse
	Notomys alexis	Spinifex Hopping Mouse
	Notomys mitchellii	Mitchell's Hopping Mouse
	Pseudomys albocinereus	Ash-grey Mouse
	Pseudomys bolami	Bolam's Mouse
	Pseudomys hermannsburgensis	Sandy Inland Mouse

Table 6. Reptiles potentially found near the project area

Family	Species	Common Name
Agamidae	*Ctenophorus cristatus*	Crested Dragon
	Ctenophorus fordi	Mallee Dragon
	Ctenophorus infans	Ring-tailed Dragon
	Ctenophorus ornatus	Ornate Crevice Dragon
	Ctenophorus reticulatus	Western Netted Dragon
	Ctenophorus salinarum	Saltpan Dragon
	Ctenophorus scutulatus	Lozenge-marked Dragon
	Diporiphora amphiboluroides	Mulga Dragon
	Moloch horridus	Thorny Devil
	Pogona minor	Western Bearded Dragon
Carphodactylidae	*Nephrurus laevissimus*	Smooth Knob-tail
	Nephrurus vertebralis	Midline Knob-tail
	Underwoodisaurus milii	Barking Gecko
Diplodactylidae	*Diplodactylus granariensis*	Wheatbelt Stone Gecko
	Diplodactylus pulcher	Beautiful Gecko
	Lucasium maini	Main's Ground Gecko
	Rhynchoedura ornata	Beaked Gecko
	Strophurus assimilis	Goldfields Spiny-tailed Gecko
	Strophurus elderi	Jewelled Gecko
	Strophurus intermedius	Southern Spiny-tailed Gecko
	Strophurus strophurus	Western Spiny-tailed Gecko
	Strophurus wellingtonae	Western Shield Spiny-tailed Gecko
Elapidae	*Brachyurophis fasciolatus*	Narrow-banded Burrowing Snake
	Brachyurophis semifasciata	Half-girdled Snake
	Demansia psammophis	Yellow-faced Whipsnake
	Furina ornata	Orange-naped Snake
	Neelaps bimaculatus	Black-naped Burrowing Snake
	Suta monachus	Hooded Snake
	Pseudechis australis	Mulga Snake
	Pseudonaja mengdeni	Western Brown Snake
	Pseudonaja modesta	Ringed Brown Snake
	Simoselaps bertholdi	Jan's Banded Snake
	Suta fasciata	Rosen's Snake
Gekkonidae	*Gehyra punctata*	Spotted Dtella
	Gehyra purpurascens	Purplish Dtella
	Gehyra variegata	Variegated Gehyra
	Heteronotia binoei	Bynoe's Gecko
Pygopodidae	*Delma australis*	Marble-faced Delma

Family	Species	Common Name
	Delma butleri	Unbanded Delma
	Delma nasuta	Sharp-snouted Delma
	Lialis burtonis	Burton's Legless Lizard
	Pygopus nigriceps	Western Hooded Scaly-foot
Pythonidae	*Antaresia stimsoni*	Stimson's Python
Scincidae	*Cryptoblepharus australis*	Inland Snake-eyed Skink
	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
	Ctenotus atlas	Southern Mallee Ctenotus
	Ctenotus brooksi	Wedgsnout Ctenotus
	Ctenotus leae	Orange-tailed Finesnout Ctenotus
	Ctenotus leonhardii	Leonhardi's Ctenotus
	Ctenotus schomburgkii	Barred Wedgesnout Ctenotus
	Ctenotus severus	Stern Ctenotus
	Ctenotus uber	Spotted Ctenotus
	Ctenotus xenopleura	Wide-striped Ctenotus
	Cyclodomorphus branchialis	Common Slender Bluetongue
	Cyclodomorphus melanops	Spinifex Slender Blue-tongue
	Egernia depressa	Southern Pygmy Spiny-tailed Skink
	Egernia formosa	Goldfields Crevice Skink
	Lerista desertorum	Central Desert Robust Slider
	Lerista kingi	King's Slider
	Lerista lineopunctulata	Dotted-line Robust Slider
	Lerista macropisthopus	Unpatterned Robust Slider
	Lerista picturata	Southern Robust Slider
	Lerista timida	Timid Slider
	Liopholis inornata	Desert Skink
	Liopholis striata	Nocturnal Desert Skink
	Menetia greyii	Common Dwarf Skink
	Morethia butleri	Woodland Morethia Skink
	Tiliqua occipitalis	Western Blue-tongued Lizard
Typhlopidae	*Anilios australis*	Austral Blind Snake
	Anilios bituberculatus	Prong-snouted Blind Snake
	Anilios hamatus	Pale-headed Blind Snake
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor
	Varanus giganteus	Perentie
	Varanus gouldii	Gould's Goanna
	Varanus panoptes	Yellow-spotted Monitor
	Varanus tristis	Black-headed Monitor

4.3 CONSERVATION SIGNIFICANT FAUNA

Conservation significant fauna are protected by the Commonwealth *EPBC Act 1999*, and this list includes species covered by international treaties such as the Japan-Australia Migratory Bird Agreement (JAMBA) and China-Australia Migratory Bird Agreement (CAMBA) and the Western Australia (WA) *BC Act 2016*. The WA *BC Act 2016* provides for the publishing of the *Wildlife Conservation (Specially Protected Fauna) Notice* that lists species under multiple categories. In addition, DBCA maintains a list of fauna that require monitoring under four priorities based on the current knowledge of their distribution, abundance and threatening processes. The *EPBC Act 1999* and *BC Act 2016* imply legislative requirements for the management of anthropogenic impacts to minimise the effects of disturbances on species and their habitats. Priority species have no statutory protection, other than the DBCA wishes to monitor potential impacts on these species. Environmental consultants and proponents of developments are encouraged to avoid and minimise impacts on these species. Definitions of the significant fauna under the WA *Wildlife Conservation Act* are provided in Appendix C.

Wetland, shorebirds and wetland migratory bird species present in the EPBC MNES online database search have been excluded from the following list and assessments as there is no suitable habitat for these species in

the project area. There are no threatened species of fauna likely to be recorded in the project area. The following is an assessment of the likelihood of each of the species listed in **Error! Reference source not found.** being found in the project area.

Table 7. Conservation species recorded in database searches for the region

Species	DBCA Schedule / Priority	Status under Commonwealth EPBC Act	Comment on the potential impact on species
Night Parrot (*Pezoporus occidentalis*)	Critically Endangered	Endangered	Highly unlikely to occur in the project area.
Sandhill Dunnart (*Sminthopsis psammophila*)	Endangered	Endangered	Highly unlikely to occur in the project area.
Malleefowl (*Leipoa ocellata*)	Vulnerable	Vulnerable	Highly unlikely to occur in the project area.
Chuditch (*Dasyurus geoffroii*)	Vulnerable	Vulnerable	Highly unlikely to occur in the project area.
Grey Falcon (*Falco hypoleucos*)	Vulnerable	Vulnerable	Highly unlikely to occur in the project area.
Princess Parrot (*Polytelis alexandrae*)	Vulnerable	Vulnerable	May infrequently be seen in the region, however, clearing vegetation and development is highly unlikely to impact on this species.
Fork-tailed Swift (*Apus pacificus*)	Migratory	Migratory	May infrequently be seen in the region, however, clearing vegetation and development is highly unlikely to impact on this species.
Grey Wagtail (*Motacilla cinerea*)	Migratory	Migratory	Highly unlikely to occur in the project area.
Peregrine Falcon (*Falco peregrinus*)	Other specially protected fauna		May infrequently be seen in the region, however, clearing vegetation and development is highly unlikely to impact on this species.
Woma (*Aspidites ramsayi*)	Priority 1		Highly unlikely to occur in the project area.
Mulgara (*Dasycercus blythi / cristicauda*)	Priority 4	Vulnerable	Highly unlikely to occur in the project area.
Central Long-eared Bat (*Nyctophilus major tor*)	Priority 3		Unlikely to occur in the project area.

Night Parrot (*Pezoporus occidentalis*) – Critically endangered under the WA *BC Act 2016* and endangered under the *EPBC Act 1999*

The Night Parrot is a small, arid-adapted, nocturnal, ground-feeding parrot (Johnstone and Storr 1998, Threatened Species Scientific Committee 2016). Its length is 22-25cm with a body mass of approximately 104g (Threatened Species Scientific Committee 2016), although it was suggested that they were semi-nomadic, the Night Parrots in south-western Queensland appear to be sedentary (Murphy 2015).

The Night Parrot was probably originally distributed over much of the semi-arid and arid Australia (Garnett *et al*. 2011, Threatened Species Scientific Committee 2016). Recordings in north-west and western Queensland in the early 1990-2000s were in a broad cross section of the habitats available (Cupitt and Cupitt 2008, Garnett *et al*. 2011, Boles *et al*. 2016). There have been recent sightings in the Pilbara in 1980, 2005 and 2017, central WA in 1979, north-eastern South Australia in 1979, western Queensland (including Pullen-Pullen-Mt Windsor-Diamantina population) in 1980, 1990, 1993, 2006 and 2013-17 (Davis and Metcalf 2008, Garnett *et al*. 2011, Charalambous 2016, Pickrell 2016, AG staff 2017, Palaszxzuk and Miles 2017, Rykers 2017, AG staff 2018),

Pilbara in 2017 (Jones 2017), and the northern Goldfields (Jackett *et al*. 2017). Garnett *et al*. (2011) suggested that there were between 50-250 mature individuals in less than 5% of its previous range. Prior to 2007 there were very few records of the Night Parrot (Plate 7).

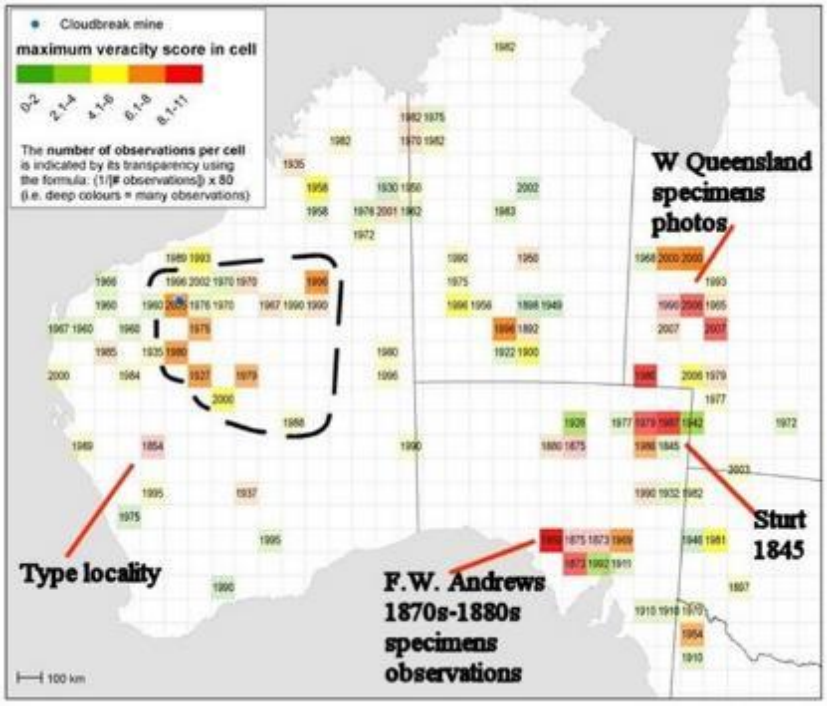


Plate 7. Map of historical Night Parrot records compiled by S. Murphy *et al*., including records to 2007

(taken from https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals/night-parrot)

Wilson's (1937) summary of observations provided information on the early records of Night Parrots' preferred habitat and breeding sites. Recent information indicates its preferred habitat appears to be in Triodia grasslands, chenopod shrublands, shrubby samphire and floristically diverse habitats dominated by large-seeded species (Threatened Species Scientific Committee 2016, McCarthy 2017, Murphy *et al*. 2017b). At Pullen Pullen Reserve it nests in large, more or less ring-shaped Triodia, and the nest consists of a tunnel (25-30º and 0º to the ground; 20-33cm long) through an apron of dead spinifex leaves that leads to a chamber under a live hummock, with a shallow depression (3-4cm) excavated into the gravelly/sandy soil (Murphy *et al*. 2017a). In the northern Goldfields the nest was again in a spinifex hummock; it was circular, with an excavated depression (~1.5-2.0cm) in sandy substrate (Hamilton et al. 2017a, Jackett et al. 2017). The entrance tunnel was 62cm long, and was downward sloping (27º) with the entrance 28cm above the ground (Hamilton et al. 2017a). It has clutches of two to four sub-elliptical, white eggs with a lustrous appearance (Murphy *et al*. 2017a). Breeding followed significant rains in March for the observations in Pullen-Pullen Reserve and in April in the northern Goldfields (Hamilton et al. 2017a, Murphy et al. 2017a), but it is thought that breeding generally occurs between April and October (Murphy *et al*. 2017a).

Murphy *et al*. (2017b) placed a GPS tag on Night Parrots and reported that the two birds called at dusk from their diurnal roosts among spinifex hummocks and then flew to more floristically diverse habitats dominated by large-seeded, prolifically seeding species to feed.

The project area is within the medium priority search area for Night Parrots as indicated by the then Department of Parks and Wildlife (Plate 8; 2017). There is no spinifex present in the project area that is similar to that described as suitable habitat in the available reports (Department of Parks and Wildlife 2017, Hamilton et al. 2017b, Murphy et al. 2017b).

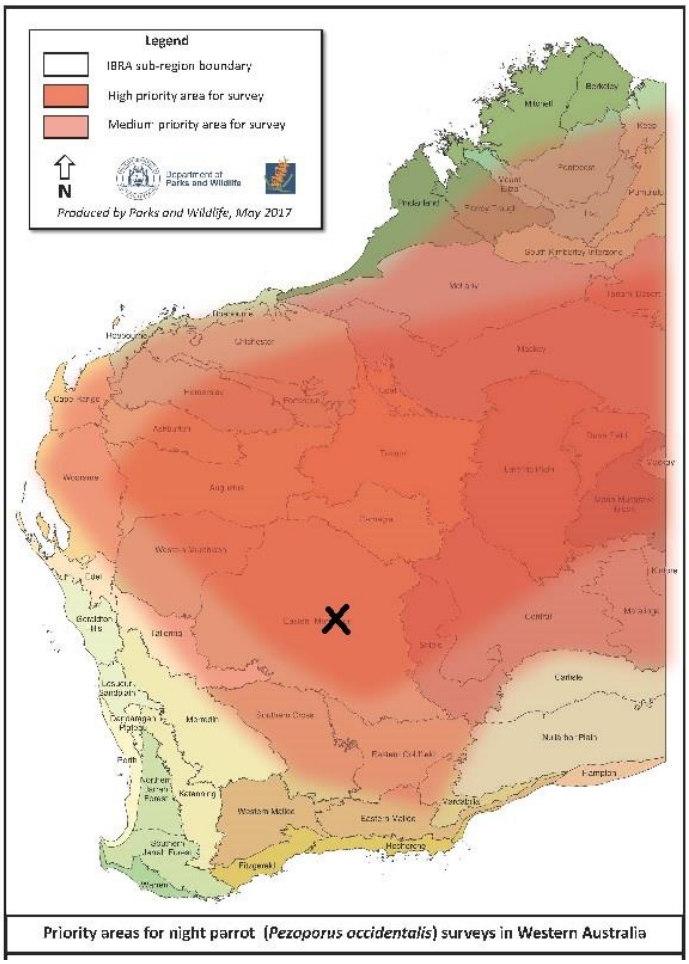


Plate 8. Search areas for Night Parrot in Western Australia

Project area indicated as a black cross

The Night Parrot has been recorded in the northern goldfields and the record is thought to be about 340km north of the project area. Its recently reported preferred habitat is not present in the project area, therefore it is highly unlikely to be recorded in the project area.

Sandhill Dunnart (***Sminthopsis psammophila***) - *Endangered* under the *BC Act 2016* and *EPBC Act 1999*

The Sandhill Dunnart is a small, dasyurid with a body length of approximately 8-12 cm, and a tail length approximately 10-12 cm (Threatened Species Scientific Committee 2015). It has been recorded from numerous widely dispersed localities including the Great Victoria Desert and the Eyre Peninsula (Woinarski et al. 2014) and more recently in areas west of the Great Victoria Desert.

The Sandhill Dunnart's preferred habitat is sandy semi-arid and arid areas dominated by mature spinifex. They live in burrows dug under large spinifex hummocks as well as hollow logs and Hopping Mice burrows (Woinarski et al. 2014).

The project area is outside the Sandhill Dunnart's existing known extant geographic range, and the habitat that it has recently been recorded in is not present in the project area. The Sandhill Dunnart is highly unlikely to be present in the project area.

Malleefowl (*Leipoa ocellata*) – Vulnerable under the WA *BC Act 2016* and *EPBC Act 1999*

Malleefowl is a member of the family of birds (Megapodiidae) that builds a nest mound in which it incubates its eggs. This relatively large, mostly terrestrial bird nests in the same general area year-after-year, and will

often use the same nest mound (Frith 1962, Priddel and Wheeler 2003). Outside the breeding period, birds will range over several square kilometres (Booth 1987, Benshemesh 2007). Chicks are independent from hatching and disperse widely, moving up to 2km per day (Benshemesh 2007) and do not appear to respond to habitat boundaries.

Malleefowl have been found in mallee regions of southern Australia from approximately the 26th parallel of latitude southwards. Malleefowl are mostly found in semi-arid and arid shrub lands and low woodlands dominated by mallee in the more temperate areas (Frith 1962, Parsons et al. 2008). Malleefowl are now only found throughout these regions in fragmented patches of dense vegetation due to clearing of habitat for agriculture, increased fire frequency, competition with exotic herbivores (sheep, rabbits, cattle, goats) and kangaroos, predation by foxes and cats, inbreeding as a result of fragmentation and possibly hunting for food.

Malleefowl build large mounds of sand, gravel and vegetation that can be 3-5m wide and over 1m high. This is mostly done between autumn and spring as a combined effort of the pair intending to use the mound. Once completed, the male then spends most of his time tending the mound, whereas, the female spends most of her time foraging.

The Malleefowl's wariness, cryptic habits and colouration make it difficult to reliably and accurately census their numbers. Brickhill (1985), Benshemesh and Emison (1996) and Priddel and Wheeler (2003) have all used the number of active mounds as a proxy of Malleefowl numbers. This is a relevant proxy, as it directly relates to the number of reproductively active birds, which is a good indicator of survival of the local population.

No Malleefowl or suitable habitat were recorded in the project area. The Malleefowl is therefore highly unlikely to be recorded in the project area.

Chuditch (*Dasyurus geoffroii*) – Vulnerable under the *BC Act 2016* and *EPBC Act 1999*

The Chuditch is the largest carnivorous marsupial in Western Australia (WA). It is usually active from dusk to dawn. Formally known from over 70% of Australia, the Chuditch now has a patchy distribution throughout the Jarrah forest and mixed Karri/Marri/Jarrah forest of south-west WA and other isolated areas (Serena and Soderquist 2008). Chuditch are solitary animals for most of their life and den in hollow logs, burrows, culverts, etc and have also been recorded in tree hollows and rock cavities. Chuditch are opportunistic feeders, and forage primarily on the ground at night. Their diet can include other mammals, birds, lizards, bird and reptile eggs but the majority is a mixture of large invertebrates (e.g. spiders, scorpions and crickets; Serena and Soderquist 2008).

Chuditch disappeared from the northern Goldfields a long-time ago, so it is highly improbable that they are present in the project area. The habitat in the project area is also unsuitable for this species.

Grey Falcon (*Falco hypoleucos*) – Vulnerable under the *BC Act 2016* and *EPBC Act 1999*.

This is Australia's rarest falcon, and it is mostly found in areas of less than 500mm rainfall north of latitude 26°S in Western Australia (Schoenjahn et al. 2019, Threatened Species Scientific Committee 2020). It is mostly found in timbered lowland plains, particularly *Acacia* shrublands that are crossed by tree-lined water courses (Threatened Species Scientific Committee 2020). However, this species has been observed in treeless areas and frequents tussock grassland and open woodland (Threatened Species Scientific Committee 2020).

This species was not seen during the site visit, has not been recorded in other fauna surveys near the project areas, and if it was present, would move away once disturbed.

Princess Parrot (*Polytelis alexandrae*) - Vulnerable under the *EPBC Act 1999* and Priority 4 species with DBCA

Very little is known about the Princess Parrot, even the exact extent of its geographical distribution. The species is found mostly in the inland arid areas of Australia, and in Western Australia in the Gibson, Little Sandy and Great Victoria Deserts (Johnstone and Storr 1998, Pavey et al. 2014), however, they occasionally occur in lightly

wooded areas adjacent to the sandy deserts (Moriarty 1972). It is thought to be nomadic within the central desert regions of Australia, occupying arid shrub lands, particularly those dominated by Mulga, Desert Oak and spinifex. Due to the paucity of information on this species, accurate estimates of its population size are difficult, however, this species is probably threatened by habitat loss to agricultural practices and changes in fire regimes.

Dr S. Thompson sighted a single specimen of this parrot in a survey near the Wanjarri Nature Reserve in 2006. It is highly unlikely that Princess Parrots would be seen this far away from their normal habitat in the sandy deserts.

Fork-tailed Swift (*Apus pacificus*) - Migratory under the *EPBC Act 1999* and *BC Act 2016*

This species breeds in the northeast and mid-east Asia and winters in Australia and southern New Guinea. It is a visitor to most parts of Western Australia, beginning to arrive in the Kimberley in late September, in the Pilbara in November and in the southwest land division in mid-December, and leaving by late April. The Fork-tailed Swift is an almost exclusively aerial species, foraging and sleeping on the wing. It rarely comes to earth, usually only for breeding. It is common in the Kimberley, uncommon to moderately common near northwest, west and southeast coasts and rare to scarce elsewhere. It is rarely seen in the Goldfields.

Terrestrial Ecosystems' assessment is that the Fork-tailed Swift may infrequently be seen in the region, however, the proposed vegetation clearing is unlikely to significantly impact on this species as it will move away to other areas if it is disturbed.

Grey Wagtail (*Motacilla cinerea*) - Migratory species under the *EPBC Act 1999* and *BC Act 2016*

The Grey Wagtail is a small yellow breasted bird with a grey back and head. Johnstone and Storr (2004) reported this migratory species as breeding in Palearctic from western Europe and north-west Africa to eastern Asia and wintering in Africa, south-east Asia, Indonesia, the Philippines, New Guinea and Australia. Its preferred habitat in Australia is banks and rocks in fast-running fresh water including rivers, streams and creeks where it feeds on insects. The Atlas of Living Australia records two sightings on the south-coast of Western Australia and none around the project area.

It is highly unlikely to be seen in the project area due to a lack of suitable habitat.

Peregrine Falcon (*Falco peregrinus*) – Other specially protected species under the *BC Act 2016*

The Peregrine Falcon is uncommon, although widespread throughout much of Australia excluding the extremely dry areas and has a wide and patchy distribution. It shows habitat preference for areas near cliffs along coastlines, rivers and ranges and within woodlands along watercourses and around lakes. Nesting sites include ledges along cliffs, granite outcrops and quarries, hollow trees near wetlands and old nests of other large bird species. There is no evidence to suggest any change in status in the last 50 years. The Peregrine Falcon has been recorded in other fauna surveys in the region but was not recorded in the project area.

Terrestrial Ecosystems' assessment is that the Peregrine Falcon may infrequently be seen in the region, however, the proposed development is unlikely to significantly impact on this species as it will move away to other areas if it is disturbed.

Woma (southern form: *Aspidites ramsayi*) – Priority 1 with DBCA

This python was once common in a crescent shaped distribution from Shark Bay through the wheatbelt to Kitchener. The Western Australian Museum has records of them being caught in the vicinity of the Great Eastern Highway from around Southern Cross and east toward Coolgardie (Thompson and Thompson 2006). The published literature indicates that it is now only found around Shark Bay and east of Kalgoorlie.

There are no recent records for the Woma near the project area and the habitat is not suitable. The Woma is therefore highly unlikely to be present in the project area or impacted by future development.

Brush-tailed Mulgara (*Dasycercus blythi*) - Priority 4 with the DBCA

Woolley (2005) recognises two species of 'Mulgara'; *Dasycercus blythi* and *D. cristicauda*. *Dasycercus blythi* has a non-crested tail, two upper premolars and six nipples; *D. cristicauda* has a crested tail, three upper premolars and eight nipples. Both species potentially have overlapping distributions in arid Australia, but it is thought that *D. cristicauda* does not currently exist in Western Australia, although there are old records indicating its presence. Woolley (2005) suggested the common names for these two species be Brush-tailed Mulgara for *D. blythi* and Crest-tailed Mulgara for *D. cristicauda*. These two species can be sympatric in places, but probably utilise different parts of the habitat on a local scale when they are recorded in the same area. Currently, there are insufficient data to separate the spatial ecology, burrows and reproductive biology of these two species. Information that follows is based on what is known for 'Mulgara' without distinguishing between the species.

Adult males are typically heavier than females (Gibson and Cole 1992, Dickman *et al*. 2001, Körtner *et al*. 2007), with females growing to 80g and males to 147g (Masters 1998, Dickman *et al*. 2001). Gibson and Cole (1992) reported pouched young in the winter and spring with lactating females as late as December. Litter sizes averaged five, but ranged from 2-6 (Gibson and Cole 1992, Masters 1998), with a single litter being produced each year (Dickman *et al*. 2001). Woolley (2008a) reported *D. blythi* females to carry up to six young in central Australia when caught in September, and in captivity mating has been observed from mid-May to Mid-June and young have been born in June to August after a gestation of five to six weeks. The breeding biology is similar for *D. cristicauda,* but because females have eight nipples they can carry up to eight young (Woolley 2008b). Adult males mostly die after mating.

The Mulgara diet includes insects, arachnids and rodents as the main prey, but reptiles, centipedes and small marsupials are also consumed (Chen et al. 1998, Masters 1998, Contos and Letnic 2019).

The reported distribution of Mulgara in Western Australia includes much of the inland spinifex covered sandy desert and spinifex vegetated areas in the Pilbara and northern goldfields. Within these areas their distribution is patchy and it is most frequently confined to habitat dominated by mature spinifex (Gibson and Cole 1992, Masters 2003, Masters *et al*. 2003). Relative abundance seems to be positively associated with rainfall in the previous 12 to 24 months (Gibson and Cole 1992, Masters 1998, Dickman *et al*. 2001, Letnic and Dickman 2005). Significant population fluctuations appear to be a characteristic of the ecology of Mulgara (Manson 1994, Barrick Plutonic Gold Mine 2006). For example, Pearson (2003-04) reported significant fluctuations at Mt Keith with 99 being caught in 2001 and only 33 being caught in 2002 in a repeated survey. The recent burning of spinifex does not seem to be sufficient to cause Mulgara to move out of an area (Thompson and Thompson 2007).

Mulgara are generally sedentary in contrast with some other small dasyurids and have high site fidelity and a low propensity for dispersal once a home range has been established (Masters 1998, Dickman *et al*. 2001, Masters 2003). Masters (2003) indicated home ranges vary in size from 1.0 to 14.4ha (mean 6.5ha), with some overlap, however, Kortner *et al*. (2007) reported home ranges for males to average 25.5ha and for females to average 10.8ha. Burrows are mostly used by a single individual, but males and females have been found together in a single burrow during the breeding season (Masters 2003, Thompson and Thompson 2007). Kortner *et al*. (2007) reported that 10 of 68 burrows they monitored were used by multiple Mulgara and one individual returned to the same burrow on 32 of 52 days monitored. Masters (2003) reported individual's burrows in her study area were concentrated in a relatively small area, as the average maximum distance across a home range was about 440m. In the Pilbara, Thompson and Thompson (2007, 2008) reported catching nine Mulgara in an area of 22ha and 50 in 210ha, and about 200 trap-nights were required to catch each Mulgara in areas with a relatively high density.

Masters (2003) reported that both males and females use 2-9 burrows, but averaged about three, whereas Kortner *et al*. (2007) reported Mulgara used up to 15 burrows, with 47% of burrows used by an individual only

once. Woolley (1990) described *D. cristicauda* burrows near Ayers Rock as having one large hole, around which there was loose soil, and either one or two smaller holes within 1m of the large hole. The tunnels to these pop holes were near vertical. Thompson and Thompson (2007) indicated that burrows in the Pilbara contained between two and nine entrances, tunnels were mostly on a single level and to a depth of about 300mm. Kortner *et al*. (Körtner *et al*. 2007) reported Mulgara burrows in the Uluru National Park varied in complexity, some with only a single entrance but others had multiple entrances. The lumen for a burrow entrance was typically an arch over a flat bottom with a height of 70-80mm, and a width of 80-100mm at the base. Internal tunnels were mostly 50-70mm wide. Masters (2008) suggested that the complexity of burrows varies geographically with those in central Australia having a single entrance with two or three side tunnels and pop holes, and those in Queensland having more than one entrance, deeper branching tunnels and numerous pop holes. This difference may have been due to differences in species that were not recognised until recently.

The habitat in the project area is not suitable for this species, so it is highly unlikely to be present.

Central Long-eared Bat (*Nyctophilus major tor*) – Priority 4 with DBCA

This species is probably the species referred to by Churchill (2008) as the Central Long-eared Bat (*Nyctophilus* sp. 1). This species is distributed across the southern and central wheatbelt, southern part of the Great Victoria Desert and the Nullarbor coast. The project area is on the northern boundary of its known distribution. It roosts in tree cavities, foliage and under loose bark.

This bat may be present in the region, and if present in project area, it is unlikely to be significantly impacted by the development as it will readily move when disturbed, and they are likely to be in a similar abundance in adjacent areas.

5. DISCUSSION

5.1 ADEQUACY OF THE FAUNA SURVEY DATA FOR FAUNA HABITATS REPRESENTED IN THE PROJECT AREA

The EPA's (2020) Technical Guidance on terrestrial fauna surveys indicated that the type of survey should be determined based on:

- level of existing regional knowledge;
- type and comprehensiveness of recent local surveys;
- degree of existing disturbance or fragmentation at the regional scale;
- extent, distribution and significance of habitats;
- significance of species likely to be present;
- sensitivity of the environment to the proposed activities; and
- scale and nature of impact.

Fauna survey data provided by Cowan and How (2004), and Dell and How (1988) provide an indication of the vertebrate fauna assemblage in the project. The project area is mostly sparely vegetated, and there is very little leaf litter on the ground indicating a limited vertebrate fauna assemblage with few individuals being present. A more detailed survey is unlikely to provide the environmental assessors with additional information or change the assessment.

5.2 AMPHIBIANS

Amphibians typically found in mulga woodlands in the Goldfields are listed in Table 4 in areas that form ponds of water after heavy rain. All the Limnodynastidae species are burrowing frogs and only come to the surface to feed and breed after substantial rain. *Pseudophryne occidentalis* finds shelter under rocks and in crevices during the dry periods and enters temporary ponds to breed after major rainfall events. All species have a wide-spread distribution in the Goldfields and are abundant. There are no conservation significant amphibians in the Goldfields.

5.3 REPTILES

Reptile species richness in the project area will be comparable with similar sparely vegetated mulga woodlands elsewhere in the bioregion. The list provided in Appendix A represents species likely to be found over a large area of diverse range of habitat types. Mulga woodlands would typically support up to 40 species of reptiles, but many of these would be in low abundance (see Table 6). Fauna habitats in the project area are likely to be similar to adjacent areas, so the loss of reptiles during vegetation clearing is unlikely to be significant in a bioregional context.

5.4 BIRDS

The number of birds and bird species in the northern Goldfields fluctuates based on seasons and recent rainfall. The project area is likely to support a similar assemblage to that present in the adjacent areas. Birds of conservation significance potentially found in the region include the Malleefowl, Peregrine Falcon, and Princess Parrot.

Malleefowl are present in the region but are not present in the project area. The Princess Parrot is nomadic and moves around the arid interior often in search of water and resources but is not regularly recorded this far away from the sandy deserts, so it is highly unlikely to be recorded in the project area. The Peregrine Falcon

will normally have a very large home range in the Goldfields, and clearing a small section of the project area, particularly when similar habitat exists in the adjacent areas, is unlikely to significantly impact on this species.

It is Terrestrial Ecosystems' view that the proposed vegetation clearing and construction of a road are unlikely to significantly impact on the avian fauna of the bioregion.

5.5 MAMMALS

The number of small terrestrial mammals potentially caught in the project area would be low due the sparsely vegetated habitat. Although, records of Numbats (*Myrmecobius fasciatus*), Burrowing Bettongs (*Bettongia lesueur*) and Bilbies (*Macrotis lagotis*) are shown in the Atlas of Living Australia and Western Australian Museum records (Appendix B), they are no longer present in this area, having been predated on by foxes, cats and dogs many years ago. None of the mammals potentially found in the project area are of conservation significance. The loss of small mammals during vegetation clearing and construction of a road are unlikely to significantly impact on the mammal fauna of the bioregion.

It was noted during the site visit that there was evidence of rabbits, donkeys, wild dogs and cattle in the project area and surrounds.

5.6 BIODIVERSITY VALUE OF THE PROJECT AREA

An ecological assessment of a site should consider its biodiversity value at the genetic, species and ecosystem levels, and its ecological functional value at the ecosystem level. There are inadequate data to assess the ecological value at the genetic level.

Fauna habitat types represented in the project area are abundant and in similar condition in adjacent areas. Therefore, the fauna assemblage that is present in the project area will also be present and abundant in the adjacent areas. The available fauna survey data (Appendix B) provides a good indication of the vertebrate fauna that are potentially in the project area.

5.6.1 Ecological functional value at the ecosystem level

Vertebrate species potentially in the project area are wide-ranging and have been recorded in various other fauna surveys in the bioregion (Appendix B). Much of the project area has been highly disturbed by historical mining or exploration activity, with the consequence that the project area will have a depleted vertebrate fauna assemblage. The most significant impact on vertebrate fauna in the project area and surrounds will have been feral cats, foxes and wild dogs. Historically, goats have heavily grazed some areas, and this would have impacted the vertebrate fauna assemblages, but the recent increase in the wild dog population has reduced the abundance of feral goats.

5.6.2 Maintenance of threatened ecological communities

No threatened ecological communities were identified in or near the project area.

5.6.3 Condition of fauna habitat

There are disused mining pits in the area and evidence of historical exploration and disturbance.

The impact of this disturbance over many years will have reduced the vertebrate terrestrial fauna assemblages in and near the project area.

5.6.4 Ecological linkages

The project area does not provide an important ecological linkage or terrestrial fauna movement corridor.

5.6.5 Abundance and distribution of similar habitat in the adjacent areas

The assessed project area is approximately 498ha. There is an abundance of similar habitat in adjacent areas and throughout the bioregion.

6. POTENTIAL IMPACTS

6.1 POTENTIAL IMPACTS ON FAUNA

Clearing of vegetation and construction of a road will potentially affect vertebrate fauna in numerous ways, including death/injury of fauna during vegetation clearing and impacts with vehicles and the loss of habitat.

Although there are anticipated short term impacts on the generic vertebrate fauna assemblage, they are not considered to result in significant impacts when considered in a bioregional context in the longer term.

6.2 DIRECT IMPACTS

6.2.1 Animal deaths during the clearing process and displacement of fauna

Clearing vegetation and activities associated with the construction of a road will result in the loss of small fauna and those that retreat to burrows, such as reptiles and mammals. Nocturnal species are unlikely to be active when most of the land clearing and construction work is taking place which will inevitably result in these individuals being killed or injured in their burrows or as they attempt to escape. Larger terrestrial animals and avian species will most often move to adjacent areas. These species will be required to establish new activity areas and home ranges, and this could result in the temporary displacement of resident species, however, this loss of fauna is unlikely to have a significant impact when considered in a bioregional context.

6.2.2 Reduction or loss of activity areas and closure of burrows

Clearing vegetation and construction of a road is likely to destroy reptile and mammal burrows or foraging habitat that are currently in use or could be used again. Clearing vegetation that forms part of the activity area of individuals has the potential to force these animals into adjacent areas. These areas may offer fewer resources placing individuals under survival pressure. It could also cause individuals to move into the territories of other individuals increasing competition for resources. Forced relocations could increase the possibility of predation.

6.3 INDIRECT IMPACTS

6.3.1 Edge effects

In addition to the obvious impact of vegetation clearing there can be an equally significant or greater impact in the adjacent areas because of 'edge effects'. Edge effects can lead to the disruption of ecological processes such as predation and dispersal, animal movements and can change assemblage structure. The consequence is that the impact area will always be much larger than the cleared area.

However, the spareness of the vegetation is likely to reduce edge effects in the project area.

6.3.2 Habitat fragmentation

The vegetation clearing and construction of a road will further fragment the local region as cleared linear tracks of land are 'unnatural' in much of the habitat. These linear structures that partition existing activity areas, isolate sections of established communities and may alter long and medium-term patterns of movement around established home ranges particularly for small mammals and reptiles. A reduction in the population because of this fragmentation would be difficult to detect given our current knowledge of the spatial ecology for most of the small vertebrate fauna known to be in the area.

There are already a number of tracks and roads in the area and habitat is sparsely vegetated, so the potential impact associated with further habitat fragmentation is likely to be low.

6.3.3 Introduced fauna and weeds

An increase in habitat fragmentation and human activity is often associated with an increase in the abundance of introduced species such as the house mouse (*Mus musculus*), foxes (*Vulpes vulpes*), cat (*Felis catus*) and wild dogs (*Canis lupus*). This increase may be due to a decline in habitat health, increased road kills, poor disposal of waste and easier access to areas via tracks.

House mice, foxes, cats, donkeys and wild dogs are known to be established in the area. In many situations they have become a 'naturalised' species in the Australian bush. Increases in fox, dog or cat numbers can have a detrimental impact on native fauna because they predate on and compete with native species, severely disrupting the natural balance. The cat is a particularly damaging predator on native fauna and any increase in their numbers could have a detrimental effect of local native fauna (Kinnear 1993, Bamford 1995); hence it is important to ensure that populations of the feral predators, such as cats under control.

Introduced plant species can successfully and rapidly invade areas of cleared native vegetation or otherwise disturbed by humans, particularly along roadways. Introduced plant species may replace native species that provide shelter or foraging areas for native fauna. There are existing cacti in adjacent areas (Plates 9-10) and the potential spread of weeds needs to be actively managed to stop them spreading further. Major changes to the structure of vegetation can alter the fauna habitat and consequently may influence fauna species composition. Preparing and implementing a weed management plan for the road construction program will largely reduce their threat to native fauna species.

Plate 9. Cactus

Plate 10. Cactus

6.3.4 Road fauna deaths

An increase in road fauna deaths is likely to occur where new roads / tracks are constructed or upgraded affecting kangaroos, nocturnal birds and ground dwelling large carnivorous predators. Species such as goannas and raptors are attracted to carrion on road verges and therefore, there is an increased propensity for these species to be killed by vehicles.

6.3.5 Fire

Increased human activity is often associated with an altered fire regime which leads to a degradation of natural ecosystems. Fire has been identified as one of the threatening processes for some conservation significant species as several small mammal and bird species rely on long unburnt vegetation.

Large and widespread fires are unlikely to be a significant threat to native fauna species near the project area due to the sparseness of the vegetation.

6.3.6 Anthropogenic activity

Unnatural noises, vibrations, artificial light sources, and vehicle and human movement in an area may be sufficient to force individuals or fauna species to move from adjacent areas or alter their activity periods. This form of disturbance is likely to occur during the vegetation clearing and road construction. The road takes a low volume of traffic so the ongoing impacts of vehicle noise area likely to be low. The overall impact is likely to be confined to a relatively small area and is unlikely to be a significant impact.

6.3.7 Dust

Dust generated from shifting topsoil and spoil and vehicle traffic can potentially degrade surrounding vegetation, reducing its ability to absorb sunlight and influencing photosynthetic rates. Degradation of these areas may potentially render habitat unsuitable for fauna. Dust suppression and management programs are an essential component of minimising impacts on fauna during the road construction. An effective dust management and monitoring program is required.

7. VERTEBRATE FAUNA RISK ASSESSMENT

7.1 RISK ASSESSMENT

Fauna surveys to support environmental approval are part of the environmental risk assessment undertaken to consider what potential impacts a development might have on the biodiversity on a particular area and region. Potential impacts on fauna from the proposed development are identified and briefly described above. Tables 8, 9 and 10 provide a summary of the risk assessment associated with this project.

Any risk assessment is a product of the likelihood of an impact occurring and the consequences of that impact. Likelihood and consequences are categorised and described below. The assessed risk level (likelihood x consequences) is then calculated as the overall risk for the development. This is followed by an assessment of the acceptability of the risk associated with each of the impacts. Disturbances and vegetation clearing have an impact on the fauna at multiple scales – site, local, landscape and regional. Each of these is considered in the risk assessment. This assessment should be considered in the context of the summary in Table 10.

Table 8. Fauna impact risk assessment descriptors

Likelihood		
Level	Description	Criteria
A	Rare	The environmental event may occur, or one or more conservation significant species may be present in exceptional circumstances.
B	Unlikely	The environmental event could occur, or one or more conservation significant species could be present at some time.
C	Moderate	The environmental event should occur, or one or more conservation significant species should be present at some time.
D	Likely	The environmental event will probably occur, or one or more conservation significant species will be present in most circumstances.
E	Almost certain	The environmental event is expected to occur, or one or more conservation significant species is expected be present in most circumstances.
Consequences		
Level	Description	Criteria
1	Insignificant	Insignificant impact on fauna of conservation significance or regional biodiversity, and the loss of individuals will be insignificant in the context of the availability of similar fauna or fauna assemblages in the area.
2	Minor	Impact on fauna localised and no significant impact on species of conservation significance in the project area. Loss of species at the local scale.
3	Moderate	An appreciable loss of fauna in a regional context or a limited impact on species of conservation significance in the project area.
4	Major	Significant impact on conservation significant fauna or their habitat in the project area and/or regional biodiversity and/or a significant loss in the biodiversity at the landscape scale.
5	Catastrophic	Loss of species at the regional scale and/or a significant loss of species categorised as 'vulnerable' or 'endangered' under the EPBC Act (1999) at a regional scale.
Acceptability of Risk		
Level of risk	Management action required	
Low	No action required.	
Moderate	Avoid if possible, routine management with internal audit and review of monitoring results annually.	
High	Externally approved management plan to reduce risks, monitor major risks annually with external audit and review of management plan outcomes annually.	
Extreme	Unacceptable, project should be redesigned or not proceed.	

Table 9. Levels of acceptable risk

		Likelihood				
		Rare or very low (A)	Unlikely or low (B)	Moderate (C)	Likely (D)	Almost certain (E)
Consequence	Insignificant (1)	Low	Low	Low	Low	Low
	Minor (2)	Low	Low	Low	Moderate	Moderate
	Moderate (3)	Low	Moderate	Moderate	High	High
	Major (4)	Moderate	Moderate	High	High	Extreme
	Catastrophic (5)	Moderate	High	High	Extreme	Extreme

Table 10. A risk assessment of the impact of ground disturbance activity on fauna

			Before management				With management		
	Potential impacts		Inherent risk			Risk controls	Residual risk		
Factor			Likelihood	Consequence	Significance		Likelihood	Consequence	Significance
Fauna survey data	Inadequate survey data to adequately assess the risks	Unknown loss of fauna, fauna of conservation significance, and fauna assemblages, and an incomplete fauna assessment.	B	2	Low				
	Inadequacy of comparative data	Limits on the availability of comparative data reduced the capacity to assess the uniqueness of the fauna assemblages in the project area.	B	2	Low				
Clearing vegetation	Loss of fauna habitat – local scale	Loss of terrestrial fauna in the project area.	E	1	Low				
	Loss of fauna habitat – landscape scale	Loss of some fauna during vegetation clearing.	B	1	Low				
	Loss of fauna habitat – regional scale	Small loss of some fauna from the region.	B	1	Low				
	Loss of a threatened ecological fauna community	Loss of an undetected threatened ecological fauna community.	A	3	Low				
	Habitat fragmentation	Fauna movement restricted resulting in the death of fauna and a loss of biodiversity.	A	2	Low				
Death or loss of conservation significant fauna	Loss of a unique terrestrial fauna ecosystem	Loss of an ecosystem containing fauna with high species richness, high abundance and numerous top of the food chain predators.	A	2	Low				
	Night Parrot	Loss of a Night Parrot or small population of Night Parrots	A	3	Low				
	Sandhill Dunnart	Loss of a Sandhill Dunnart or small population of Sandhill Dunnarts	A	2	Low				
	Malleefowl	Loss of a Malleefowl or small population of Malleefowl	A	2	Low				
	Chuditch	Loss of a Chuditch or small population of Chuditch	A	2	Low				
	Grey Falcon	Loss of a Grey Falcon or small population of Grey Falcon	A	2	Low				
	Princess Parrot	Loss of a Princess Parrot or small population of Princess Parrot	A	2	Low				
	Fork-tailed Swift	Loss of a Fork-tailed Swift or small population of Fork-tailed Swift	A	2	Low				
	Grey Wagtail	Loss of a Grey Wagtail or small population of Grey Wagtail	A	2	Low				
	Peregrine Falcon	Loss of a Peregrine Falcon or small population of Peregrine Falcon	A	2	Low				
	Woma	Loss of a Woma or small population of Woma	A	2	Low				

			Before management				With management		
	Mulgara	Loss of a Mulgara or small population of Mulgara	A	2	Low				
	Central Long-eared Bat	Loss of a Central Long-eared Bat or small population of Central Long-eared Bat	A	2	Low				
Human impacts	Increase or spread of weeds	Changed vegetation and a resulting loss of fauna habitat.	E	2	Mod	Implementation of a weed management plan.	D	2	Low
	Road kills	Animals being killed by vehicles as they cross roads	E	1	Low	Limiting speeds	E	1	Low
	Increase in feral fauna; specifically the fox, wild dog and cat	Increased predation on the native fauna	C	3	Mod	Encourage the local mining companies to Implement feral animal control program(s)	C	2	Low
	Dust	Increased potential for dust	E	2	Mod	Implementation of a dust management plan during road construction.	C	2	Low

7.2 NATIVE VEGETATION CLEARING PRINCIPLES

The *Environmental Protection Act (1986)* provides criteria to judge the potential impact of a development on clearing native vegetation on flora and fauna. These criteria have been listed below with a response to indicate how clearing of the vegetation in the project area might be judged against these principles as they relate to fauna and fauna assemblages (Table 11). Where possible, native vegetation should not be cleared if any of the following principles are compromised.

Table 11. Assessment of impact using the native vegetation clearing principles

Principle	Response
It comprises a high level of biological diversity.	Clearing vegetation will not comprise a high level of biodiversity.
It comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	Clearing the vegetation will not result in the loss of significant habitat for indigenous fauna.
It includes, or is necessary for the continued existence or, rare flora.	N/A
It comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.	The area does not contain a threatened ecological fauna community.
It is significant as a remnant of native vegetation in an area that has been extensively cleared.	The area is not a remnant.
It is growing in, or in association with, an environment associated with a watercourses or wetland.	The area does not contain a natural wetland.
The clearing of the vegetation is likely to cause appreciable land degradation.	N/A
The clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	Clearing of vegetation is unlikely to impact on the environmental values of the bioregion.

Principle	Response
The clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	N/A
The clearing of the vegetation is likely to cause, or exacerbate the incidence of flooding.	N/A

7.3 REFERRAL UNDER THE EPBC ACT

The proposed project is unlikely to significantly impact on a conservation significant vertebrate fauna species, so a referral under the *EPBC Act 1999* is not recommended.

8. SUMMARY

The total area assessed was approximately ~46ha and contains one broad fauna habitat of mixed mulga, acacia and chenopod shrubland. As with most areas in the Goldfields the density of trees and shrubs varies appreciably across the project area with denser vegetation along the drainage lines. Some of the project area is highly disturbed or cleared and provides no habitat value.

The project area currently does not provide an important ecological linkage or fauna movement corridor. Clearing native vegetation and construction of a road is likely to result in the loss of a small number of vertebrate fauna that are unable to move away during the clearing process. The few larger animals, such as goannas, and most of the birds will move into adjacent areas once clearing commences.

The proposed vegetation clearing and construction of a road will result in indirect impacts on the vertebrate fauna such as a reduction or loss of activity areas and closure of burrows, habitat fragmentation, increased presence of feral predators, road deaths and unnatural noises, vibrations, artificial light sources and vehicle and human movement in an area all of which may result in the death of animals or force some of them into adjacent areas.

Impacts on vertebrate fauna associated with clearing vegetation and road construction in a bioregional context will be very low.

There are no threatened species of fauna likely to be significantly impacted by clearing vegetation and road construction, therefore a referral under the *EPBC Act 1999* is not recommended.

9. MANAGEMENT STRATEGIES

The purpose of this section is to identify generic management and mitigation strategies to address the potential impacts of development in the project area.

9.1 INDUCTION AND AWARENESS

All contractors and staff involved in vegetation clearing and road construction should be made aware of the possible presence and issues associated with terrestrial fauna in the area through the induction process.

9.2 DUST

Dust generated from the vegetation clearing and construction could potentially degrade surrounding vegetation, reducing its ability to absorb sunlight, and influencing photosynthetic rates. Degradation of these areas will potentially render habitat unsuitable for fauna. Dust suppression and management programs are an essential component of minimising disturbance impacts on fauna.

9.3 MINIMISING SECONDARY IMPACTS TO FAUNA AND FAUNA HABITAT

Pets and feral animals have the potential to impact on fauna. Pets should not be permitted on site and feral and pest fauna numbers monitored and controlled. To be effective, management of feral and pest species needs to be undertaken in collaboration with the landowner, pastoralist, and neighbouring tenement holders. All rubbish likely to attract animals should be suitably contained and disposed of so as not to encourage the feeding of fauna during the road construction.

Based on feral cat tracks and scats recorded in the study area it is highly probable that the study area currently supports a small population of feral cats. Reducing the impacts of feral cats will reduce the stress on fauna and fauna assemblages in the area. Wild dogs and donkeys are also common in the area and will impacting on the local and regional vertebrate fauna assemblage.

The following management recommendations will reduce potential impacts to fauna and fauna habitat:

- areas for clearing are minimised to reduce the loss of habitat and individual fauna;
- weed control measures are implemented during and post construction activities;
- control and reduction methods are implemented for feral and pest fauna in collaboration with surrounding mining companies and land managers; and
- pets are not allowed on site.

10. REFERENCES

AG staff. 2017. Night parrot feather discovered in South Australia gives hope to ecologists. Australian Geographic **September**.

AG staff. 2018. Critically endangered night parrot fledging photographed on Queensland reserve. Australian Geographic **February**.

Bamford, M. J. 1995. Predation by feral cats upon lizards. The Western Australian Naturalist **20**:191-196.

Barrick Plutonic Gold Mine. 2006. Management Plan for the Protection of the Mulgara. Perth.

Bell, D. T., R. C. Bell, and W. A. Loneragan. 2007. Winter bird assemblages across an arid gradient in south-west Western Australia. Winter bird assemblages across an arid gradient in south-west Western Australia **90**:219-227.

Benshemesh, J. 2007. National Recovery Plan for Malleefowl. South Australia.

Benshemesh, J. S., and W. B. Emison. 1996. Surveying breeding densities of Malleefowl using an airborne thermal scanner. Wildlife Research **23**:121-141.

Boles, W. E., N. W. Longmore, and M. C. Thompson. 2016. A Recent Specimen of the Night Parrot *Geopsittacus occidentalis*. Emu **94**:37-40.

Booth, D. T. 1987. Home range and hatchling success of Malleefowl, *Leipoa ocellata* Gould (Megapodiidae), in Murray Mallee near Renmark, S.A. Australian Wildlife Research **14**:95-104.

Brickhill, J. 1985. An aerial survey of nests of Malleefowl *Leipoa ocellata* Gould (Megapodiidae) in central New South Wales. Australian Wildlife Research **12**:257-261.

Charalambous, S. 2016. First night parrot fledgling spotted in 100 years spotted in western Queensland. Australian Geographic **November**.

Chen, X., C. R. Dickman, and M. B. Thompson. 1998. Diet of the mulgara, *Dasycercus cristicauda* (Marsupialia: Dasyuridae), in the Simpson Desert, central Australia. Wildlife Research **25**:233-242.

Churchill, S. 2008. Australian Bats. Jacana Books, Crows Nest, NSW.

Contos, P., and M. Letnic. 2019. Diet of the crest-tailed mulgara (*Dasycercus cristicauda*) in the Strzelecki Desert. Australian Mammalogy.

Cowan, M. 2001. Murchison 1 (MUR1 - East Murchison subregion). Pages 466-479 *in* N. L. McKenzie, J. E. May, and S. McKenna, editors. A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002. Department of Conservation and Land Management, Perth.

Cowan, M. A., and R. A. How. 2004. Comparisons of ground vertebrate assemblages in arid Western Australia in different seasons and decades. Records of the Western Australian Museum **22**:91-100.

Cupitt, R., and S. Cupitt. 2008. Another recent specimen of the Night Parrot *Pezoporus occidentalis* from Western Queensland. Australian Field Ornithology **25**:69-75.

Davis, R. A., and B. M. Metcalf. 2008. The Night Parrot (*Pezoporus occidentalis*) in northern Western Australia: a recent sighting from the Pilbara region. Emu **108**:233-236.

Dell, J., R. A. How, A. V. Milewski, and G. J. Keighery. 1988. The biological survey of the eastern goldfields of Western Australia Part 5: Edjudina - Menzies Study Area. Records of the Western Australian Museum **Supplement No. 31**:38-69.

Department of Parks and Wildlife. 2017. Interim guideline for preliminary surveys of night parrot (*Pezoporus occidentalis*) in Western Australia. Perth.

Dickman, C. R., A. S. Haythornthwaite, G. H. McNaught, P. S. Mahon, B. Tamayo, and M. Letnic. 2001. Population dynamics of three species of dasyurid marsupials in arid central Australia: a 10 year study. Wildlife Research **28**:493-506.

Environmental Protection Authority. 2020. Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment. Western Australia.

Frith, H. J. 1962. The Mallee Fowl. Angus and Robertson, Sydney.

Garnett, S. T., J. K. Szabo, and G. Dutson. 2011. The Action Plan for Australian Birds 2010. CSIRO, Collingwood, Melbourne.

Gibson, D., and J. Cole. 1992. The Mulgara Mirage: A vanishing species, or just unknown? Wildlife Australia.

Hamilton, N., A. Burbidge, T. Douglas, and L. Gilbert. 2017a. Piecing the puzzle together: the fate of the Night Parrot nest found in Western Australia by Jackett et al. (2017). Australian Field Ornithology **34**:151-154.

Hamilton, N. A., M. Onus, B. Withnell, and K. Withnell. 2017b. Recent sightings of the Night Parrot *Pezoporus occidentalis* from Matuwa (Lorna Glen) and Milrose Station in Western Australia. Australian Field Ornithology **34**:71-75.

Jackett, N., B. Greatwich, G. Swann, and A. Boyle. 2017. A nesting record and vocalisations of the Night Parrot Pezoporus occidentalis from the East Murchison, Western Australia. Australian Field Ornithology **34**:144-150.

Johnstone, R. E., and G. M. Storr. 1998. Handbook of Western Australian Birds. Volume I - Non-Passerines (Emu to Dollarbird). Western Australian Museum, Perth.

Johnstone, R. E., and G. M. Storr. 2004. Handbook of Western Australian Birds. Volume II - Passerines (Blue-winged Pitta to Goldfinch). Western Australian Museum, Perth.

Jones, A. 2017. Night parrot sighting in Western Australia shocks birdwatching world. ABC News.

Keith Lindbeck and Associates. 2012. Central Yilgarn Iron Project (CYIP) Mt Mason Fauna Assessment. Perth.

Keith Lindbeck and Associates. 2013. Mt Mason Project and Proposed Haul Road Targeted EPBC Fauna Survey. Perth.

Kinnear, J. 1993. Masterly marauders: The cat and the fox. Landscope **8**:20-28.

Körtner, G., C. R. Pavey, and F. Geiser. 2007. Spatial ecology of the mulgara in arid Australia: impact of fire history on home range size and burrow use. Journal of Zoology **273**:350-357.

Letnic, M., and C. R. Dickman. 2005. The responses of small mammals to patches regenerating after fire and rainfall in the Simpson Desert, central Australia. Austral Ecology **30**:24-39.

Manson, J. 1994. The implications of home range variation between sexes and seasons in an arid dwelling dasyurid, the Mulgara *(Dasycercus cristicauda*). University of Western Australia, Perth.

Masters, P. 1998. The Mulgara *Dasycercus cristicauda* (Marsupialia: Dasyuridae) at Uluru National Park, Northern Territory. Australian Mammalogy **20**:403-407.

Masters, P. 2003. Movement patterns and spatial organisation of the mulgara, *Dasycercus cristicauda* (Marsupialia: Dasyuridae), in central Australia. Wildlife Research **30**:339-344.

Masters, P. 2008. Crest-tailed Mulgara. Pages 49-50 *in* S. Van Dyck and R. Strahan, editors. The Mammals of Australia. Reed New Holland, Sydney.

Masters, P., C. R. Dickman, and M. Crowther. 2003. Effects of cover reduction on Mulgara *Dasycercus cristicauda* (Marsupialia: Dasyuridae), rodent and invertebrate populations in central Australia: Implications for land management. Austral Ecology **28**:658-665.

McCarthy, M. 2017. Night parrot feather discovery proves Australia's most elusive bird is alive in South Australia. ABC News.

Moriarty, T. K. 1972. Birds of Wanjarri, W.A. (27°25'S, 120°40'E). Emu **72**:1-7.

Murphy, S. 2015. Shining a light: The research unlocking the secrets of the mysterious Night Parrot. Australian Birdlife **4**:30-35.

Murphy, S. A., J. J. Austin, R. K. Murphy, J. Silcock, L. Joseph, S. T. Garnett, N. P. Leseberg, J. E. M. Watson, and A. H. Burbidge. 2017a. Observations on breeding Night Parrots (*Pezoporus occidentalis*) in western Queensland. Emu **117**:107-113.

Murphy, S. A., J. Silcock, R. Murphy, J. Reid, and J. J. Austin. 2017b. Movements and habitat use of the night parrot *Pezoporus occidentalis* in south-western Queensland. Austral Ecology.

Ninox Wildlife Consulting. 2006. A Vertebrate Fauna Assessment of the Tarmoola Area. Perth.

Palaszxzuk, A., and S. Miles. 2017. New night parrot community discovered in central west Queensland.

Parsons, B. C., J. C. Short, and J. D. Roberts. 2008. Contraction in the range of Malleefowl (*Leipoa ocellata*) in Western Australia: a comparative assessment using presence-only and presence-absence datasets. Emu **108**:221-231.

Pavey, C. R., C. E. M. Nano, J. R. Cole, P. J. McDonald, P. Nunn, A. Silcocks, and R. H. Clarke. 2014. The breeding and foraging ecology and abundance of the Princess Parrot (*Polytelis alexandrae*) during a population irruption. Emu:NULL.

Pearson, D. 2003-04. Mulgaras and mining. Landscope **19**:26-31.

Pickrell, J. 2016. The night parrot's secret sanctuary. Australian Geographic **August**.

Priddel, D., and R. Wheeler. 2003. Nesting activity and demography of an isolated population of malleefowl (*Leipoa ocellata*). Wildlife Research **30**:451-464.

Rykers, E. 2017. Night parrot call recordings released online for first time. Australian Geographic **February**.

Schoenjahn, J., C. R. Pavey, and G. H. Walter. 2019. Ecology of the Grey Falcon *Falco hypoleucos* – current and required knowledge. Emu - Austral Ornithology **120**:74-82.

Serena, M., and T. Soderquist. 2008. Western Quoll *Dasyurus geoffroii*. Pages 54-56 *in* S. van Dyck and R. Strahan, editors. The Mammals of Australia. Reed New Holland, Sydney.

Storr, G. M., and R. E. Johnstone. 1983. Part VI Amphibians and Reptiles. Pages 70-74 *in* N. L. McKenzie, editor. Wildlife of the Dampier Peninsula, south-west Kimberley, Western Australia. Western Australian Wildlife Research Centre, Department of Fisheries and Wildlife, Perth.

Storr, G. M., L. A. Smith, and R. E. Johnstone. 1990. Lizards of Western Australia. III: Geckos and Pygopods. Western Australian Museum, Perth.

Storr, G. M., L. A. Smith, and R. E. Johnstone. 1999. Lizards of Western Australia. I: Skinks. Western Australian Museum, Perth.

Storr, G. M., L. A. Smith, and R. E. Johnstone. 2002. Snakes of Western Australia. Western Australian Museum, Perth.

Terrestrial Ecosystems. 2023. Vertebrate fauna reconnaissance survey and risk assessment for the Mt Ida Lithium Project. Perth.

Thompson, G. G., and S. A. Thompson. 2007. Shape and spatial distribution of Mulgara (*Dasycercus cristicauda*) burrows, with comments on their presence in a burnt habitat and a translocation protocol. Journal of the Royal Society of Western Australia **90**:195-202.

Thompson, G. G., and S. A. Thompson. 2008. Abundance and spatial distribution of five small mammals at a local scale. Australian Mammalogy **30**:65-70.

Thompson, S. A., and G. G. Thompson. 2006. Reptiles of the Western Australian Goldfields. Goldfields Environmental Management Group, Kalgoorlie, WA.

Thompson, S. A., and G. G. Thompson. 2010. Terrestrial Vertebrate Fauna Assessments for Ecological Impact Assessment. Terrestrial Ecosystems, Perth.

Threatened Species Scientific Committee. 2015. Conservation Advice *Sminthopsis psammophila* sandhill dunnart. Canberra.

Threatened Species Scientific Committee. 2016. Conservation Advice *Pezoporus occidentalis* Night Parrot. Canberra.

Threatened Species Scientific Committee. 2020. Conservation Advice *Falco hypoleucos* Grey Falcon. Canberra.

Tyler, M. J., L. A. Smith, and R. E. Johnstone. 2000. Frogs of Western Australia. Western Australian Museum, Perth.

Van Dyck, S., and R. Strahan. 2008. The Mammals of Australia. Reed New Holland, Sydney.

Wilson, H. 1937. Notes on the Night Parrot, with references to recent occurrences. Emu **37**:79-87.

Woinarski, J. C. Z., A. A. Burbidge, and P. L. Harrison. 2014. The Action Plan for Australian Mammals 2012. CSRIO Publishing, Melbourne.

Woolley, P. A. 1990. Mulgaras, *Dasycercus cristicauda* (Marsupialia: Dasyuridae); their burrows, and records of attempts to collect live animals between 1966 and 1979. Australian Mammalogy **13**:61-64.

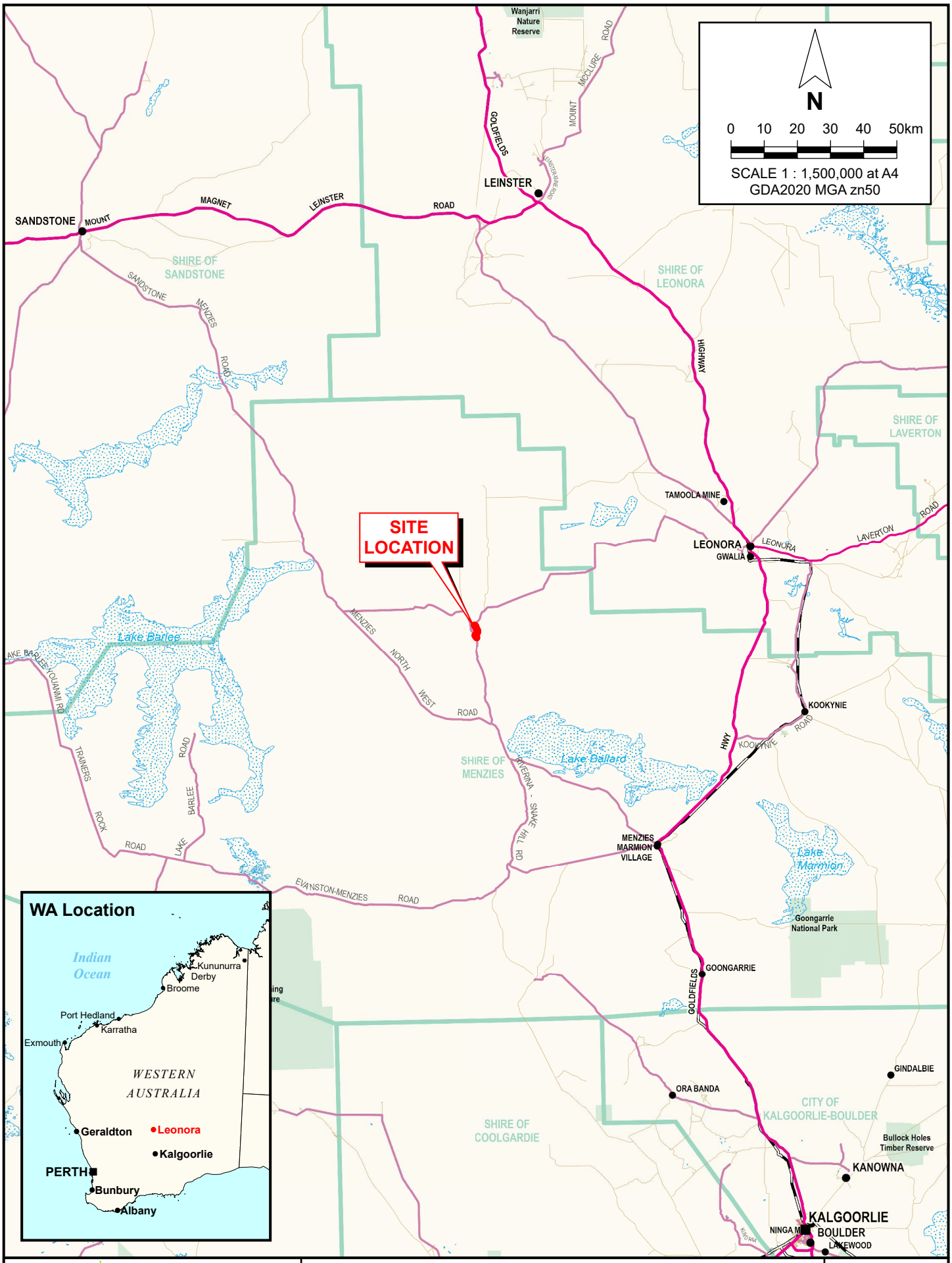
Woolley, P. A. 2005. The species of *Dasycercus* Peters, 1875 (Marsupialia: Dasyuridae). Memoirs of Museum Victoria **62**:213-221.

Woolley, P. A. 2008a. Brush-tailed Mulgara. Pages 47-48 *in* S. Van Dyck and R. Strahan, editors. The Mammals of Australia. Reed New Holland, Sydney.

Woolley, P. A. 2008b. Crest-tailed Mulgara. Pages 49-50 *in* S. Van Dyck and R. Strahan, editors. Mammals of Australia. Reed New Holland, Sydney.

Figures

Vertebrate fauna risk assessment
Mt Ida - Sandstone Road realignment



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TERRESTRIAL ECOSYSTEMS

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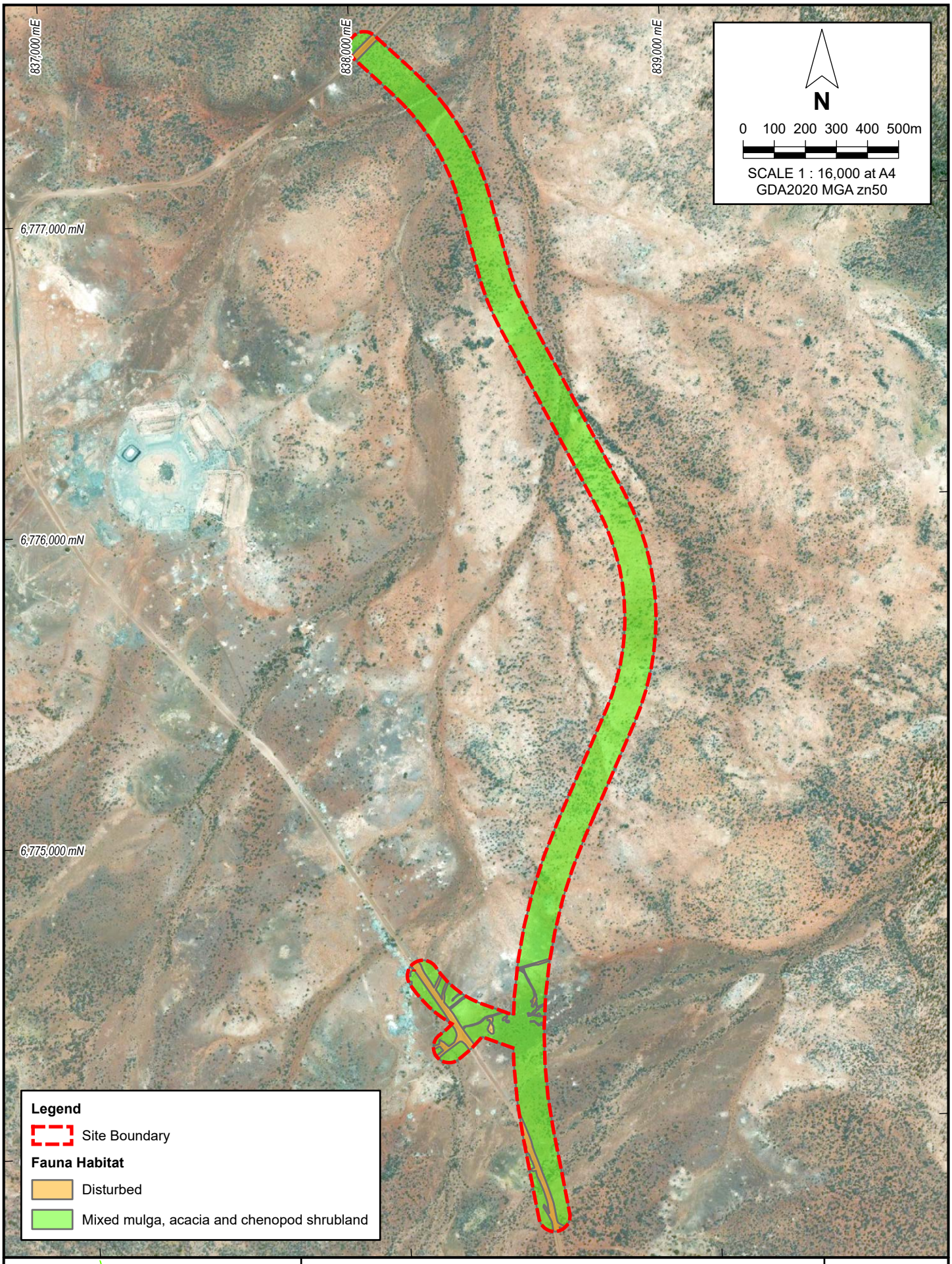
VERTEBRATE FAUNA RISK ASSESSMENT
MT IDA-SANDSTONE ROAD REALIGNMENT PROJECT

REGIONAL LOCATION

Figure 1

Drawn: S. Thompson | Date: 14 May 2023 | Job: 2023-0033



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TERRESTRIAL ECOSYSTEMS

Drawn: S. Thompson | Date: 14 May 2023

Mt Ida Gold Pty Ltd
VERTEBRATE FAUNA RISK ASSESSMENT
MT IDA-SANDSTONE ROAD REALIGNMENT PROJECT

FAUNA HABITAT TYPES

Figure 2

Job: 2023-0033

Appendix A. Results of the EPBC Act Protected Matters Search

Vertebrate fauna risk assessment
Mt Ida - Sandstone Road realignment

Australian Government
Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

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

Report created: 19-Apr-2022

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:	None
Listed Threatened Species:	10
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Lands:	13
Commonwealth Heritage Places:	None
Listed Marine Species:	13
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:	5
Regional Forest Agreements:	None
Nationally Important Wetlands:	3
EPBC Act Referrals:	4
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 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
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat known to occur within area
MAMMAL		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
PLANT		
Eleocharis papillosa Dwarf Desert Spike-rush [2519]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Myriophyllum lapidicola Chiddarcooping Myriophyllum [55940]	Endangered	Species or species habitat known to occur within area
Ricinocarpos brevis [82879]	Endangered	Species or species habitat known to occur within area
Tetratheca paynterae Paynter's Tetratheca [66451]	Endangered	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		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat 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
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

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

Commonwealth Land Name	State
Unknown	
Commonwealth Land - [51796]	WA
Commonwealth Land - [52197]	WA
Commonwealth Land - [51756]	WA
Commonwealth Land - [51754]	WA
Commonwealth Land - [51755]	WA
Commonwealth Land - [51753]	WA
Commonwealth Land - [51751]	WA
Commonwealth Land - [51058]	WA
Commonwealth Land - [52213]	WA
Commonwealth Land - [51752]	WA
Commonwealth Land - [52232]	WA
Commonwealth Land - [51750]	WA
Commonwealth Land - [51984]	WA

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		

Scientific Name	Threatened Category	Presence Text
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within 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
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 known to occur within area overfly marine area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area
Thinornis cucullatus as Thinornis rubricollis Hooded Dotterel, Hooded Plover [87735]		Species or species habitat known to occur within area overfly marine area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State
Bulga Downs & Cashmere Downs Pastoral leases portions	NRS Addition - Gazettal in Progress	WA
Credo	NRS Addition - Gazettal in Progress	WA
Goongarrie	National Park	WA
Mount Manning Range	Nature Reserve	WA
Unnamed WA46847	Nature Reserve	WA

Nationally Important Wetlands [Resource Information]

Wetland Name	State
Lake Ballard	WA
Lake Barlee	WA
Lake Marmion	WA

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
Ularring Hematite Project, WA	2012/6426	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Mt Mason Hematite DSO Project, 110kms northwest of Menzies, WA	2013/6870	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
Mt Richardson Iron Ore Project and Northern Yilgarn Haul Road	2022/9152	Referral Decision	Referral Publication

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
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

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

Please feel free to provide feedback via the Contact Us page.

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Appendix B. Vertebrate Fauna Recorded in Biological Surveys in the Region

Vertebrate fauna risk assessment
Mt Ida - Sandstone Road realignment

B.1 VERTEBRATE FAUNA ASSESSMENTS

		Surveys	A	B									C									D		E								F	G
Family	Species	Common names		GG26	GG27	GG29	GG28	GS28	GS29	GS26	GS27	GS30	GG30	Site 13	Site 3	Site 9	Site 9a	Site 12	Site 21	Site 22	Site 21a	Goongarrie NP	Site 12a	Mine (Tarmoola	Pipeline	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 9	Site 8	Unknown	Goongarrie
Amphibians																																	
Limnodynastidae	*Neobatrachus kunapalari*	Wheatbelt Frog	X																														
	Neobatrachus sudelli	Sudell's Frog	X																														
	Neobatrachus sutor	Shoemaker Frog	X										3	1	5	10																	
	Neobatrachus wilsmorei	Plonking Frog	X		3	2							1		11		2	2															
	Platyplectrum spenceri	Spencer's Burrowing Frog	X																														
Myobatrachidae	*Pseudophryne occidentalis*	Western Toadlet	X																														
Pelodryadidae	*Cyclorana maini*	Main's Frog	X																														
	Cyclorana occidentalis	Western Water-holding Frog	X																														
	Litoria moorei	Motorbike Frog	X																														
Reptiles																																	
Agamidae	*Ctenophorus cristatus*	Crested Dragon					5	1	1										5														
	Ctenophorus fordi	Mallee Dragon	X	22	42	2	15	2	2	6	9			43	26			2	16															
	Ctenophorus infans	Ring-tailed Dragon	X																														
	Ctenophorus ornatus	Ornate Crevice Dragon	X																														
	Ctenophorus pictus	Painted Dragon	X																														
	Ctenophorus reticulatus	Western Netted Dragon	X									1	2			2	1				4			X										
	Ctenophorus salinarum	Saltpan Dragon	X																														
	Ctenophorus scutulatus	Lozenge-marked Dragon	X		3	7	3		8			3	1													1	3	5	3	1				
	Ctenophorus vadnappa	Red-barred Dragon	X											3		2	1		7	3	2													
	Diporiphora amphiboluroides	Mulga Dragon																										2						
	Moloch horridus	Thorny Devil	X		1				1	1	2		1	1			1	2																
	Pogona minor	Western Bearded Dragon	X	1	1	1	1		3	1	1		3	1	1	2		4	2	1	1						1		1					
Carphodactylidae	*Nephrurus laevissimus*	Smooth Knob-tail	X	18	18		2	1	1	12	9			18	18			1		2														
	Nephrurus vertebralis	Midline Knob-tail	X																														
	Underwoodisaurus milii	Barking Gecko	X									9																						
Diplodactylidae	*Diplodactylus granariensis*	Wheatbelt Stone Gecko	X			2	1	5	8	4	8	4						1	2	1	1													
	Diplodactylus pulcher	Beautiful Gecko	X						1			2	1														1			1				
	Lucasium maini	Main's Ground Gecko	X			1	2	2										3	1	2														
	Rhynchoedura ornata	Beaked Gecko	X		2	1	2	2	3	1				2		1		7	1	2														
	Strophurus assimilis	Goldfields Spiny-tailed Gecko	X							3																1								
	Strophurus elderi	Jewelled Gecko	X																														
	Strophurus intermedius	Southern Spiny-tailed Gecko	X															2																

		Surveys	A	B										C											D		E									F	G
Family	Species	Common names		GG26	GG27	GG29	GG28	GS28	GS29	GS26	GS27	GS30	GG30	Site 13	Site 3	Site 9	Site 9a	Site 12	Site 21	Site 22	Site 21a	Goongarrie NP	Site 12a	Mine (Tarmoola	Pipeline	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 9	Site 8	Unknown	Goongarrie
	Strophurus wellingtonae	Western Shield Spiny-tailed Gecko	X																																	
Elapidae	*Brachyurophis fasciolatus*	Narrow-banded Burrowing Snake	X								1																									
	Brachyurophis semifasciata	Half-girdled Snake								1		1																									
	Demansia psammophis	Yellow-faced Whipsnake	X				2																													
	Furina ornata	Orange-naped Snake	X																																	
	Neelaps bimaculatus	Black-naped Burrowing Snake	X																																	
	Suta monachus	Hooded Snake	X				1													1																
	Pseudechis australis	Mulga Snake	X																																	
	Pseudonaja mengdeni	Western Brown Snake	X															1																		
	Pseudonaja modesta	Ringed Brown Snake	X		1		3							1						3																
	Simoselaps bertholdi	Jan's Banded Snake	X						1																											
Gekkonidae	*Gehyra punctata*	Spotted Dtella	X																																	
	Gehyra purpurascens	Purplish Dtella	X				2													2																
	Gehyra variegata	Variegated Gehyra	X	1	1		3	4	6		2	3	1	1	1			2		4	2			X						1						
	Heteronotia binoei	Bynoe's Gecko	X										2								2											1				
Pygopodidae	*Delma australis*	Marble-faced Delma	X																																	
	Delma butleri	Unbanded Delma	X	1			1																													
	Delma nasuta	Sharp-snouted Delma	X												1					1																
	Lialis burtonis	Burton's Legless Lizard																1																		
	Pygopus nigriceps	Western Hooded Scaly-foot	X			1												1	1																	
Pythonidae	*Antaresia stimsoni*	Stimson's Python	X																																	
Scincidae	*Cryptoblepharus australis*	Inland Snake-eyed Skink	X																																	
	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink	X			1	3				1		3						1	3	1															
	Ctenotus atlas	Southern Mallee Ctenotus	X	4	3	1	4	3	2	2	3			3	4					1																
	Ctenotus brooksi	Wedgsnout Ctenotus	X	17						3					24																					
	Ctenotus leae	Orange-tailed Finesnout Ctenotus	X																																	
	Ctenotus leonhardii	Leonhardi's Ctenotus	X													5	9									1	8	2	1							
	Ctenotus schomburgkii	Barred Wedgesnout Ctenotus	X	4	9	3	5	5	1		1			9	4	1			3	5							1	1							
	Ctenotus severus	Stern Ctenotus	X																																	
	Ctenotus uber	Spotted Ctenotus	X			1						1	6						1		1														
	Ctenotus xenopleura	Wide-striped Ctenotus	X																																	
	Cyclodomorphus branchialis	Common Slender Bluetongue	X															1		2																
	Cyclodomorphus melanops	Spinifex Slender Blue-tongue				10	2		2			2																								
	Egernia depressa	Southern Pygmy Spiny-tailed Skink	X																2	1										3						
	Egernia formosa	Goldfields Crevice Skink	X										5																							
	Lerista desertorum	Central Desert Robust Slider	X																																	
	Lerista kingi	King's Slider	X																																	

		Surveys	A	B										C											D		E									F	G
Family	Species	Common names		GG26	GG27	GG29	GG28	GS28	GS29	GS26	GS27	GS30	GG30	Site 13	Site 3	Site 9	Site 9a	Site 12	Site 21	Site 22	Site 21a	Goongarrie NP	Site 12a	Mine (Tarmoola	Pipeline	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 9	Site 8	Unknown	Goongarrie
	Lerista lineopunctulata	Dotted-line Robust Slider	X																																
	Lerista macropisthopus	Unpatterned Robust Slider	X				1			2										1																
	Lerista picturata	Southern Robust Slider	X																																
	Liopholis inornata	Desert Skink	X	3	2	1		2		2	4			1	3			1	1		1															
	Liopholis striata	Nocturnal Desert Skink	X																																
	Menetia greyii	Common Dwarf Skink	X	1	2	1	1	1	1		1		1	2	1	1			1	2							1			3					
	Morethia butleri	Woodland Morethia Skink	X										2								2														
	Tiliqua occipitalis	Western Blue-tongued Lizard	X		1						1			1				1																	
Typhlopidae	*Anilios australis*	Austral Blind Snake	X						2	1																									
	Anilios bituberculatus	Prong-snouted Blind Snake						1																											
	Anilios hamatus	Pale-headed Blind Snake							1																										
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor														1										3	2								
	Varanus giganteus	Perentie	X																																
	Varanus gouldii	Gould's Goanna	X			2		1								1	1		2		2			X											
	Varanus panoptes	Yellow-spotted Monitor	X																							1		2	1	2					
	Varanus tristis	Black-headed Monitor										1									3														
Birds																																			
Casuariidae	*Dromaius novaehollandiae*	Emu	X											8	2	1				3	1	1		X											
Anatidae	*Chenonetta jubata*	Australian Wood Duck																						X											
Megapodiidae	*Leipoa ocellata*	Malleefowl																																2	
Columbidae	*Phaps chalcoptera*	Common Bronzewing																		2	1	1	1												
	Ocyphaps lophotes	Crested Pigeon													2	6						1		X	X										
	Geopelia cuneata	Diamond Dove														1																			
Cuculidae	*Chrysococcyx basalis*	Horsfield's Bronze-Cuckoo												6		1				2	2	1				1	2	2	1						
Cuculidae	*Chrysococcyx osculans*	Black-eared Cuckoo												3	4					6		1			X	1				1					
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar																		3		1						1							
Podargidae	*Podargus strigoides*	Tawny Frogmouth																		1		1													
Turnicidae	*Turnix velox*	Little Buttonquail												13	3							1													
Ardeidae	*Egretta novaehollandiae*	White-faced Heron																				1		X											
Accipitridae	*Hieraaetus morphnoides*	Little Eagle													1					2		1													
	Aquila audax	Wedge-tailed Eagle																				1		X											
	Circus assimilis	Spotted Harrier																	1			1													
	Accipiter fasciatus	Brown Goshawk																				1													
	Accipiter cirrocephalus	Collared Sparrowhawk																				1													
	Haliastur sphenurus	Whistling Kite																						X											
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo																	4			1			X		1	2	2	1					

		Surveys	A	B										C										D		E								F	G
Family	Species	Common names		GG26	GG27	GG29	GG28	GS28	GS29	GS26	GS27	GS30	GG30	Site 13	Site 3	Site 9	Site 9a	Site 12	Site 21	Site 22	Site 21a	Goongarrie NP	Site 12a	Mine (Tarmoola	Pipeline	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 9	Site 8	Unknown	Goongarrie
Strigidae	*Ninox boobook*	Southern Boobook																			1													
Alcedinidae	*Dacelo novaeguineae*	Laughing Kookaburra																																1
Alcedinidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher																			1													
Meropidae	*Merops ornatus*	Rainbow Bee-eater												3	1					5		1												7	
Falconidae	*Falco cenchroides*	Nankeen Kestrel																			1		X											
	Falco longipennis	Australian Hobby																		1		1		X											
	Falco berigora	Brown Falcon													2					2		1		X	X										
Cacatuidae	*Eolophus roseicapilla*	Galah																		4	62	1		X	X		2			2					
	Nymphicus hollandicus	Cockatiel																		11	4	1		X		13	3		21	3					
Psittaculidae	*Neopsephotus bourkii*	Bourke's Parrot																				1							5						
	Barnardius zonarius	Australian Ringneck														10			3			1		X	X	8	5	8	5	5					1
	Psephotus varius	Mulga Parrot												4	4	3			2			1		X											
	Melopsittacus undulatus	Budgerigar												1	6				38	27		1				10		20	15						
Ptilonorhynchidae	*Chlamydera guttata*	Western Bowerbird	X																								1								
	Ptilonorhynchus maculata	Spotted Bowerbird																						X											
Climacteridae	*Climacteris affinis*	White-browed Treecreeper	X																1		1	1			X										
	Climacteris rufus	Rufous Treecreeper	X																																
Maluridae	*Malurus pulcherrimus*	Blue-breasted Fairywren	X											15	9																				
	Malurus splendens	Splendid Fairywren	X											24								1		X	X	15	10	20	14	21					1
	Malurus leucopterus	White-winged Fairywren	X													17						1		X											
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater	X											2								1													
	Purnella albifrons	White-fronted Honeyeater	X											69	125	16			7	144	6	1	4												
	Manorina flavigula	Yellow-throated Miner	X													109			3	74		1		X	X			1	7						1
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater	X											18	23	7			6	52	4	1		X	X	1	1	5	5	6					1
	Anthochaera carunculata	Red Wattlebird	X													1				5								2	5						1
	Gavicalis virescens	Singing Honeyeater	X											2		4				1		1		X	X	1	1	1	2	2					1
	Ptilotula ornata	Yellow-plumed Honeyeater	X																	230		1													
	Ptilotula plumula	Grey-fronted Honeyeater																		12															
	Conopophila whitei	Grey Honeyeater												2		1					17	1													
	Epthianura tricolor	Crimson Chat	X																								2								
	Epthianura aurifrons	Orange Chat	X																																
	Epthianura albifrons	White-fronted Chat	X																			1		X											
	Sugomel nigrum	Black Honeyeater	X											7	4																				
	Lichmera indistincta	Brown Honeyeater	X																			1		X											
	Nesoptilotis leucotis	White-eared Honeyeater	X											4																					1
	Melithreptus brevirostris	Brown-headed Honeyeater	X																	6		1													1
Pardalotidae	*Pardalotus striatus*	Striated Pardalote	X												1					2		1		X											1

		Surveys	A	B										C										D		E								F	G
Family	Species	Common names		GG26	GG27	GG29	GG28	GS28	GS29	GS26	GS27	GS30	GG30	Site 13	Site 3	Site 9	Site 9a	Site 12	Site 21	Site 22	Site 21a	Goongarrie NP	Site 12a	Mine (Tarmoola	Pipeline	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 9	Site 8	Unknown	Goongarrie
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat	X											16	8				2		1	1					1			2					1
	Calamanthus campestris	Rufous Fieldwren																												1					
	Acanthiza iredalei	Slender-billed Thornbill	X																			1													1
	Acanthiza apicalis	Inland Thornbill	X											32	38				1	15	2	1	2		X	19	10	18	11	16					1
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill	X											2		4				1				X	X		2								
	Acanthiza uropygialis	Chestnut-rumped Thornbill	X											23	3	27				46	10	1	2	X	X										1
	Acanthiza robustirostris	Slaty-backed Thornbill	X																							5	5	14	8	12					
	Smicrornis brevirostris	Weebill	X											50	36				2	269	2	1		X		2		10	5						
	Gerygone fusca	Western Gerygone	X																																
	Aphelocephala leucopsis	Southern Whiteface	X																		12	1		X	X										
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler	X											1							3	1			X		3								1
Cinclosomatidae	*Cinclosoma castanotum*	Chestnut Quail-thrush																		3															
	Cinclosoma castaneothorax	Chestnut-breasted Quail-thrush	X																																1
Campephagidae	*Coracina maxima*	Ground Cuckooshrike	X																	6		1													
	Coracina novaehollandiae	Black-faced Cuckooshrike	X												11	3				12		1		X	X			2							1
	Lalage tricolor	White-winged Triller	X											2		2				14	6	1													
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	X											2								1													1
Oreoicidae	*Oreoica gutturalis*	Crested Bellbird	X											11	6	2				15	2	1	1	X	X	6	8	6	5	5					1
Pachycephalidae	*Colluricincla harmonica*	Grey Shrikethrush	X											6	16					17	1	1		X	X	2	2	2	1	3					1
	Pachycephala inornata	Gilbert's Whistler	X																																
	Pachycephala pectoralis	Golden Whistler	X																																
	Pachycephala rufiventris	Rufous Whistler	X												2					32	1	1		X	X	2		1							1
Artamidae	*Artamus personatus*	Masked Woodswallow	X											1	1					18		1													
	Artamus superciliosus	White-browed Woodswallow																				1													
	Artamus cinereus	Black-faced Woodswallow	X																		1	1		X	X										
	Artamus cyanopterus	Dusky Woodswallow	X																																
	Cracticus torquatus	Grey Butcherbird	X											2	2	1				8		1		X	X										1
	Cracticus nigrogularis	Pied Butcherbird	X											3	2	14				5	2	1		X			1	1	2	1					1
	Gymnorhina tibicen	Australian Magpie	X													5				2															
	Strepera versicolor	Grey Currawong	X													4				1	1	1				3	1	5	1	4					1
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	X													1				5		1		X	X										1
	Rhipidura albiscapa	Grey Fantail	X																	13		1				1									1
Monarchidae	*Grallina cyanoleuca*	Magpie-lark	X																					X											
Corvidae	*Corvus orru*	Torresian Crow	X																	2				X	X	3	2	4							
	Corvus bennetti	Little Crow	X													149				7		1				1		1	1						1
	Corvus coronoides	Australian Raven	X																																
Petroicidae	*Microeca fascinans*	Jacky Winter	X																	28		1													

		Surveys	A	B										C										D		E								F	G
Family	Species	Common names		GG26	GG27	GG29	GG28	GS28	GS29	GS26	GS27	GS30	GG30	Site 13	Site 3	Site 9	Site 9a	Site 12	Site 21	Site 22	Site 21a	Goongarrie NP	Site 12a	Mine (Tarmoola	Pipeline	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 9	Site 8	Unknown	Goongarrie
	Petroica goodenovii	Red-capped Robin	X											8		4				20	4	1		X	X		4	4	5	3					1
	Melanodryas cucullata	Hooded Robin	X												2					32	1	1													1
	Drymodes brunneopygia	Southern Scrub-Robin	X																																
Locustellidae	*Cincloramphus cruralis*	Brown Songlark	X																			1													
	Cincloramphus mathewsi	Rufous Songlark	X																		2	1													
Hirundinidae	*Hirundo neoxena*	Welcome Swallow	X											2	1							1		X											
	Petrochelidon ariel	Fairy Martin	X												5							1													
	Petrochelidon nigricans	Tree Martin	X												7									X											
	Cheramoeca leucosterna	White-backed Swallow	X																			1		X											
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird	X											3	1	4			1	5		1													1
Estrildidae	*Taeniopygia guttata*	Zebra Finch	X												4					2		1		X	X										
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit	X													2				4		1		X											
Mammals																																			
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna	X																					X											
Bovidae	*Bos taurus*	Cow																						X											
	Capra hircus	Goat																						X											
	Ovis aries	Sheep														1	1		1					X											
Camelidae	*Camelus dromedarius*	Dromedary																		1															
Suidae	*Sus scrofa*	Pig	X																																
Canidae	*Canis lupus*	Dingo	X											1						1				X											
	Vulpes vulpes	Red Fox												1	1						1														
Felidae	*Felis catus*	Cat													1																				
Molossidae	*Austronomus australis*	White-striped Freetail Bat	X																	1						1	1	1	1	1					
	Mormopterus planiceps	Southern Free-tail Bat	X																																
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	X																							1	1	1	1	1					
	Nyctophilus geoffroyi	Lesser Long-eared Bat	X																																
	Nyctophilus major	Greater Long-eared Bat	X																																
	Scotorepens balstoni	Inland Broad-nosed Bat	X																							1	1	1	1						
	Vespadelus baverstocki	Inland Forest Bat	X																																
	Vespadelus finlaysoni	Finlayson's Cave Bat																								1	1	1	1	1					
Dasyuridae	*Antechinomys laniger*	Kultarr	X																																
	Ningaui ridei	Wongai Ningaui	X	1				4	3	5				1	3																				
	Ningaui yvonneae	Mallee Ningaui	X																																
	Pseudantechinus woolleyae	Woolley's False Antechinus																													1				
	Sminthopsis crassicaudata	Fat-tailed Dunnart	X	1					1						1		1																		
	Sminthopsis dolichura	Little Long-tailed Dunnart	X	1	1	1	1		1	2	2	12		3					1	1						1	2	3	4	3					

		Surveys	A	B										C											D		E									F	G
Family	Species	Common names		GG26	GG27	GG29	GG28	GS28	GS29	GS26	GS27	GS30	GG30	Site 13	Site 3	Site 9	Site 9a	Site 12	Site 21	Site 22	Site 21a	Goongarrie NP	Site 12a	Mine (Tarmoola	Pipeline	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 9	Site 8	Unknown	Goongarrie
	Sminthopsis hirtipes	Hairy-footed Dunnart	X																																	
	Sminthopsis longicaudata	Long-tailed Dunnart																										2								
	Sminthopsis ooldea	Ooldea Dunnart	X																																	
Macropodidae	*Osphranter robustus*	Euro	X																1					X												
	Osphranter rufus	Red Kangaroo	X																					X												
Leporidae	*Oryctolagus cuniculus*	Rabbit													1									X												
Muridae	*Mus musculus*	House Mouse	X					1		2	4			4	2											4	2	2	23	10		1	2		
	Notomys alexis	Spinifex Hopping Mouse	X	9	3	1	1		2					2	9				2	1						5										
	Notomys mitchellii	Mitchell's Hopping Mouse	X	1											3				1																	
	Pseudomys albocinereus	Ash-grey Mouse	X																																	
	Pseudomys bolami	Bolam's Mouse	X																		3															
	Pseudomys hermannsburgensis	Sandy Inland Mouse	X		2				4	1				2	1											3		1	2	1						

A Atlas of Living Australia

B Cowan, M.A. and How, R.A. (2004) Comparisons of ground vertebrate assemblages in arid Western Australia in different seasons and decades. *Records of the Western Australian Museum*, 22, 91-100.

C Dell, J and How, R.A. (1988) Vertebrate fauna. In: The biological Survey of the Eastern Goldfields of Western Australia, Part 5, Edjudina - Menzies Study Area. *Records of the Western Australian Museum*, Supplement No 31, pp. 38-77.

D Ninox Wildlife Consulting (2006) *A vertebrate fauna assessment of the Tarmoola area*. Unpublished report for St Barbara Limited, Perth.

E Keith Lindbeck and Associates (2012) *Central Yilgarn Iron Project (CYIP) Fauna Assessment Mt Mason*, Unpublished report for Jupiter Mines Ltd, Perth.

F Keith Lindbeck And Associates (2013) *Mt Mason Project and Proposed Haul Rd Targeted EPBC Fauna Survey*, unpublished report for Jupiter Mines Ltd, Perth.

G Bell, D.T., Bell, R.C. and Loneragan, W.A. (2007) Winter bird assemblages across an arid gradient in south-west Western Australia. *Journal of the Royal Society of Western Australia* 90, 219-227.

Appendix C.

Definitions of Significant Fauna under the WA *Biodiversity Conservation Act 2016* and Priority Species

Vertebrate fauna risk assessment
Mt Ida - Sandstone Road realignment

ATTACHMENT C
DEFINITIONS OF SIGNIFICANT FAUNA UNDER THE WA BIODIVERSITY CONSERVATION ACT 2016

Threatened, Extinct and Specially Protected fauna or flora[1] are species[2] which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such. The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016*. Categories of Threatened, Extinct and Specially Protected fauna and flora are:

T Threatened Species

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR Critically endangered species

Threatened species considered to be "*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.

[1] The definition of flora includes algae, fungi and lichens

[2] Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

EN Endangered species

Threatened species considered to be "*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.

VU Vulnerable species

Threatened species considered to be "*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

Extinct Species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

EW Extinct in the wild species

Species that "*is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the pwild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially Protected Species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI Migratory birds protected under an international agreement

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

CD Species of special conservation interest (conservation dependant fauna)

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

OS Other specially protected species

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

P Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations

P1 Priority 1: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

P2 Priority 2: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

P3 Priority 3: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

P4 Priority 4: Rare, Near Threatened and other species in need of monitoring

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.


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