Basic Vertebrate Fauna Assessment

Expansion of the Renewable Energy Zone

Prepared for: Granny Smith Mining Company

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EXECUTIVE SUMMARY

Granny Smith Mining is proposing to increase the area of its renewable energy zone. Two areas (i.e. 150ha and 240ha) within the project area were previously assessed (Terrestrial Ecosystems 2018b, 2022). This assessment consolidated the fauna habitats for these two areas and the larger area was assessed in November 2023 for a total area of 941ha. This combined renewable energy zone will be used for solar and wind power generation.

Based on a field assessment and vegetation mapping undertaken by Native Vegetation Solutions, the following six broad fauna habitats are present in the project area:

- Banded ironstone formation (BIF);
- Open Mulga;
- Mulga over ironstone gravel;
- Mulga over chenopod;
- Chenopod;
- Tecticornia; and
- Disturbed areas.

The density of trees and shrubs in the relatively undisturbed areas varied across the project area but the vegetation was mostly sparse. The fauna habitat varied from highly degraded to good with the more degraded areas being due to a haul road that runs east-west through the project area, the solar farm that is now present in an earlier assessed area, gravel tracks, historical exploration activity and cattle grazing.

The Southern Whiteface (listed as Vulnerable under the *EPBC Act*) has been recorded in Granny Smith mining tenements and in other fauna surveys in the adjacent area, so it is likely to be present in low numbers in the project area. This small bush bird is relatively abundant in this part of the Goldfields and will readily move if disturbed, so vegetation clearing, and the further development of the solar farm is unlikely to significantly impact on this species. Banded ironstone formations (BIFs) which are the preferred habitat of the Long-tailed Dunnart, a Priority 4 species with DBCA, is likely to be present in the project area. The BIFs represents only a small percentage of the project area, and clearing it is unlikely to have a significant impact on Long-tailed Dunnarts, when viewed in a bioregional context. Clearing native vegetation in other habitat types is likely to result in the loss of small vertebrate fauna on-site that are unable to move away during the clearing process. The few larger animals, such as kangaroos and large goannas and snakes, and most of the birds will move into adjacent areas once clearing commences.

Impacts associated with clearing vegetation in the project area in a landscape or bioregional context on the vertebrate fauna are likely to be low as there are vast tracts of similar habitat in adjacent areas.

Operational wind turbines present a risk to a range of birds and bats. The main risk is mortality through collision with moving turbine blades (blade-strike), although alienation (behavioural avoidance of suitable habitat near infrastructure) is also an important issue. A thorough assessment of the potential impacts on the birds and bats can only be undertaken when the number of turbines, and location, size and speed of the turbines are known.

The proposed vegetation clearing is unlikely to significantly impact on a conservation significant species, so a referral under the *EPBC Act* is not recommended. However, the potential impacts of wind turbines are unknown at this stage.

It is recommended that:

- an induction program that includes a component on managing vertebrate fauna is mandatory for staff working on site;

- a feral predator (i.e. feral cat and wild dog) reduction program is implemented in the winter months of each year;
- a Vertebrate Fauna Management is prepared and implemented for the operations;
- the impact of dust on adjacent vegetation and fauna habitat is managed and monitored against appropriate KPIs; and
- if practical, avoid impacting on the BIF habitat and mine adits.

1. INTRODUCTION

1.1 BACKGROUND

Gold Fields is an Australian mineral exploration and gold producing company with major tenements in the eastern Goldfields of Western Australia. The Granny Smith Mining Company, a subsidiary of Gold Fields, requested a Basic vertebrate fauna risk assessment of an area around two areas that had previously been assessed to support the preparation of documentation seeking environmental approvals for the expansion of its renewable energy zone (i.e. project area) in the eastern Goldfields (Figure 1). Terrestrial Ecosystems undertook the vertebrate fauna assessment, including a site reconnaissance survey for the original area (i.e. ~ 150ha; Terrestrial Ecosystems 2018b) and subsequently undertook a desktop assessment of a larger surrounding area (i.e. 240ha). With the inclusion of these two earlier assessed areas, the size of the total project area was ~941ha.

1.2 PROJECT OBJECTIVES AND SCOPE OF WORKS

Terrestrial Ecosystems was commissioned to undertake a Basic vertebrate fauna risk assessment for the expansion of renewable energy zone. The purpose of this Basic fauna risk assessment was to provide information to the Department of Mines, Industry Regulation and Safety (DMIRS) regarding 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's (2020) *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment*.

Data from an earlier field assessment on 22 October 2018 for the central part of the project area (~150ha; Terrestrial Ecosystems 2018b) and a desktop assessment (Terrestrial Ecosystems 2022) were incorporated into this assessment. The fauna habitat assessment was undertaken for the project area assessed in 2023. A consolidated fauna habitat map has been provided for the entire project area and it is based on the field work and the vegetation mapping undertaken by Native Vegetation Solutions.

A typical 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 including 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:

- reviewed Terrestrial Ecosystems' database (includes Atlas of Living Australia) to identify potential vertebrate fauna within the area;
- searched the DBCA's Threatened and Priority Species database;

- searched the Commonwealth Governments database of fauna of national environmental significance to identify species potentially occurring within the area that are protected under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* or international migratory bird agreements (JAMBA/CAMBA);
- used information provided by Native Vegetation Solutions who undertook the botanical assessment of the project area to map fauna habitats and their condition;
- reviewed previous fauna surveys conducted near the project area;
- undertook an assessment of the potential risks to the fauna associated with clearing additional areas of native vegetation;
- discussed the likelihood of *EPBC Act 1999* and *Biodiversity Conservation Act (BC Act) 2016* listed species 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 (2003) described the subregion as mostly dominated by mulga woodlands that are often rich in ephemerals; hummock grasslands, salt bush shrub lands and haloscarcia shrub lands. In this now very dated report recorded no threatened ecological communities in the vicinity of the project areas. Threatening processes for conservation significant fauna were listed by Cowan (2003) as fox and cat predation.

2.2 LAND USE HISTORY

The dominant land uses for the bioregion are native pasture to support grazing and crown land reserves, and to a lesser extent mining. The area surrounding the Granny Smith project area has been extensively explored for minerals and there are many operational and non-operational mining projects in the region.

The project area is on Mt Weld Station which continues to graze cattle near the project area, and it is near the northern boundary of Lake Carey. An active haul road runs through the project area from east to west (Figure 2).

2.3 CLIMATE

The project area is characterised as semi-arid. Laverton, 30km to the north, has an annual rainfall of approximately 235mm, although this varies considerably from year-to-year. The highest mean maximum and minimum temperatures in Laverton are in January with an average of 35.8°C and 20.5°C, respectively (Bureau of Meteorology, 2024). The lowest mean daily maximum and minimum temperatures occur in July (Chart 1). Average monthly rainfall is heaviest in January - March.

Summer rain is unpredictable and often results from thunderstorms coming from the north and the west or decaying cyclonic activity as low-pressure cells move from the Pilbara through the Goldfields.

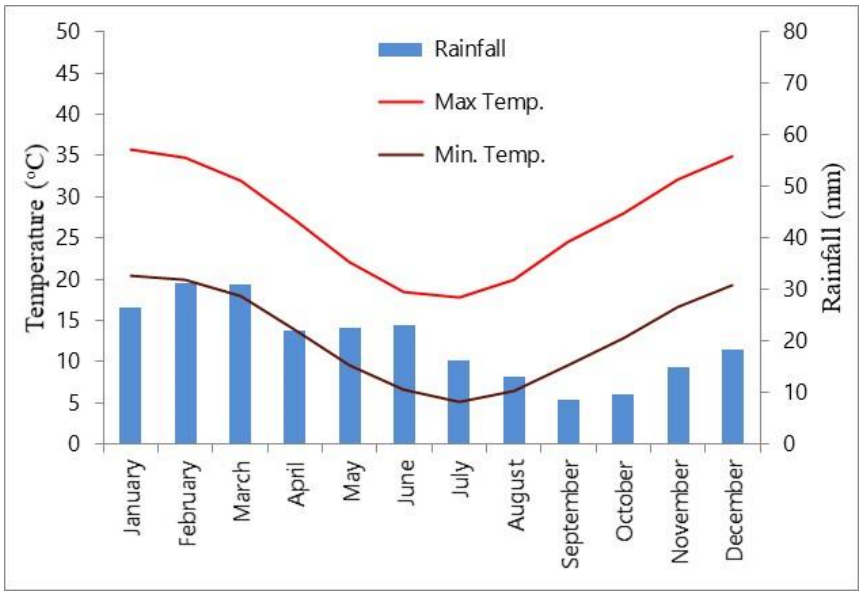


Chart 1. Climatic averages for Laverton

2.4 REGIONAL BIOLOGICAL FAUNA CONTEXT OF PROJECT AREA

Numerous fauna surveys and assessments have been undertaken near the project area and in similar habitats in the region. These include:

- Bamford Consulting Ecologists (2007) *Fauna Assessment and Targeted Mulgara Search of the Fish Deposit*, Laverton Gold Project, Perth.
- 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.
- Biota Environmental Sciences (2004) *Cosmos Nickel Mine Extension Fauna Survey*. Unpublished report for Sir Samuel Mines NL and URS, Perth.
- Biota Environmental Sciences (2007) *Bannockburn Fauna Habitat and Assemblage Survey*. Unpublished report for Jubilee Mines NL, Perth.
- Coffey Environments (2007) *Level 1 Fauna Assessment, Leinster Nickel Operations*, Unpublished report for BHP Billiton, Nickel Operations, Perth.
- Coffey Environments (2008b) *Level 2 Fauna Assessment for Moolart Well, Dogbolter and Erlistoun*. Unpublished report for Regis Resources, Ltd, Perth.
- Craig, M. D. and Chapman, A. (2003) Effects of short-term drought on the avifauna of Wanjarri Nature Reserve: What do they tell us about drought refugia. *Journal of the Royal Society of Western Australia* 86: 133-137.
- 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, 38-77.
- Dell, J., How, R. A. and Milewski, A. V. (1992) The biological survey of the Eastern Goldfields, Part 6, Youanmi-Leonora Study Area. *Records of the Western Australian Museum*, Supplement No 40, 131.
- Donarto Environmental Services (2005) *Leinster Nickel Operations Tailing Storage Facility and Water Storage Areas*: Wildlife Interactions and Assessment of Risks, Perth.
- Dunlop, J. N. (1990) The small vertebrate ground fauna of Mulga habitats near Wiluna, Western Australia. *Mulga Research Centre Journal*, 10, 19-27.
- ENV Australia (2008) *Agnew Prospects Fauna Assessment*. Unpublished report for Agnew Gold Mining Company Pty Limited, Perth.
- Halpern Glick Maunsell, (1999) *Rosemont Gold Project Biological Assessment Survey - Phases 1 & 2*. Unpublished report for Johnson's Well Mining NL, Perth.
- Hall, N.J, McKenzie, N.L. and Keighery, B.J. (1994) The Biological Survey of the Eastern Goldfields of Western Australia Part 10. Sandstone-Sir Samuel and Laverton-Leonora Study Areas. *Records of the Western Australian Museum*. Supplement No. 47.
- Harewood, G (2011) *Terrestrial Fauna Survey (Level 1) of the West Laverton Area (P38/3717, P38/3718, P38/3491, P38/3492, P38/3314, P38/3490, P38/3315, M38/0046, M38/0049, M38/0040, M38/0358, M38/0048, M38/0101, M38/0364, M38/0342, M38/0345, L38/0179, L38/0177, L38/0178, L38/0153, L38/0092, E38/1930, E38/2347, E38/2084 & E38/1966).* Unpublished report for Crescent Gold Limited.
- Hart, Simpson and Associates (2000) *Anaconda Nickel Ltd, Cawse Expansion Project, Fauna Survey*. Unpublished report for Anaconda Nickel Ltd, Perth.
- How, R. A. and Dell, J. (1992) Vertebrate fauna. In: The Biological Survey of the Eastern Goldfields of Western Australia Part 7. Duketon - Sir Samuel Study Area. *Records of the Western Australian Museum*; Supplement 40, 90-109.
- McKenzie, N. L., Rolfe, J. K. and Youngson, W. K. (1992) Vertebrate fauna. In: The Biological Survey of the Eastern Goldfields of Western Australia; Part 8; Kurnalpi - Kalgoorlie Study Area. *Records of the Western Australian Museum*, Supplement No 41, 37-65.

- McKenzie, N. L., Rolfe, J. K. and Youngson, W. K. (1994) Vertebrate fauna. In: The Biological Survey of the Eastern Goldfields of Western Australia Part 10, Sandstone-Sir Samuel and Laverton-Leonora Study Areas. *Records of the Western Australian Museum*, Supplement No 47, pp. 51-85.
- MBS Environmental (2004) *Vegetation and Habitat Assessment of the Euro, Sickle and Admiral Hill Project Areas, Laverton*. Unpublished report for Crescent Gold Limited, Perth.
- Moriarty; T. K. (1972) Birds of Wanjarri; WA (27º; 25'S; 120º 40'E) *The Emu*, 72, 1-7.
- Murphy, D. (1994) *Vertebrate fauna species of the North-eastern Goldfields*. Report to Western Mining's Leinster Nickel and Mount Keith Operations, Perth.
- Ninox Wildlife Consulting (1998) *A Vertebrate Fauna Survey of the Murrin Expansion Project*. Unpublished report for Anaconda Nickel Ltd, Perth.
- Ninox Wildlife Consulting (2005) *Vertebrate Fauna Habitat Assessment of the Proposed Expansions to the Cosmos Nickel Mine, near Leinster, Western Australia*. Unpublished report for URS Australia Pty Ltd, Perth.
- Onus, M. L., Rolfe, J.K., and Algar, D. (2011) Assessment of feral cat abundance and control options at Barrick, Granny Smith. Perth.
- Stantec (2020) *Mt Weld Rare Earth Project Level 2 and Targeted Terrestrial Fauna Survey*. Unpublished report for Mt Weld Mining Pty Ltd, Perth.
- Terrestrial Ecosystems (2010) *Level 2 Fauna Risk Assessment for the Garden Well Project Area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2011a) *Level 2 Fauna Risk Assessment for Granny Deeps Project Area*. Unpublished report for Barrick Gold Corporation, Perth.
- Terrestrial Ecosystems (2011b) *Targeted Survey for Long-tailed Dunnarts for the Granny Deeps Project Area*. Unpublished report for Barrick Gold Corporation, Perth.
- Terrestrial Ecosystems (2012a) *Level 1 Fauna Risk Assessment for the Anchor Project.* Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2012b) *Level 1 Fauna Risk Assessment for the Moolart Well to Garden Well Access Road on M38/354, M38/302, M38/303 and L38/216*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2012c) *Level 1 Fauna Risk Assessment for the Petra Project*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2012d) *Level 1 Fauna Risk Assessment for the Reichelt Project*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2012e) *Level 1 Fauna Risk Assessment for the Rosemont Project Area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2012f) *Level 1 Fauna Risk Assessment for the Russell Find Project*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2012g) *Level 1 Vertebrate Fauna Risk Assessment for the Proposed Exploration Areas around the Granny Open Pit Project Area*. Unpublished report for Barrick Gold Corporation, Perth.
- Terrestrial Ecosystems (2012h) *Level 1 Vertebrate Fauna Risk Assessment for the Proposed Mining Areas around the Granny Open Pit Project Area*. Unpublished report for Barrick Gold Corporation, Perth.
- Terrestrial Ecosystems (2013) *Level 1 Fauna Risk Assessment for Two Waste Dumps either side of the proposed Rosemont Project Area (G38/29, G38/30, G38/31, G38/32) and a Slurry Pipeline from the Rosemont mine to the Garden Well processing plant (L38/219)*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2015b) *Level 1 Fauna Risk Assessment for the Gloster Project and haul road*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2016a) *Level 1 Fauna Risk Assessment for the Anchor Project Area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2016b) *Level 1 Fauna Risk Assessment for the Baneygo Project*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2016c) *Level 1 Fauna Risk Assessment for the Dogbolter-Coopers Project Area.* Unpublished report for Regis Resources Ltd, Perth.

- Terrestrial Ecosystems (2016c) *Level 1 Fauna Risk Assessment for the Petra Project Area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2016d) *Level 1 Fauna Risk Assessment for the Tooheys Project Area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2017b) *Level 1 Fauna Risk Assessment for the proposal Haul Road to the Baneygo Project Area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2017c) *Level 1 Fauna Risk Assessment for the proposal Haul Road to the proposed Petra Mining area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2018a) *Level 1 Fauna Risk Assessment for the proposal Haul Road to the proposed Petra Mining area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2018c) *Vertebrate Fauna Risk Assessment for the Petra Mining Project*, Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2020b) *Vertebrate fauna risk assessment for the Granny Smith Tailing Storage Facility Expansion*. Unpublished letter report for Granny Smith Gold Mine, Perth.
- Terrestrial Ecosystems (2021b) *Potential impact on Long-tailed Dunnarts by the proposed vegetation clearing and construction of a new TSF west of Cell 3 at Granny Smith Mine*. Unpublished letter report for Granny Smith Gold Mine, Perth.
- Terrestrial Ecosystems (2021a) *Basic vertebrate fauna assessment for the North Keringal Borefield*, Unpublished report for Granny Smith Mining Company, Perth.

In addition, individual records for fauna contained in the Atlas of Living Australia and the Western Australian Museum collection have also been accessed.

The most relevant and useful data are those from the two Terrestrial Ecosystems' (2011a, b) surveys in the area. These two surveys were undertaken in 2011 and were undertaken in similar habitat and ~5km from the project area. These surveys included pit trapping, funnel traps, echolocation bat detection surveys, avifauna surveys and short-range invertebrate surveys. One of Terrestrial Ecosystems surveys was a Level 2 fauna assessment, and the other was an extensive targeted trapping program for Long-tailed Dunnarts (*Antechinomys longicaudata*). Terrestrial Ecosystems has also completed multiple Basic (Level 1) fauna risk assessments in adjacent areas for Granny Smith mining operations (Terrestrial Ecosystems 2014, 2015a, 2017a, 2020b, 2021b, a).

Western Australian Museum (WAM) regional eastern goldfields biological surveys were undertaken in the Duketon-Sir Samuel, Sandstone–Sir Samuel and Laverton areas (How et al. 1992, McKenzie et al. 1994). These surveys were to the north of the project area. HGM (1999) undertook a terrestrial fauna assessment for the Rosemont Gold Project, which is also located to the north of the project area. A survey was undertaken by Terrestrial Ecosystems staff for the Moolart Well area (Coffey Environments 2008a) in the summer of 2007/08 and Terrestrial Ecosystems (2010) surveyed the Garden Well mine; both of these surveys included habitat similar to the project area. Stantec (2020) has done surveys on the Mt Weld Mining lease to the north-east of the project area and these surveys have also been considered in this report. The WAM bioregional surveys of the Edjudina – Menzies and the Kurnalpi - Kalgoorlie areas (Dell et al. 1988, McKenzie and Hall 1992) and Terrestrial Ecosystems unpublished data for around Ora Banda are for areas to the south of the project area. The Murrin Murrin Expansion project fauna survey is for an area to the west of the project area (Ninox Wildlife Consulting 1998).

These fauna surveys, when considered together, provide a near complete list of the vertebrate species likely to be found in the project area. The composition of vertebrate fauna assemblages varies from habitat-to-habitat and site-to-site within the bioregion, but the survey data contained in the attached appendices provide a good indication of the vertebrate fauna assemblage that is likely to be found in the project area. These data therefore provide a good regional context and indicate the extent of fauna assemblage variation that might be anticipated from site-to-site and temporally.

2.5 FAUNA SPECIES AT RISK

Cowan (2003) reported the fauna species at risk in the East Murchison subregion as Bilby (*Macrotis lagotis*), Marsupial Mole (*Notoryctes typhlops*), Mulgara (*Dasycercus cristicauda / blythi*), Malleefowl (*Leipoa ocellata*), Princess Parrot (*Polytelis alexandrae*), Slender-billed Thornbill (*Acanthiza iredalei iredalei*), Great Desert Skink (*Liopholis kintorei*) and Peregrine Falcon (*Falco peregrinus*). Since then the Night Parrot (*Pezoporus occidentalis*), and Southern Whiteface (*Aphelocephala leucopsis*) were added to the Commonwealth threatened species list for the bioregion. This report assesses the potential for these species to be found in the project area and the potential impact that the proposed development might have on these species, and other conservation significant fauna.

3. METHODOLOGY

3.1 DATABASE SEARCHES

A review of the *EPBC Act* list of protected species was undertaken to identify species of conservation interest to the Commonwealth Government (Appendix A). In addition, a desktop search of the Terrestrial Ecosystems' fauna survey database was used to develop an appreciation of the vertebrate fauna assemblages in relevant sections of the bioregion 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 us to create lists of species expected to utilise the project area and broader bioregion. 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 (e.g. water and shore birds). Vagrants can be recorded almost anywhere. Many of the records are historical and the species is no longer present in the local area (e.g. Malleefowl, Bilby). 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. Therefore, 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 Atlas of Living Australia and the Western Australian 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.

3.2 SITE INSPECTION AND FAUNA HABITAT ASSESSMENT

A site reconnaissance survey was undertaken on 22 October 2018 for the central part of the project area (~150ha; Terrestrial Ecosystems 2018b) and on 3 November 2023 for the remaining area. This fauna habitat assessment methodology required the assessor to stop at multiple locations within the project area and to assess a suite of data about the fauna habitat and its condition. This information included a description of the habitat structure, habitat condition, landform, soils, vegetation and time since last fire (Table 1).

This field assessment 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 mitigation and management strategies might be implemented to reduce potential impacts.

Table 1. Variables assessed during the rapid 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 affected 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.	
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 investigation and fauna habitat assessment. This survey was done with Eren Reid of Native Vegetation Solutions who concurrently undertook a flora and vegetation assessment. Simon Pitt prepared this report and it was reviewed by Drs Graham and Scott Thompson before it was sent to the client. Dr Scott Thompson and Simon Pitt completed the habitat mapping.

Senior scientists have appropriate relevant post-graduate qualifications, extensive experience in conducting vertebrate fauna surveys and assessments, have published research articles on biodiversity, fauna assemblages, conservation significant species, trapping techniques and temporal variations in trapped fauna assemblages and are therefore appropriately trained and experienced to undertake the survey and prepare the assessment. Both Drs Thompson have undertaken multiple assessments on the Granny Smith mining tenements and are familiar with the site and habitat in the project area.

Dr Scott Thompson is the only environmental practitioner in Western Australia who has independent specialist certification (CEnvP – Ecology Specialist) in combination with post-graduate tertiary qualifications and is a licenced pest management technician (LPMT). This unique set of skills and qualifications ensures Scott undertakes fauna surveys, assessments and control programs to the highest standard and quality assurance. The qualifications and experience of the survey and reporting personnel are shown in Table 2.

Table 2. Project personnel and their qualifications

Name	Qualifications	Experience	Role
Dr Scott Thompson	BSc. (Env. Sc.), MSc. (Env. Mngt.), PhD (Env. Sc./Mngt), Cert III (Vertebrate Pest Mngt), Cert IV (WHS). CEnvP (Ecology Specialist)	> 20 years	Survey coordinator and Principal zoologist
Dr Graham Thompson	Post Grad. Dip. (Zool.), PhD (Zoology), Cert III (Vertebrate Pest Mngt),	> 20 years	Principal zoologist
Simon Pitt	BSc (NRM); Cert III (Rural and Env Pest Mngt),	> 15 years	Zoologist

3.4 TAXONOMY AND NOMENCLATURE

Taxonomy and nomenclature for fauna species used in this report are generally based on the WA Museum (WAM) species lists. Terrestrial Ecosystems has presumed that the fauna identifications referred to in the appendices or in reports used to provide local and regional comparative data were correct and we have only corrected obvious records where the nomenclature was known to be incorrect.

3.5 LIMITATIONS

This Basic vertebrate fauna risk assessment is based on information contained in the Commonwealth Government 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.

Lists of species potentially in and around the project area have been compiled from records in the WAM records, Atlas of Living Australia and reports of fauna surveys undertaken nearby. Some records in the Atlas of Living Australia and the WAM are very old, and those species are no longer present in the area. Terrestrial Ecosystems has not been able to verify the primary data and is therefore not able to vouch for the accuracy of these records. All these sources of data are known to contain errors, and this should be considered when reading this assessment. These errors occur because of a misidentification of individuals, taxonomic name changes and incorrect coordinates being entered into the database.

The *EPBC Act* online matters of national environmental significance (MNES) database for terrestrial fauna includes historical records and places a wide buffer around previously known locations of threatened species in its database. A search of this database will invariably include species that are either locally extinct or were never present in parts of the search area.

The EPA's (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 3.

Table 3. Fauna survey limitations and constraints

Possible limitations	Constraint	Comment
Availability of data and information	No	There is a substantial quantity of vertebrate fauna survey data available for similar habitats near the project area, that have been accessed and used.
Competency/experience of the survey team, including experience in the bioregion surveyed	No	The field surveyor and authors of this report have appropriate post-graduate qualifications, have undertaken multiple surveys and assessments in the Goldfields, have published a book and multiple refereed journal articles based on fauna surveys in the region and are familiar with the vertebrate fauna in this bioregion.
Scope of the survey, e.g. where faunal groups were excluded from the survey	N/A	The scope of the survey met the requirements of a Basic vertebrate fauna assessment.
Timing, weather and season	No	Weather was suitable for a site visit.

Possible limitations	Constraint	Comment
Disturbance that may have affected results, e.g. fire, flood	No	Disturbances in the project area have been factored into this assessment.
The proportion of fauna identified, recorded or collected	N/A	
Adequacy of the survey intensity and proportion of survey achieved, e.g. the extent to which the area was surveyed	No	This was a reconnaissance survey to assess and map fauna habitats, and to record any observations of Malleefowl, their tracks and mounds. It was not a targeted or detailed survey. Fauna habitats have been mapped for the entire project area.
Access problems	No	The site was accessible during the assessment
Problems with data and analysis, including sampling biases	N/A	This report collated and commented on data from other reports.

N/A = not applicable, Significant = major impact on outcome of the assessment, Moderate = impacted parts of the assessment, Negligible = almost no impact on the assessment.

4. RESULTS

4.1 FAUNA HABITAT

Based on fauna habitat assessments in the field and information provided by Native Vegetation Solutions gathered during a botanical assessment of the project area, the project area supports the following six broad fauna habitats (Figure 2; Appendix E):

- Banded ironstone formation (Plates 1-2);
- Open Mulga (Plates 3-6);
- Mulga over ironstone gravel (Plates 5–6);
- Mulga over chenopod (Plates 7-8);
- Chenopod (Plates 9–10);
- Tecticornia (Plates 11-12); and
- Disturbed areas.

The density of Mulga trees and shrubs varied across the project area, being more-dense around the ephemeral creek line that runs north-south through the western side of the project area.

The fauna habitat condition varied from degraded to good with the more degraded areas being due to infrastructure, historical exploration activity, cattle grazing and a haul road. There was evidence of rabbits and other feral fauna in the area.



Plate 1. Banded ironstone formation



Plate 2. Banded ironstone formation



Plate 3. Open Mulga



Plate 4. Open Mulga



Plate 5. Mulga over ironstone gravel



Plate 6. Mulga over ironstone gravel



Plate 7. Mulga over chenopod



Plate 8. Mulga over chenopod



Plate 9. Chenopod



Plate 10. Chenopod



Plate 11. Tecticornia



Plate 12. Tecticornia

4.2 FERAL FAUNA

Evidence of camels, rabbits () and cats were recorded during the site reconnaissance visit and there were station cattle present in the project area.

4.3 MINE ADIT

There are two mine adits in a rocky hill in the south-east of the project area (Plate 14). These mine adits support a small colony of bats.



Plate 13. Rabbit scats



Plate 14. Mine adit

4.4 FAUNA ASSEMBLAGE

In 2011, Terrestrial Ecosystems (2011a) undertook a Level 2 vertebrate fauna survey for nearby areas at Granny Smith. This survey area supported fauna habitat like that in the project area. Thirteen survey sites were trapped between 6-12 January 2011, which was optimal for reptiles and suitable for mammals. All pit-traps and drift fences were dug in prior to the field assessment and closed until the start of the trapping program. Each survey site contained four trap lines. Each trap line contained three 20L PVC buckets, three 150mm by 500mm deep PVC pipes as pit-traps and three pair of funnel traps evenly spaced along a 30m fly-wire drift fence. Trap lines were arranged approximately 50m apart. The trapping effort was 1,092 bucket pit-trap nights, 1,092 pipe pit-trap nights and 2,184 funnel trap nights.

An avian survey was undertaken concurrently with the trapping program. The avian surveys were conducted from sunrise for approximately four hours and again each afternoon for approximately four hours. The search protocol was for a 20-minute active walking transect search of approximately 3ha before moving to another area. Seventy sites were surveyed, which equated to approximately 1,400 minutes of survey effort. All birds were identified by their call or direct observation. Birds were also recorded opportunistically during the survey period by all field survey staff.

Bat echolocation calls were recorded using an Anabat system. Two Anabat recorders were left standing vertically all night (10-12 hours) on three occasions (8, 9 and 11 January 2011), and included representative habitat types and other locations likely to attract bats.

Table 4 indicates the small mammals, reptiles and amphibians caught during the 2011 survey. The reptile, mammal and amphibian assemblage recorded is like that recorded in other patches of open mulga woodland in this part of the Goldfields, except for the capture of three Long-tailed Dunnarts. As indicated in the follow up targeted survey report for Long-tailed Dunnarts (Terrestrial Ecosystems 2011b), it was unexpected to record Long-tailed Dunnarts in this area and this record at the time was more than 200km south-east of the previous known records. However, since then the Long-tailed Dunnart has been recorded at several banded ironstone formations (BIFs) in the general area.

Four species of bats were recorded during the 2011 survey (*Chalinolobus gouldii* - Gould's Wattled bat; *Mormopterus* sp. (sp. 3) - Inland free-tailed bat; *Scotorepens balstoni* - Inland broad-nosed bat; and *Vespadelus finlaysoni* - Finlayson's cave bat). All these species are commonly recorded throughout the Goldfields.

Table 4. Granny Smith terrestrial fauna survey results

			Sites												
Taxa	**Family**	**Species**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Mammals	Dasyuridae	*Antechinomys laniger*	2	1			3	3	3	2		2			1
		Sminthopsis dolichura	1	1	3	7	5	4	13	3	5	3		1	1
		Sminthopsis hirtipes				1									
		Antechinomys longicaudata					1	1							1
		Sminthopsis macroura	2	3		2	1	1	1	1	1	5	5	3	2
	Muridae	*Notomys alexis*	3												
		Pseudomys hermannsburgensis	1	1	1	3					1	2	2	5	6
		Mus musculus						1					5		
Amphibians	Hylidae	*Cyclorana maini*		1							11	5	1		
		Cyclorana platycephala		1	1						5	2		1	1
	Limnodynastidae	*Neobatrachus kunapalari*									1				
		Neobatrachus sutor	8	2	5	3	1			1	13	2		1	
Reptiles	Agamidae	*Diporiphora amphiboluroides*				2	1	1							
		Tympanocryptis pseudopsephos				2	3	1		1					
	Elapidae	*Parasuta monachus*						1		1					
	Gekkonidae	*Diplodactylus granariensis*										1			
		Diplodactylus pulcher	2			1	4	3	1			2	1		1
		Gehyra variegata		3	2	4		1		3		2	1	2	
		Heteronotia binoei	2				1					1	2	1	5
		Rhynchoedura ornata	3					2			1				
		Strophurus wellingtonae	4	2											1
	Scincidae	*Ctenotus leonhardii*	2	2					1		5	9	7	16	27
		Egernia depressa		1	1	2	2	3	9	6		1			
		Eremiascincus richardsonii				2									1
		Lerista desertorum													2
		Lerista distinguenda													1
		Menetia greyii											1		

			Sites												
		Morethia butleri		1		1		2			6	1		3	
		Tiliqua multifasciata	1												
	Typhlopidae	*Anilios australis*								1	1				
		Anilios bicolor			1										
	Varanus	*Varanus caudolineatus*		2		1	3	1	1			1		2	
		Varanus panoptes	4		7		3	2	2			4	2		6

The bird surveys recorded 820 individuals from 60 species across 70 survey sites and an additional 495 birds were opportunistically observed (Table 5). A proportion of these species are seldom seen in the north-eastern Goldfields. These are mostly the 'water birds' in the list (e.g. Musk Duck, Australian Wood Duck, Pink-eared Duck, Pacific Black Duck, Hardhead, stilts and White-faced Heron). Some of these birds will occasionally be seen in water contained in disused mining pits during the non-rainy period, however, it was the presence of the heavy rain that resulted in their presence in the area. No Malleefowl nests or tracks were observed during the survey.

Table 5. Bird survey results for Granny Smith mining area in 2011 survey

Family	Species	Common Name	No
Accipitridae	*Aquila audax*	Wedge-tailed Eagle	3
Anatidae	*Biziura lobata*	Musk Duck	2
	Chenonetta jubata	Australian Wood Duck	81
	Malacorhynchus membranaceus	Pink-eared Duck	5
	Anas gracilis	Grey Teal	74
	Anas superciliosa	Pacific Black Duck	13
	Aythya australis	Hardhead	2
Casuariidae	*Dromaius novaehollandiae*	Emu	4
Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel	4
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt	5
	Cladorhynchus leucocephalus	Banded Stilt	14
Ardeidae	*Egretta novaehollandiae*	White-faced Heron	2
Columbidae	*Phaps chalcoptera*	Common Bronzewing	6
	Ocyphaps lophotes	Crested Pigeon	21
Alcedinidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher	1
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo	3
Falconidae	*Falco cenchroides*	Nankeen Kestrel	2
	Falco berigora	Brown Falcon	2

Family	Species	Common Name	No
Rallidae	*Fulica atra*	Eurasian Coot	21
Acanthizidae	*Acanthiza robustirostris*	Slaty-backed Thornbill	68
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill	1
	Acanthiza apicalis	Inland Thornbill	12
	Aphelocephala leucopsis	Southern Whiteface	13
Artamidae	*Artamus personatus*	Masked Woodswallow	27
	Artamus cinereus	Black-faced Woodswallow	6
	Artamus minor	Little Woodswallow	2
	Cracticus torquatus	Grey Butcherbird	9
	Cracticus nigrogularis	Pied Butcherbird	5
	Gymnorhina tibicen	Australian Magpie	1
Campephagidae	*Coracina maxima*	Ground Cuckoo-Shrike	7
	Coracina novaehollandiae	Black-faced Cuckoo-Shrike	7
	Lalage tricolor	White-winged Triller	4
Corvidae	*Corvus bennetti*	Little Crow	5
	Corvus orru	Torresian Crow	2
Estrildidae	*Taeniopygia guttata*	Zebra Finch	2
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow	6
	Hirundo neoxena	Welcome Swallow	6
	Petrochelidon nigricans	Tree Martin	10
Maluridae	*Malurus splendens*	Splendid Fairy-wren	12
	Malurus leucopterus	White-winged Fairy-wren	4
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater	2
	Gavicalis virescens	Singing Honeyeater	40
	Manorina flavigula	Yellow-throated Miner	41
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater	44
	Epthianura tricolor	Crimson Chat	4
Monarchidae	*Grallina cyanoleuca*	Magpie-Lark	17
Motacilidae	*Anthus novaeseelandiae*	Australasian Pipit	8
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird	4
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler	22
	Colluricincla harmonica	Grey Shrike-thrush	3

Family	Species	Common Name	No
	Oreoica gutturalis	Crested Bellbird	46
Pardalotidae	*Pardalotus striatus*	Striated Pardalote	1
Petroicidae	*Petroica goodenovii*	Red-capped Robin	10
	Melanodryas cucullata	Hooded Robin	7
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler	14
Ptilonorhynchidae	*Ptilonorhynchus guttatus*	Western Bowerbird	7
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	10
Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe	30
Psittacidae	*Barnardius zonarius*	Australian Ringneck	6
	Psephotus varius	Mulga Parrot	20

4.5 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 deployed by some of the surveys and they also reflect variations in soils and vegetation as well as temporal variations in the fauna assemblages.

Tables 5-8 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 6. Birds potentially found near the project area

Family	Species	Common Name
Casuariidae	*Dromaius novaehollandiae*	Emu
Anatidae	*Biziura lobata*	Musk Duck
	Tadorna tadornoides	Australian Shelduck
	Chenonetta jubata	Australian Wood Duck
	Malacorhynchus membranaceus	Pink-eared Duck
	Anas gracilis	Grey Teal
	Anas superciliosa	Pacific Black Duck
	Aythya australis	Hardhead
Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe
Columbidae	*Phaps chalcoptera*	Common Bronzewing
	Phaps histrionica	Flock Bronzewing
	Ocyphaps lophotes	Crested Pigeon
	Geopelia placida	Diamond Dove
Podargidae	*Podargus strigoides*	Tawny Frogmouth
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar
Apodidae	*Apus pacificus*	Fork-tailed Swift
Otididae	*Ardeotis australis*	Australian Bustard
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant

Family	Species	Common Name
Ardeidae	*Ardea pacifica*	White-necked Heron
	Egretta novaehollandiae	White-faced Heron
Accipitridae	*Haliastur sphenurus*	Whistling Kite
	Accipiter fasciatus	Brown Goshawk
	Accipiter cirrocephalus	Collared Sparrowhawk
	Circus assimilis	Spotted Harrier
	Aquila audax	Wedge-tailed Eagle
	Hieraaetus morphnoides	Little Eagle
Falconidae	*Falco cenchroides*	Nankeen Kestrel
Falconidae	*Falco berigora*	Brown Falcon
	Falco longipennis	Australian Hobby
	Falco peregrinus	Peregrine Falcon
Rallidae	*Tribonyx ventralis*	Black-tailed Native-hen
	Fulica atra	Eurasian Coot
Recurvirostridae	*Himantopus leucocephalus*	Pied Stilt
	Cladorhynchus leucocephalus	Banded Stilt
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover
	Elseyornis melanops	Black-fronted Dotterel
	Vanellus tricolor	Banded Lapwing
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper
Turnicidae	*Turnix velox*	Little Button-quail
Cacatuidae	*Eolophus roseicapillus*	Galah
	Nymphicus hollandicus	Cockatiel
Psittacidae	*Barnardius zonarius*	Australian Ringneck
	Psephotus varius	Mulga Parrot
	Melopsittacus undulatus	Budgerigar
	Neopsephotus bourkii	Bourke's Parrot
	Neophema splendida	Scarlet-chested Parrot
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-cuckoo
	Chalcites osculans	Black-eared Cuckoo
	Heteroscenes pallidus	Pallid Cuckoo
Halcyonidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher
Meropidae	*Merops ornatus*	Rainbow Bee-eater
Climacteridae	*Climacteris affinis*	White-browed Treecreeper
	Climacteris rufa	Rufous Treecreeper
Ptilonorhynchidae	*Ptilonorhynchus maculatus*	Spotted Bowerbird
	Ptilonorhynchus guttatus	Western Bowerbird
Maluridae	*Malurus splendens*	Splendid Fairy-wren
	Malurus leucopterus	White-winged Fairy-wren
	Malurus lamberti	Variegated Fairy-wren
Acanthizidae	*Calamanthus fuliginosus*	Striated Fieldwren
	Pyrrholaemus brunneus	Redthroat
	Smicrornis brevirostris	Weebill
	Gerygone fusca	Western Gerygone
	Acanthiza robustirostris	Slaty-backed Thornbill
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill
	Acanthiza uropygialis	Chestnut-rumped Thornbill
	Acanthiza apicalis	Inland Thornbill
	Aphelocephala leucopsis	Southern Whiteface
Pardalotidae	*Pardalotus striatus*	Striated Pardalote
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater

Family	Species	Common Name
	Gavicalis virescens	Singing Honeyeater
	Lichenostomus ornatus	Yellow-plumed Honeyeater
	Lichenostomus plumulus	Grey-fronted Honeyeater
	Purnella albifrons	White-fronted Honeyeater
	Manorina flavigula	Yellow-throated Miner
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater
	Epthianura tricolor	Crimson Chat
	Epthianura aurifrons	Orange Chat
	Sugomel niger	Black Honeyeater
	Lichmera indistincta	Brown Honeyeater
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler
Psophodidae	*Cinclosoma castaneothorax*	Chestnut-breasted Quail-thrush
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella
Campephagidae	*Coracina maxima*	Ground Cuckoo-shrike
	Coracina novaehollandiae	Black-faced Cuckoo-shrike
	Lalage tricolor	White-winged Triller
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler
	Colluricincla harmonica	Grey Shrike-thrush
	Oreoica gutturalis	Crested Bellbird
Artamidae	*Artamus personatus*	Masked Woodswallow
	Artamus cinereus	Black-faced Woodswallow
	Artamus minor	Little Woodswallow
	Cracticus torquatus	Grey Butcherbird
	Cracticus nigrogularis	Pied Butcherbird
	Gymnorhina tibicen	Australian Magpie
	Strepera versicolor	Grey Currawong
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail
	Rhipidura leucophrys	Willie Wagtail
Corvidae	*Corvus coronoides*	Australian Raven
	Corvus bennetti	Little Crow
	Corvus orru	Torresian Crow
Monarchidae	*Grallina cyanoleuca*	Magpie-lark
Petroicidae	*Microeca fascinans*	Jacky Winter
	Petroica goodenovii	Red-capped Robin
	Melanodryas cucullata	Hooded Robin
Megaluridae	*Cincloramphus mathewsi*	Rufous Songlark
	Cincloramphus cruralis	Brown Songlark
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow
	Hirundo neoxena	Welcome Swallow
	Petrochelidon ariel	Fairy Martin
	Petrochelidon nigricans	Tree Martin
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit

Table 7. Amphibians potentially found near the project area

Family	Species	Common Name
Hylidae	*Cyclorana maini*	Sheep Frog
	Cyclorana platycephala	Water-holding Frog
Limnodynastidae	*Neobatrachus aquilonius*	Northern Burrowing Frog
	Neobatrachus kunapalari	Kunapalari Frog
	Neobatrachus sudelli	Sudell's Frog
	Neobatrachus sutor	Shoemaker Frog
	Neobatrachus wilsmorei	Goldfields Bullfrog
	Platyplectrum spenceri	Spencer's Burrowing Frog

Table 8. Mammals potentially found near the project area

Family	Species	Common Name
Bovidae	*Bos taurus*	Cow
	Capra hircus	Goat
	Ovis aries	Sheep
Camelidae	*Camelus dromedarius*	Dromedary
Canidae	*Canis lupus*	Dingo/dog
	Vulpes vulpes	Red Fox
Felidae	*Felis catus*	Feral Cat
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheath-tail Bat
Molossidae	*Austronomus australis*	White-striped Free-tail Bat
	Mormopterus planiceps	Southern Free-tail Bat
Pteropodidae	*Syconycteris australis*	Common Blossom-bat
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat
	Chalinolobus morio	Chocolate Wattled Bat
	Nyctophilus geoffroyi	Lesser Long-eared Bat
	Scotorepens balstoni	Inland Broad-nosed Bat
	Scotorepens greyii	Little Broad-nosed Bat
	Vespadelus regulus	Southern Forest Bat
Dasyuridae	*Antechinomys laniger*	Kultarr
	Antechinomys longicaudata	Long-tailed Dunnart
	Dasycercus cristicauda/blythi	Mulgara
	Ningaui ridei	Wongai Ningaui
	Sminthopsis crassicaudata	Fat-tailed Dunnart
	Sminthopsis dolichura	Little Long-tailed Dunnart
	Sminthopsis hirtipes	Hairy-footed Dunnart
	Sminthopsis macroura	Stripe-faced Dunnart
	Sminthopsis ooldea	Ooldea Dunnart
Macropodidae	*Osphranter robustus*	Euro
	Osphranter rufus	Red Kangaroo
Leporidae	*Oryctolagus cuniculus*	European Rabbit
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna
	Equus caballus	Domestic Horse
Equidae	*Mus musculus*	House Mouse
Muridae	*Notomys alexis*	Spinifex Hopping Mouse
	Pseudomys desertor	Desert Mouse

Table 9. Reptiles potentially found in the project area

Family	Species	Common Name
Agamidae	*Ctenophorus caudicinctus*	Ring-tailed Dragon
	Ctenophorus fordi	Mallee Dragon
	Ctenophorus inermis	Military Dragon
	Ctenophorus isolepis	Crested Dragon
	Ctenophorus maculatus	Spotted Dragon
	Ctenophorus nuchalis	Central Netted 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
	Tympanocryptis pseudopsephos	Pebble Dragon
Boidae	*Antaresia stimsoni*	Stimson's Python
Carphodactylidae	*Nephrurus levis*	Three-lined Knob-tail
	Nephrurus vertebralis	Midline Knob-tail
	Nephrurus wheeleri	Banded Knob-tail
	Underwoodisaurus milii	Barking Gecko
Diplodactylidae	*Diplodactylus conspicillatus*	Fat-tailed Diplodactylus
	Diplodactylus granariensis	Wheat-belt Stone Gecko
	Diplodactylus pulcher	Fine-faced Gecko
	Lucasium damaeum	Beaded Gecko
	Lucasium squarrosum	Mottled Ground Gecko
	Strophurus assimilis	Goldfields Spiny-tailed Gecko
	Strophurus elderi	Jewelled Gecko
	Strophurus strophurus	Western Spiny-tailed Gecko
	Strophurus wellingtonae	Spiny-tailed Gecko
Elapidae	*Brachyurophis fasciolata*	Narrow-banded Burrowing Snake
	Brachyurophis semifasciata	Half-girdled Snake
	Furina ornata	Orange-naped Snake
	Suta monachus	Monk Snake
	Pseudechis australis	Mulga Snake
	Pseudechis butleri	Spotted Mulga Snake
	Pseudonaja mengdeni	Gwardar
	Pseudonaja modesta	Ringed Brown Snake
	Simoselaps bertholdi	Jan's Banded Snake
	Suta fasciata	Rosen's Snake
Gekkonidae	*Gehyra purpurascens*	Purplish Dtella
	Gehyra variegata	Tree Dtella
	Gehyra xenopus	Crocodile-faced Dtella
	Heteronotia binoei	Bynoe's Prickly Gecko
	Rhynchoedura ornata	Western Beaked Gecko
Pygopodidae	*Aprasia picturata*	Black-headed Worm-lizard

Family	Species	Common Name
	Delma butleri	Unbanded Delma
	Delma nasuta	Sharp-snouted Delma
	Lialis burtonis	Burton's Snake-lizard
	Pygopus nigriceps	Western Hooded Scaly-foot
Scincidae	*Cryptoblepharus australis*	Inland Snake-eyed Skink
	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
	Ctenotus ariadnae	Ariadna's Ctenotus
	Ctenotus atlas	Southern Mallee Ctenotus
	Ctenotus dux	Fine Side-lined Ctenotus
	Ctenotus grandis	Grand Ctenotus
	Ctenotus greeri	Spotted-necked Ctenotus
	Ctenotus hanloni	Nimbel Ctenotus
	Ctenotus helenae	Clay-soil Ctenotus
	Ctenotus leonhardii	Leonhardi's Ctenotus
	Ctenotus pantherinus	Leopard Skink
	Ctenotus piankai	Coarse Sands Ctenotus
	Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus
	Ctenotus schomburgkii	Schomburgk's Ctenotus
	Ctenotus severus	Stern Ctenotus
	Ctenotus uber	Spotted Ctenotus
	Egernia depressa	Pygmy Spiny-tailed Skink
	Egernia formosa	Goldfields Crevice-skink
	Eremiascincus richardsonii	Broad-banded Sand Swimmer
	Lerista bipes	North-western Sandslider
	Lerista desertorum	Central Desert Robust Slider
	Lerista distinguenda	South-western Orange-tailed Slider
	Lerista kingi	King's 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 multifasciata	Centralian Blue-tongued Lizard
	Tiliqua occipitalis	Western Blue-tongued Lizard
Typhlopidae	*Anilios australis*	Austral Blind Snake
	Anilios bicolor	Dark-spined Blind Snake
	Anilios endoterus	Interior Blind Snake
	Anilios hamatus	Pale-headed Blind Snake
	Anilios waitii	Waite's Blind Snake
Varanidae	*Varanus brevicauda*	Short-tailed Pygmy Monitor
	Varanus caudolineatus	Stripe-tailed Monitor
	Varanus eremius	Pygmy Desert Monitor
	Varanus giganteus	Perentie
	Varanus gouldii	Gould's Goanna

Family	Species	Common Name
	Varanus panoptes	Yellow-spotted Monitor
	Varanus tristis	Black-headed Monitor

Family	Species	Common Name
Cheluidae	*Chelodina steindachneri*	Steindachner's Snake-necked Turtle

4.6 CONSERVATION SIGNIFICANT FAUNA

Conservation significant fauna are protected by the Commonwealth *Environment Protection and Biodiversity Conservation* (*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) *Biodiversity Conservation Act 2016*. The WA *Biodiversity Conservation Act 2016* provides for the publishing of the *Wildlife Conservation (Specially Protected Fauna) Notice* that lists species under multiple categories. In addition, the 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 *Biodiversity Conservation 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 Biodiversity Conservation Act* are provided in Appendix C.

There are two species listed under the *EPBC Act*, one species listed under the WA *Biodiversity Conservation 2016* (*BC Act*) and one species listed on the DBCA's Priority Fauna List that potentially occur in the project area. Shore birds and waders have been excluded from this list due to a lack of suitable habitat near the project area (e.g. *Actitis hypoleucos*, *Calidris acuminata, Calidris melanotos,* and *Tringa nebularia*).

The following is an assessment of the likelihood of each of the species listed in Table 10 being found in the project area.

Table 10. Potential conservation significant species found around the project area

Species	DBCA Schedule / Priority	Status under Commonwealth *EPBC Act*	Comment
Night Parrot *Pezoporus occidentalis*	Critically Endangered	Endangered	Highly unlikely to be in the project area, due to a lack of suitable habitat. The potential for impacting on this species is very low.
Sandhill Dunnart *Sminthopsis psammophilia*	Endangered	Endangered	Highly unlikely to be in the project area due to a lack of suitable habitat. The potential for impacting on this species is very low.
Malleefowl *Leipoa ocellata*	Vulnerable	Vulnerable	Unlikely to be in the project area due to a lack of suitable habitat and an abundance of feral fauna. The potential for impacting on this species is low.
Great Desert Skink *Liopholis kintorei*	Vulnerable	Vulnerable	Highly unlikely to be in the project area due to a lack of suitable habitat. The potential for impacting on this species is very low.
Chuditch *Dasyurus geoffroii*	Vulnerable	Vulnerable	Highly unlikely to be in the project area due to a lack of suitable habitat. The potential for impacting on this species is therefore low.

Species	DBCA Schedule / Priority	Status under Commonwealth *EPBC Act*	Comment
Grey Falcon *Falco hypoleucos*	Vulnerable	Vulnerable	Highly unlikely to be in the project area due to lack of suitable habitat and if it is in the area, then it has a large home range and the potential for impacting this species is very low.
Princess Parrot *Polytelis alexandrae*	Priority 4	Vulnerable	May infrequently be seen in the area, however, clearing vegetation is unlikely to impact on this species.
Southern Whiteface *Aphelocephala leucopsiss*		Vulnerable	Likely to be present in the project area. It is a mobile species and the potential impact on this species from the project is low.
Mulgara *Dasycercus blythi*	Priority 4		Highly unlikely to be in the project area due to a lack of suitable habitat. The potential for impacting on this species is therefore low.
Oriental Plover *Charadrius veredus*	IA	Migratory	Unlikely to be in the project area due to a lack of suitable habitat. The potential for impacting on this species is therefore low.
Fork-tailed Swift *Apus pacificus*	IA	Migratory	May very infrequently be seen in the area, however, clearing vegetation is unlikely to impact on this aerial species.
Grey Wagtail *Motacilla cinereal*	IA	Migratory	Highly unlikely to be present in the project area. The potential for impacting on this species is therefore low.
Yellow Wagtail *Motacilla flava*	IA	Migratory	Highly unlikely to be present in the project area. The potential for impacting on this species is therefore low.
Peregrine Falcon *Falco peregrinus*	OS		May infrequently be seen in the area, however, clearing vegetation is unlikely to impact on this species.
Long-tailed Dunnart *Antechinomys longicaudata*	Priority 4		Caught in the Granny Smith area. Potentially present on the rocky ridges and small breakaways.

IA Migratory birds protected under international agreements; OS Other specially protected fauna

Night Parrot (*Pezoporus occidentalis*) – Critically Endangered under the *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.

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 (25-30^{o} and 0^{o} 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. 2017, Jackett et al. 2017). The entrance tunnel was 62cm long, and was downward sloping (27^{o}) with the entrance 28cm above the ground (Hamilton et al. 2017). 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. 2017, 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 Department of Biodiversity, Conservation and Attractions' (Department of Parks and Wildlife 2017) survey guidelines for Night Parrots indicated that 'at the local (site) level, roosting and nesting sites are in clumps of dense vegetation, primarily old and large spinifex clumps (often >50 years unburnt), especially hummocks that are ring-forming. These may be in expanses or isolated patches, but sometimes associated with other vegetation types, such as dense chenopod shrubs. Spinifex hummocks that are collapsed (i.e. less than about 40-50 cm in height) are not likely to provide adequate shelter.' Although there are old rings of spinifex in some areas, none of the spinifex hummocks were above 40cm suggesting the habitat is not suitable for this parrot.

As the preferred roosting and nesting sites for Night Parrots are not present in the project area and there is a significant threatening process for the species in the area (i.e. feral cats), it is Terrestrial Ecosystems' assessment that Night Parrots are not present in the project area and will therefore not be impacted by any proposed development.

Sandhill Dunnart (*Sminthopsis psammophilia*) – Critically Endangered under the *BC Act 2016* and Endangered under the *EPBC Act 1999*

The Sandhill Dunnart is a small (30-45g) arid adapted dasyurid that is found in the eastern part of the Western Australian section of the Great Victoria Desert, eastern Goldfields and the western and southern parts of South Australia. Recent surveys undertaken for the Great Victoria Desert Trust have increased their geographic range in the Great Victoria Desert.

The habitat in the project area is not suitable for this Dunnart and there are no records of the Sandhill Dunnart near the project area in the Atlas of Living Australia, so it is highly unlikely that they are present in the project area.

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

Malleefowl have been found in mallee regions of southern Australia from approximately the 26th parallel of latitude southwards. However, Malleefowl are now only found throughout these regions in fragmented patches 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.

Some very old disused Malleefowl mounds were recorded in other regional surveys near the project area. The site assessment recorded no Malleefowl, their mounds or tracks, and the vegetation in the project area was too sparse to support Malleefowl and the presence of feral species ensures that they are unable to survive in this area. Malleefowl are therefore unlikely to occur in the project area.

Great Desert Skink (*Liopholis kintorei*) - Vulnerable under the *EPBC Act 1999* and *BC Act 2016*

Liopholis kintorei is a large skink found in the sandy desert regions of Western Australia, Northern Territory and South Australia. It is found on sandflats and clay-based or loamy soils vegetated with spinifex. It lives in a multi-entranced communal burrow system and uses shared defecation sites. Storr *et al*. (1999) recorded them as being in the Wanjarri area of the Great Victoria Desert, and the DBCA Threatened species database records them in Laverton in 1967. There are no recent records near the project area in the Atlas of Living Australia.

The Giant Desert Skink prefers sandy soils vegetated with spinifex. This habitat is not present in the project area. Terrestrial Ecosystems' assessment is that *Liopholis kintorei* is very unlikely be found in the project area due to a lack of suitable habitat.

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

The Chuditch is the largest extant carnivorous marsupial in 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. 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).

How *et al*. (1988) reported Chuditch being found near the Norseman-Lake King Road and near Mount Holland. DBCA records show that one specimen was recorded in 1974 in Kambalda East. There are records south of Southern Cross and Marvel Loch and there have been other old sightings east of Kambalda and near Norseman, but none recently. As the project area is a very long way outside of its current known geographic distribution it is highly unlikely that the Chuditch would be found in the project area. Consequently, Terrestrial Ecosystems' assessment is that vegetation clearing in the project area is unlikely to have any significant impact on 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 south of latitude 26°S in Western Australia (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). There are no recent records of this species near the project area in the Atlas of Living Australia.

There are multiple records of the Grey Falcon in the Pilbara, but very few in the Goldfields. This species was not seen during the site visit, nor recorded in other fauna surveys in the adjacent areas, so it is unlikely to be present in the project area. If it was present, then it 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. 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 the species, accurate

estimates of its conservation significance are difficult to make, however, this species is probably threatened by habitat loss to agricultural practices and changes in fire regimes.

Dr S. Thompson sighted this parrot in a survey near the Wanjarri Nature Reserve in 2006 and Moriarty (1972) also reported it in the same area, so it may occasionally be seen in the general area. The proposed vegetation clearing is unlikely to significantly impact on this species as it will move away to other areas if it is disturbed.

Southern Whiteface (*Aphelocephala leucopsis*) - Vulnerable species under the *EPBC Act 1999*

The Southern Whiteface is a recent addition to the *EPBC Act 1999*. It is a small bird found in the arid and semi-arid interior from the WA coast near Hamelin Bay through the Great Victoria Desert into the arid areas of South Australia, Victoria, NSW and Queensland (Johnstone and Storr 2004, Department of Climate Change Energy the Environment and Water 2023).

It is found in open woodlands and shrublands with an understorey of grasses and low shrubs (Department of Climate Change Energy the Environment and Water 2023). It forages on the ground, feeding on insects, spiders and seeds that are mostly found in the leaf-litter (Johnstone and Storr 2004, Department of Climate Change Energy the Environment and Water 2023).

The Southern Whiteface has been recorded in multiple fauna surveys in the region, and in the avifauna survey on the Granny Smith mining operations area (Plate 15), so it is likely to be present in the project area. In recent years, almost every comprehensive avifauna survey in the region has recorded the presence of Southern Whiteface. It will readily move if disturbed. Given its widespread distribution, abundance in surveys and ability to move if disturbed, it is unlikely to be significantly impacted by vegetation clearing and low impact activities in the project area.

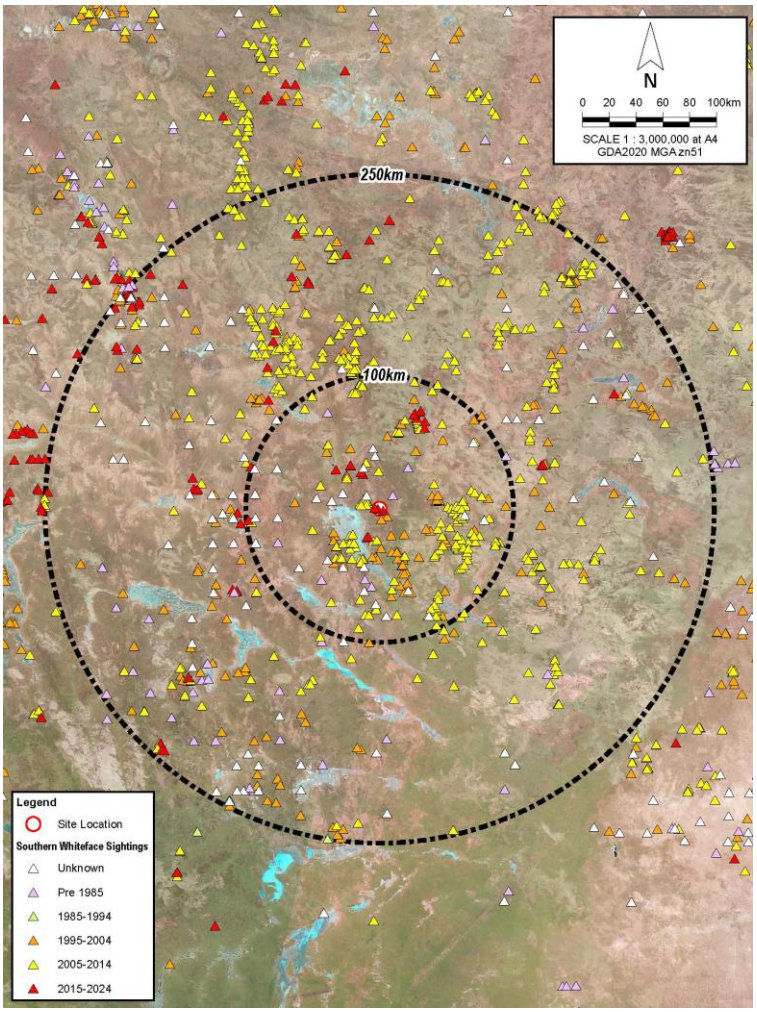


Plate 15. Southern Whiteface records in Terrestrial Ecosystems' fauna survey database near the project area

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.

The reported distribution of Mulgara 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 mature spinifex dominated habitat (Gibson and Cole 1992, Masters 2003, Masters et al. 2003, Thompson and Thompson 2008). In some areas, their relative abundance is 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) and recent burning of the spinifex does not seem to be sufficient to shift Mulgara 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).

Fauna habitat in the project area is not suitable for Mulgara. It is therefore highly unlikely of be found in the project area.

Oriental Plover (*Charadrius veredus*) - Migratory species under the *EPBC Act 1999* and *BC Act 2016*

A migrant species with patchy distribution in Australia, the Oriental Plover is sparsely distributed across arid and semi-arid Australia but avoids truly desert regions. Its preferred habitat is dry plains. It was not recorded in other fauna surveys undertaken near the project area. The species is under threat because of habitat reduction due to agriculture and changing fire regimes. This plover has not been recorded in the general area in any of the other regional surveys and there are scant records of this species near the project area in Atlas of Living Australia.

Terrestrial Ecosystems' assessment is that the Oriental Plover is unlikely to be seen in the project area.

Fork-tailed Swift (*Apus pacificus*) - Migratory species 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 almost exclusively an aerial species, foraging and sleeping on the wing. 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 (Plate 16), so it is unlikely to be impacted by the proposed development. It was not present in the DBCA's threatened species database search.

It rarely comes to the ground, usually only for breeding, so it is unlikely to be significantly impacted by vegetation clearing and low impact disturbance in the project area.

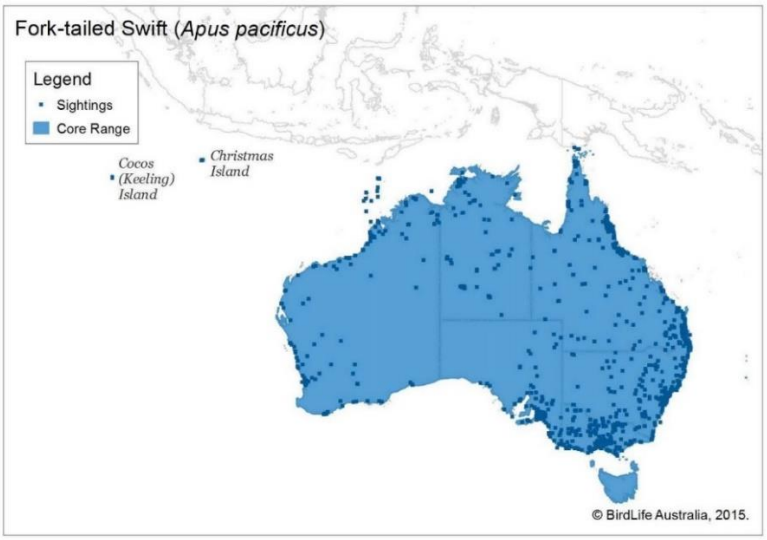


Plate 16. Range and actual reported sightings of the Fork-tailed Swift

(taken from http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds)

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 records and suitable habitat (Plate 17). It is unlikely to be significantly impacted by vegetation clearing and disturbance in the project area.

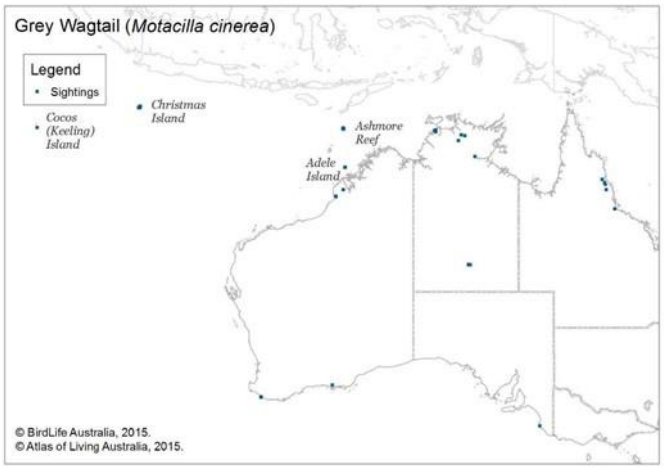


Plate 17. Reported sightings of the Grey Wagtail

(taken from http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds)

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

The Yellow Wagtail is found in the millions in the northern hemisphere and the Atlas of Living Australia records multiple records of this bird in Australia in the coastal areas. There are no records for this species in inland Western Australia near the project area (Plate 18), therefore it is highly unlikely to be significantly impacted by vegetation clearing and low impact disturbance in the project area.

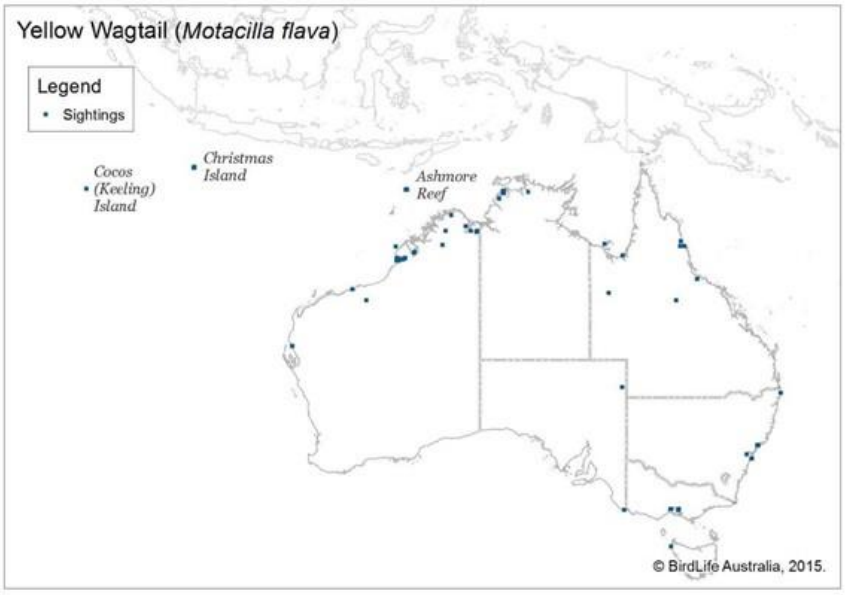


Plate 18. Reported sightings of the Yellow Wagtail

(taken from http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds)

Peregrine Falcon (*Falco peregrinus*) – Other specially protected fauna 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 seen in the Wanjarri Nature Reserve (Moriarty 1972, Ninox Wildlife Consulting 1994), at Honeymoon Well (Ninox Wildlife Consulting 1994) and Mileura (Tingay and Tingay 1977), so they could infrequently be seen in the general area.

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

Long-tailed Dunnart (*Antechinomys longicaudata*) – Priority 4 species with DBCA.

Burbidge et al. (2008) summarised the Long-tailed Dunnart distribution as widely scattered in the arid zone where it inhabits rugged rocky areas. They went on to suggest that its striated footpads, long tail and behaviour in captivity indicated that it was an active and capable climber. Specimens have been recorded in several rocky ranges in the Gibson Desert, West MacDonnell National Park, Murchison, Carnarvon Basin and the Pilbara. Most historical capture sites are within rugged rocky landscapes that support a low open woodland or

shrubland of Acacias (especially mulga) with an understorey of spinifex hummocks, and (occasionally) also perennial grasses and cassias.

Three adult Long-tailed Dunnarts were caught in the Granny Smith Level 2 fauna survey (Terrestrial Ecosystems 2011a) and a single individual was caught in the follow up targeted survey (Terrestrial Ecosystems 2011b). Subsequently, Long-tailed Dunnarts have been caught at several locations nearby (e.g. Stantec 2020). Most of these records occurred on stoney habitat and generally on rises, breakaways or banded ironstone formations. Suitable habitat for the Long-tailed Dunnart is present in the project area, so it is possible that they are present.

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.

The two-season survey by Terrestrial Ecosystems (2011a) was undertaken at Granny Smith in similar fauna habitat to the project area. Stantec (2020) has undertaken a Level 2 survey approximately 15km to the north-east of the project area. In addition, there are multiple other surveys (McKenzie et al. 1992, Ninox Wildlife Consulting 1998, Terrestrial Ecosystems 2010, 2011a, 2020a, 2023) undertaken in mulga woodland habitat in the eastern Goldfields, so the vertebrate fauna assemblages in this habitat type are well known, and an additional survey is unlikely to provide new information that will alter the regulators assessment.

Previous Long-tailed Dunnart surveys and investigations in the adjacent areas (Terrestrial Ecosystems 2011a, b) provide sufficient information to provide an adequate assessment of potential impacts on this species.

The EPA's (2020) *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* is not specific about when a Detailed or Targeted vertebrate fauna survey is required. Rather it has indicated that the level of survey effort should be determined after consideration of the criteria in Table 11.

Table 11. Criteria for determining survey requirements

Criteria	Response
Level of existing regional knowledge	There are multiple surveys in the region and in similar habitat types. The local vertebrate fauna species is well known, and additional trapping surveys are unlikely to add additional species to the existing knowledge.
Type and comprehensiveness of recent local surveys	Multiple surveys are available for the region. They provide useful contextual information concerning the project area and compiling a species list. The Terrestrial Ecosystems' (2011a) comprehensive survey for the Granny Smith mine far exceeded the effort of most other Level 2 and Detailed surveys undertaken in the bioregion (Thompson and Thompson 2023).
Degree of existing disturbance or fragmentation at the regional scale	The project area is largely intact and has good quality fauna habitat. However, it does contain a existing solar farm and cleared areas that were the historical mining infrastructure, and these areas are highly degraded.
Extent, distribution and significance of habitats	The available fauna habitats are not unique and are widely represented in the bioregion.

Criteria	Response
Significance of species likely to be present	Southern Whiteface (Vulnerable) is likely to be in the project area. Long-tailed Dunnarts (Priority 4) have been trapped during surveys in nearby areas and are potentially present in the project area. Additional surveys are unlikely to provide new information that would alter the environmental assessment.
Sensitivity of the environment to the proposed activities	There was no evidence to suggest that the project area has a unique fauna habitat that is environmentally sensitive from a vertebrate fauna perspective.
Scale and nature of impact.	The scale of the project is small, relative to the availability of similar fauna habitat in adjacent areas and is unlikely to have a large impact on fauna in the bioregion.

5.2 CONSERVATION SIGNIFICANT FAUNA

It is probable that the Southern Whiteface is in the project area, as it has been recorded in the nearby surveys of Granny Smith mining area (Terrestrial Ecosystems 2011a) and the Mt Weld mining area (Stantec 2020). If it is disturbed, then it will readily move to adjacent areas, so it is unlikely to be significantly impacted. Long-tailed Dunnarts have been recorded in nearby fauna surveys (Terrestrial Ecosystems 2011b, a, Stantec 2020) in rocky areas, BIFs or rocky outcrops. The habitat favoured by Long-tailed Dunnarts is present in the project area so this species may be present. The Peregrine Falcon is potentially infrequently seen in the project area and will move to adjacent areas if disturbed and the Fork-tailed Swift is a migrant aerial species that would largely be unaffected by a development as they rarely land.

5.2.1 Amphibians

Frogs are normally only detected immediately after rainfall or around semi-permanent pools. It is likely that *Cyclorana maini, Pseudophryne occidentalis, Neobatrachus kunapalari* and *Neobatrachus wilsmorei* would be found in the general area. These species, other than *P. occidentalis,* burrow into the ground and aestivate between rainfall events. *Pseudophryne occidentalis* find shelter under rocks and in crevices during the dry periods and enter temporary ponds to breed after major rainfall events. All four species have a wide-spread distribution and are abundant, and because of the ephemeral creek lines in the project area, some or all these species could be present. Clearing vegetation is likely to result in a loss of individuals within the disturbed area, however, is unlikely to have a significant impact on these species when assessed in a regional context.

5.2.2 Reptiles

Typically, between 25 and 35 species of reptiles are caught in open mulga woodland (Coffey Environments 2008a, Terrestrial Ecosystems 2010, 2011a, 2012i). None of the species likely to be in the project area are of conservation significance. There were no characteristics of the reptile assemblage surveyed in 2011 that indicated the fauna habitat present in the project area are of conservation significance or different to that in the neighbouring areas and given that there were large expanses of similar habitat in adjacent areas, clearing of the vegetation is unlikely to have significant impact on reptiles when assessed in a regional context.

Terrestrial Ecosystems' view is that the proposed clearing of the project area is unlikely to significantly impact on the reptile fauna of the bioregion.

5.2.3 Birds

The number of birds and bird species in the northern Goldfields fluctuates based on seasons and recent rainfall. Semi-arid and arid areas of inland Australia support a diverse range of transient and nomadic species that move through large areas in search of available resources. Heavy rain that is followed by flowering and seeding of many plant species is often sufficient to draw many of these nomadic species to the general area. These species move on to other areas once the resource is depleted or better resources are available in adjacent areas.

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 area include the Southern Whiteface, Peregrine Falcon and Princess Parrot. The Southern Whiteface is a small bush bird that is widespread and abundant in this bioregion. This bird will readily move if disturbed, so clearing the vegetation is unlikely to significantly impact on this species. The impact of a windfarm on avian fauna is unknown in this area.

The Princess Parrot is nomadic and moves around the arid interior often in search of water and resources and the Peregrine Falcon will normally have a very large home range and clearing a small section of vegetation in the project area, particularly when similar habitat exists in the adjacent areas, is unlikely to significantly impact on this species. All birds will readily shift to other areas when there is a disturbance.

Terrestrial Ecosystems' view is that the proposed vegetation clearing is unlikely to significantly impact on the avian fauna of the bioregion. The impact of a windfarm on avian fauna is unknown in this area.

5.2.4 Mammals

The diversity of small terrestrial mammals potentially caught in the project area would be low due the sparsely vegetated and degraded habitat. The capture of Long-tailed Dunnarts (Terrestrial Ecosystems 2011b, a) in the Granny Smith mining area was unexpected as they are rarely caught, not normally caught this far south and not normally caught in open, flat, mulga woodland with no spinifex, low shrubs and little ground cover. However, since those individuals were caught, this species has been recorded in other banded ironstone formations in the eastern Goldfields and recorded at Mt Weld approximately 10km to the north-east of the project area (Stantec 2020). It is possible that the Long-tailed Dunnart is present in the project area as there are rocky outcrops and banded ironstone formations, its preferred habitat.

There are no other mammals of conservation significance likely to be in the project area.

5.3 BIODIVERSITY VALUE

From a fauna perspective, the project area has been grazed resulting in degradation of the mulga and shrublands. The feral cat is present, and this species will over many years have had a significant impact on the native vertebrate fauna. The habitat types identified in the project area are also abundant in adjacent areas. There will be localised impacts from clearing however these will not be significant in a regional context.

5.3.1 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). There is likely to be a relatively low abundance of reptiles and mammals caught in the project area because of the sparseness of the vegetation, lack of leaf litter on the ground in many areas and degradation by cattle and feral fauna.

Vegetation clearing will increase the existing impact in the area, however, it is unlikely to have a significant impact on the vertebrate fauna.

5.3.2 Maintenance of threatened ecological communities

No threatened ecological fauna communities were identified in the project area.

5.3.3 Condition of fauna habitat

The uncleared fauna habitats present in the project area are generally in good to very good condition.

5.3.4 Ecological linkages

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

5.3.5 Size and scale of the proposed disturbance

The assessed project area is approximately 3,493ha, although the proposed disturbance area is much smaller. The project area represents a very small proportion of similar fauna habitat found in the adjacent area and the bioregion.

5.3.6 Abundance and distribution of similar habitat in the adjacent areas

Fauna habitats present in the project area are abundant in adjacent areas. It is therefore likely that the fauna assemblage in the project area is like the many square kilometres of similar habitat in adjacent areas and the bioregion.

5.3.7 Potential impacts on ecosystem function

Clearing native vegetation is likely to result in the loss of small vertebrate fauna that are unable to move away during the clearing process. The few larger animals, such as kangaroos and large goannas and snakes, and most of the birds will move into adjacent areas once clearing commences. There will be a small loss of native fauna to vehicle strikes on access tracks, but this will be very low. Shifting animals into adjacent areas may increase the pressure on resources in those areas and there may be some disruption to the ecosystems for a short period until a balance is restored.

Impacts associated with clearing vegetation in the project area in a local, landscape and bioregional context on the vertebrate fauna are likely to be low as it is a very small amount of clearing and there are vast tracts of similar habitat in adjacent areas.

6. POTENTIAL ENVIRONMENTAL IMPACTS

Vegetation clearing and development of the area will potentially affect vertebrate fauna in numerous ways, including death/injury of fauna during vegetation clearing, impacts with vehicles and the loss of habitat.

Although there are anticipated short term impacts on fauna, they are not likely to result in significant impacts on fauna habitat and fauna assemblages in the long term. The overall impact on fauna species and species of conservation significance will be minimal provided the recommended management procedures are implemented and adhered to.

6.1 DIRECT IMPACTS

6.1.1 Animal deaths during the clearing process and displacement of fauna

Clearing vegetation and activities associated with the development will result in the loss of some small fauna 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 may result in these individuals being adversely impacted when they attempt to escape. This loss of vegetation is unlikely to have a significant impact when considered in a bioregional context. 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.

Clearing large areas increases fauna habitat edges. Small mammals can respond both positively and negatively to edges depending on their ecological traits (Laurance 1991, 1994, Goosem and Marsh 1997, Goosem 2000). Edge and disturbance effects can lead to altered and most often higher levels of predation, restricting or increasing fauna movements and altering assemblage structure (Oxley et al. 1974, Paton 1994, Baker et al. 1998, Temple 1998, Luck et al. 1999, Goosem et al. 2001). Goldingay and Whelan (1997) and Clarke and Oldland (2007) reported that edge effects can extend up to 150-200m from the edge for some species, meaning the impact area on vertebrate fauna is likely to be larger than the cleared footprint.

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.

An assessment of the habitat types in the project area would indicate that 'edge effects' would be minimal.

6.1.2 Reduction or loss of activity areas and closure of burrows

Clearing vegetation and associated development activities are likely to destroy reptile and mammal burrows or foraging habitat that are currently in use or that 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.

6.2 INDIRECT IMPACTS

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. Vehicle tracks also have the propensity to develop weed infestations which can impact on natural fauna habitats. Cleared corridors can also provide improved predator access to areas, enhance the invasion of pest species into areas and may act as inhibitors or disrupt fauna migration and movement patterns.

There are numerous potential threats associated with vegetation clearing and development that could have an impact on the vertebrate fauna in the study area. Some of these are discussed below.

6.2.1 Habitat fragmentation

In addition to direct impacts of vegetation clearing, infrastructure including tracks, has the potential to fragment habitat. 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 development would be difficult to detect given our current knowledge of the spatial ecology for most of the small mammals known to be in the area. The project area contains sparse vegetation and existing vehicle tracks. The impacts of habitat fragmentation due to additional vehicle tracks would therefore be quite low.

6.2.2 Introduced fauna and weeds

House mice, foxes, cats and wild dogs are known to be established in the area and based on the tracks, scats and fauna observed during the field investigations there is a relatively high density of feral cats and dogs in the project 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 feral cat is a particularly damaging predator on native fauna and any increase in their numbers could have a detrimental effect on local native fauna (Kinnear 1993, Bamford 1995, Woinarski et al. 2017, Woinarski et al. 2018, Murphy et al. 2019); 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. Introduced plant species may replace native species that provide shelter or foraging areas for native fauna. Major changes to the structure of vegetation will alter the fauna habitat and consequently may influence fauna species composition. Preparing and implementing a weed management plan will largely reduce their threat to native fauna species.

6.2.3 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. Given the small size of the project area, and the likely low level of additional vehicle movements once the area becomes operational, the impacts of road fauna deaths is likely to be low.

6.2.4 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 numerous 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 in and adjacent to the project area due to the sparseness of the vegetation.

6.2.5 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 initial vegetation clearing and when development activity commences. The overall impact is likely to be confined to a relatively small area and is unlikely to be a significant impact.

6.2.6 Dust

Dust generated from shifting topsoil and increased 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 in areas adjacent to the mine. An effective dust management and monitoring program is required.

6.3 IMPACTS OF THE WIND TURBINES ON BIRDS AND BATS

Operational wind turbines present a risk to a range of birds and bats. The main risk is mortality through collision with moving turbine blades (blade-strike), although alienation (behavioural avoidance of suitable habitat near infrastructure) is also an important issue.

6.3.1 Collision impacts

Fatality and injury may be caused by collision with the moving blades, or by being swept down by the wake behind a blade (Winkleman 1994) or for microbats, via barotrauma. Barotrauma is a 'traumatic [usually fatal] respiratory tract injury caused as a result of a sudden air pressure differential that may occur near moving wind turbine rotors' (Environment Protection and Heritage Council 2010). For the purposes of this assessment, barotrauma and blade-strike are referred to collectively as 'collision' impacts. Key factors when considering the potential rates of collision at a wind farm include the proposed configuration in relation to habitat (such as good quality forest) and topographical features (such as steep slopes providing updraughts).

Birds and bats flying within or close to the rotor swept area (RSA) are at risk of collision impacts. The RSA is the area of air space defined by the rotation of the turbine blade. As well as direct collision with infrastructure, the rotating blades produce a wake which may draw animals into the blades; the wake is principally behind the turbine within the same plane (Sandersee 2009). The wind turbines therefore present a collision risk to birds and bats that fly within or close to RSA height, and the ground clearance of the RSA relative to the flying height of bird and bat species is therefore a key consideration.

6.3.2 Alienation impacts

Operational wind turbines may cause changes in bird and bat behaviour. This behaviour includes avoiding nesting or foraging resources or diverging around the broad area where turbines are located; this is termed an 'alienation' or 'barrier' effect. The turbines, in these instances, act to 'sterilise' otherwise suitable areas of habitat or movement pathways. Alienation may affect local sedentary birds in their daily traverses for foraging, roosting and breeding sites or may cause migratory birds to shift migratory flyways. Birds and bats may be forced to change their flight behaviour to avoid collisions with turbines, subsequently impacting on their breeding and foraging success (Drewitt and Langston 2006). Alienation of hunting habitat for raptors such as Wedge-tailed Eagles or other birds of prey may be of particular concern for local populations. The distance over which disturbance effects can extend from a wind farm varies. A distance of 600m is often reported as the zone of disturbance around turbines, however this ranges from 80m (for a grassland songbird), to 800m (for waterfowl) and four kilometres (for seabirds) (Sharp 2010).

For both collision and alienation impacts, many species appear to habituate to the presence of turbines, after an initial acclimation period, reducing the effect of these impacts (Auswind 2006, De Lucas et al. 2008).

In general, birds at risk of collision are those that frequent the rotor sweep area and not all species of birds are at equal risk of collision with turbines. Generally, the higher risk groups of birds are:

- Raptors – soaring birds use landform features such as elevation, ridges and slopes to cruise and take ascendance. Further, they are generally higher order species, meaning they are less abundant and therefore more susceptible to population level impacts.
- Passerines - Passerines have been among the most frequently reported fatalities at wind farms in Europe, America and Australia. Breeding birds in the vicinity of wind farms may be at greater collision risk if displaying aerial courtship. Migrating and nomadic passerines typically fly at altitudes of 150m or higher.
- Waterbirds - waterbird (i.e. grebes, cormorants, ducks, waders, cranes, rails, crakes, gulls, shorebirds) fatalities have been reported worldwide at wind farms close to staging, breeding and wintering areas.

Bats, specifically microbats, are also impacted by collision impacts at wind farms worldwide. Bat species at most risk are those that forage above canopy height (i.e. in open airspace) and move through their environment at higher speeds. These species are more likely to travel at blade-sweep height and collisions result either where the individual fails to detect the moving blades or is unable to manoeuvre around them.

There are five species of bats potentially in this part of the Goldfields (Table 12), and all are nocturnal, insectivorous, use echolocation to find food and roost in tree hollows. Bats are killed by wind-turbines (Hull and Cawthen 2013, Thompson et al. 2017, Smallwood et al. 2020, Davy et al. 2021), so it can be expected that a number of bats foraging at night in the vicinity of wind-turbines will be killed, and over time many of the local bats would be lost (Bennett et al. 2022) .

Table 12. Bat species potentially in the Goldfields

Species	Common name
Chalinolobus gouldii	Gould's Wattled Bat
Chalinolobus morio	Chocolate Wattled Bat
Nyctophilus geoffroyi	Lesser Long-eared Bat
Scotorepens balstoni	Inland Broad-nosed Bat
Vespadelus regulus	Southern Forest Bat

Birds are also killed by wind-turbines (Drewitt and Langston 2006, Perold et al. 2020, Smallwood et al. 2020, Chambert and Besnard 2021), so it can be expected that a small number of birds foraging in the vicinity of wind-turbines will be killed, and overtime some of the local birds would be lost (Chambert and Besnard 2021). In a summary of South African data (Perold et al. 2020), diurnal raptors were killed most often (36% of carcasses, 23 species) followed by passerines (30%, 49 species), waterbirds (11%, 24 species), swifts (9%, six species), large terrestrial birds (5%, 10 species), pigeons (4%, six species) and other near passerines (1%, seven species). So, a wide range of species will potentially be negatively impacted by wind-turbines.

Smallwood et al. (2020) indicated that bird and bat mortality increases with increasing wind energy capacity of wind-turbines. Arnett et al. (2010) reported that by increasing the wind-turbines cut-in speed (i.e. the lowest wind speed at which the turbine generates power) it reduced bat mortality 5.5 and 3.6 times compared with the normal operational cut-in speed; demonstrating that active management of wind-turbines could reduce bat, and probably bird mortality.

A thorough assessment of the potential impacts on the birds and bats can only be undertaken when the number of turbines, and location, size and speed of the turbines are known.

7. VERTEBRATE FAUNA RISK ASSESSMENT

7.1 RISK ASSESSMENT

Fauna surveys to support Environmental Impact Assessments (EIA) 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 13, 14 and 15 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 15.

Table 13. 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 study 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 study area.
4	Major	Significant impact on conservation significant fauna or their habitat in the study 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. May a referral to the Commonwealth under the EPBC Act 1999.	
Extreme	Unacceptable, project should be redesigned or not proceed.	

Table 14. 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 15. Assessed risk of potential impacts on the vertebrate fauna assemblage

			Before management			Management	With management		
			Inherent risk				Residual risk		
Factors	**Potential impacts**		**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.	A	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.	A	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				
	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				

			Before management			Management	With management		
Death or loss of conservation significant fauna	Malleefowl (*Leipoa ocellata*)	Death or the reduced viability of Malleefowl.	A	3	Low				
	Southern Whiteface (*Aphelocephala leucopsis*)	Loss of a Southern Whiteface or small population of Southern Whiteface	A	2	Low				
	Peregrine Falcon (*Falco peregrinus*)	Death or the reduced viability of the Peregrine Falcon.	A	2	Low				
	Fork-tailed Swift (*Apus pacificus*)	Death or the reduced viability of Fork-tailed Swift.	A	2	Low				
	Long-tailed Dunnart (*Antechinomys longicaudata*)	Loss of a Long-tailed Dunnart or small population of Long-tailed Dunnart	A	2	Low		C	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 as they crossroads by vehicles	E	1	Low	Limiting speeds	E	1	Low
	Increase in feral mammals, specifically wild dog and feral cats	Increased predation on the native fauna	C	2	Low				
Wind turbine impacts	Impacts on birds and bats due to an operating wind farm	Death, injury or changed behaviour due to collision or avoidance impacts to a species	D	3	High	Further assessment, modified design and monitoring	D	2	Mod

7.2 NATIVE VEGETATION CLEARING PRINCIPLES AS THEY PERTAIN TO VERTEBRATE FAUNA

The *Environmental Protection Act (1986)* outlines 10 principles that are to be used in the assessment of native vegetation clearing permit applications which are also applicable for other assessments and approvals (Table 16). Where possible, native vegetation should not be cleared if any of the following principles are compromised.

Table 16. 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. The project area is likely to support a small population of Southern Whiteface, a small bush bird listed as vulnerable under the *EPBC Act*. This bird is widespread in this part of the Goldfields and will move it disturbed. There is a possibility that the larger BIFs in the project area support a small population of Long-tailed Dunnarts, a Priority 4 species with DBCA. It is unlikely that clearing the vegetation and earth works would have a significant impact on this species when considered in a bioregional context, as there are other BIFs in the Goldfields that would support this species.
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 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.
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 CRITERIA FOR ASSESSING POTENTIAL IMPACTS ON VULNERABLE SPECIES

The significance of potential impacts of vegetation clearing in the project area is assessed in accordance with the criteria in the Commonwealth Government's significant impact assessment criteria (Department of the Environment 2013) in Table 17.

Table 17. Criteria for assessing the potential impacts on Southern Whiteface

(taken from: Department of the Environment 2013)

Vulnerable Species	Southern Whiteface
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
• lead to a long-term decrease in the size of an important population of a species	No
• reduce the area of occupancy of an important population	No
• fragment an existing important population into two or more populations	No
• adversely affect habitat critical to the survival of a species	No
• disrupt the breeding cycle of an important population	No
• modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No
• result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	No
• introduce disease that may cause the species to decline, or	No
• interfere substantially with the recovery of the species.	No
• modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No

This small bush bird is abundant and widespread in the bioregion and will readily move if disturbed, so is unlikely to be significantly impacted by vegetation clearing. Based on the assessment using criteria in the Commonwealth Government's significant impact assessment criteria (Department of the Environment 2013) the proposed vegetation clearing will not have a significant impact on this species.

7.4 REFERRAL UNDER THE EPBC ACT

The project area is likely to support Southern Whiteface (listed as vulnerable under the *EPBC Act 1999*), however, the proposed vegetation clearing is unlikely to significantly impact this species or any other conservation significant vertebrate fauna species, so a referral under the *EPBC Act* is not recommended. The potential impacts of wind turbines are unknown at this stage and the recommendation to refer will need to be reconsidered when the design and potential impacts on wind turbines are known.

8. SUMMARY

Granny Smith Mining is proposing to increase the area of its renewable energy area. Two areas (i.e. ~150ha and 240ha) within the project area were previously assessed (Terrestrial Ecosystems 2018b, 2022). This assessment consolidated the fauna habitats for these two areas and the larger area was assessed in November 2023 for a total area of 941ha.

Based on a field assessment and vegetation mapping undertaken by Native Vegetation Solutions, the following six broad fauna habitats are present in the project area:

- Banded ironstone formation (BIF);
- Open Mulga;
- Mulga over ironstone gravel;
- Mulga over chenopod;
- Chenopod;
- Tecticornia; and
- Disturbed areas.

The density of trees and shrubs in the relatively undisturbed areas varied across the project area but the vegetation was mostly sparse. The fauna habitat varied from highly degraded to good with the more degraded areas being due to a haul road that runs east-west through the project area, the solar farm that is now present in an earlier assessed area, gravel tracks, historical exploration activity and cattle grazing.

The Southern Whiteface (listed as Vulnerable under the *EPBC Act*) has been recorded in Granny Smith mining tenements and in other fauna surveys in the adjacent area, so it is likely to be present in low numbers in the project area. This small bush bird is relatively abundant in this part of the Goldfields and will readily move if disturbed, so vegetation clearing is unlikely to significantly impact on this species. Banded ironstone formations (BIFs) which are the preferred habitat of the Long-tailed Dunnart, a Priority 4 species with DBCA, is likely to be present in the project area. The BIFs represents only a small percentage of the project area, and clearing it is unlikely to have a significant impact on Long-tailed Dunnarts, when viewed in a bioregional context. Clearing native vegetation in other habitat types is likely to result in the loss of small vertebrate fauna on-site that are unable to move away during the clearing process. The few larger animals, such as kangaroos and large goannas and snakes, and most of the birds will move into adjacent areas once clearing commences.

Impacts associated with clearing vegetation in the project area in a landscape or bioregional context on the vertebrate fauna are likely to be low as there are vast tracts of similar habitat in adjacent areas.

Operational wind turbines present a risk to a range of birds and bats. The main risk is mortality through collision with moving turbine blades (blade-strike), although alienation (behavioural avoidance of suitable habitat near infrastructure) is also an important issue. A thorough assessment of the potential impacts on the birds and bats can only be undertaken when the number of turbines, and location, size and speed of the turbines are known.

The proposed vegetation clearing is unlikely to significantly impact on a conservation significant species, so a referral under the *EPBC Act* is not recommended. However, the potential impacts of wind turbines are unknown at this stage.

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. Specific management and mitigation strategies to address potential impacts should be addressed in the recommended Vertebrate Fauna Management Plan.

9.1 INDUCTION AND AWARENESS

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

Recommendation 1: An induction program that includes a component on managing fauna is mandatory for staff working in the project area.

Recommendation 2: Information on protecting fauna and reporting deaths and sightings of feral fauna or conservation significant species should be incorporated into the induction program.

9.2 DUST

Dust generated from the vegetation clearing and development 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.

Recommendation 3: The impact of dust on adjacent vegetation and fauna habitat is managed against appropriate KPIs and in accordance with the clients' dust management protocols.

9.3 MINIMISING HABITAT FRAGMENTATION

Loss of vegetation and habitat may contribute to the decline in the number of fauna on and in the vicinity of project area. Where possible, access routes should be aligned to existing tracks and other barriers or follow the boundaries of broad-scale vegetation associations in the area to minimise the impact on the terrestrial fauna, which are often dependent upon specific habitat types. Clearing should be minimised wherever possible and fragmentation of remnant vegetation should be avoided wherever possible. Once areas are no longer required then they should be rehabilitated.

Recommendation 4: All areas disturbed during exploration construction are rehabilitated as soon as practical after they are no longer required.

Recommendation 5: Where possible, access routes are aligned to existing roads, tracks and other barriers or follow the boundaries of broad-scale vegetation associations in the area.

Recommendation 6: Avoid the banded ironstone hills and ridges, and mine adits**.**

9.4 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 around the site.

Based on regional data it is highly probable that the study area currently supports a population of feral cats. Reducing the impacts of feral cats will reduce the stress on fauna and fauna assemblages in the area.

Increased activity will result in increased traffic and a consequential increase in the fauna deaths on tracks and roads. Limiting vehicle speeds on access roads can reduce collisions with fauna, particularly larger animals such as kangaroos and emus. Dead animals on the road also have the propensity to attract raptors, goannas and even cattle, which are then likely to be killed.

Recommendation 7: Pets are not permitted on site.

Recommendation 8: All waste and rubbish be contained in bins and regularly removed from the project or placed in land fill and suitably covered to exclude access to predator species.

Recommendation 9: Feeding of native fauna is prohibited.

Recommendation 10: Feral animal management is undertaken in cooperation with neighbouring operations.

9.5 UNCAPPED DRILL HOLES

Uncapped drill holes can pose a serious threat to small animals, including ground dwelling reptiles, frogs and small mammals. A log of all on-site drill holes should be maintained detailing when they were capped, how and by whom. All drill holes should be temporarily capped on completion of drilling and permanently capped or closed as soon as possible after exploration activities have ceased.

Recommendation 11: A log of all on-site drill holes be maintained detailing when they were capped, how and by whom.

9.6 VERTEBRATE FAUNA MANAGEMENT PROTOCOL

Vertebrate fauna management protocols should be implemented that avoid, mitigate and minimise impacts on fauna during the vegetation clearing, infrastructure development and operational phase. These protocols deal with the method of vegetation clearing, reducing fauna deaths on the roads, the impacts of artificial light spill, vibration, dust, feral species management, monitoring and recording conservation species, monitoring impacts on fauna in adjacent areas, staff inductions, etc.

Management of secondary impacts to habitat and fauna should be addressed in Vertebrate Fauna Management Protocols. These should include:

- Control and reduction methods for feral and pest fauna;
- Management of pets on site;
- Habitat fragmentation and barriers to fauna movement;
- Vegetation clearing and development protocols;

- Vehicle impacts on vertebrate fauna (short and long term);
- Vehicle speed limits on site; and
- Anthropogenic activity.

> **Recommendation 12:** Vertebrate fauna management protocols are prepared and implemented for the life of the operation.

9.7 IMPACTS OF WIND TURBINES

The operation of wind turbines can have direct and indirect impacts on birds and bats. When the number of turbines, and location, size and speed of the turbines are known a assessment of the potential impacts on birds and bats can be undertaken.

> **Recommendation 13:** An assessment of the potential impacts of operating wind turbines is undertaken prior to their construction and operation in the area.

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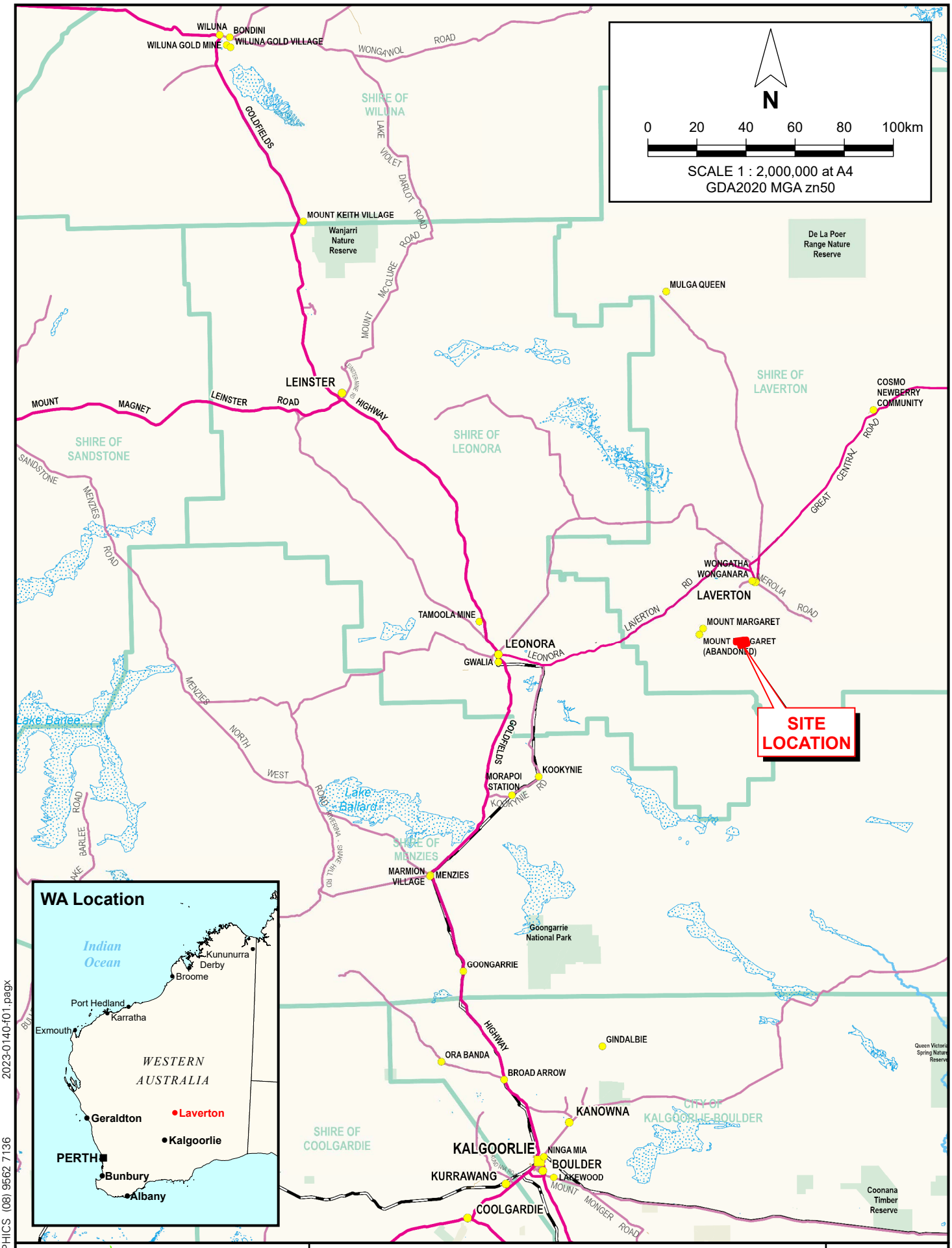
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Figures

Basic Vertebrate Fauna Assessment
Expansion of the Renewable Energy Zone





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TERRESTRIAL ECOSYSTEMS

Drawn: G. Thompson | Date: 4 Feb 2024

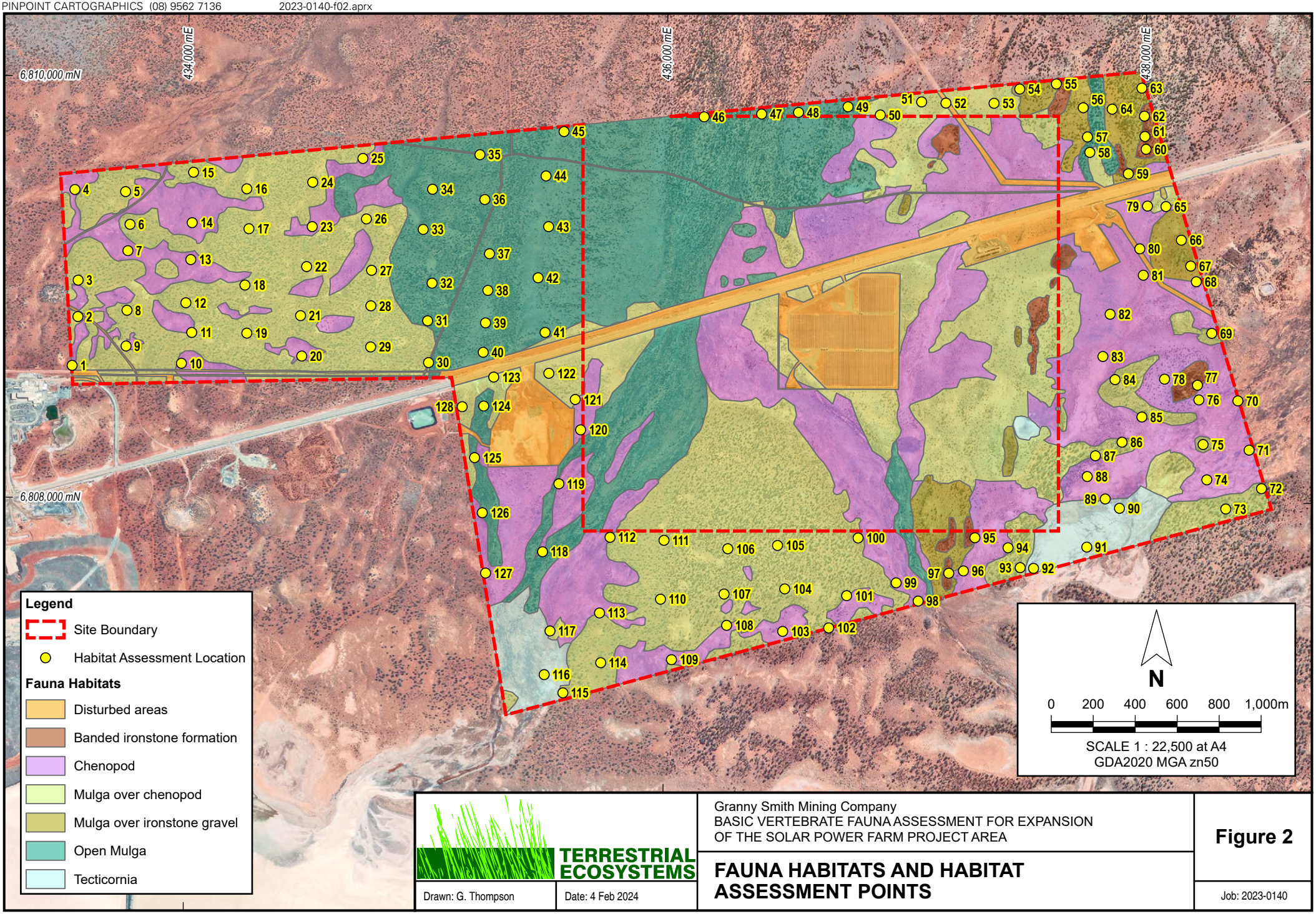
Granny Smith Mining Company
BASIC VERTEBRATE FAUNA ASSESSMENT FOR EXPANSION OF THE SOLAR POWER FARM PROJECT AREA

REGIONAL LOCATION

Figure 1

Job: 2023-0140

PINPOINT CARTOGRAPHICS (08) 9562 7136 2023-0140-f02.aprx



TERRESTRIAL ECOSYSTEMS

Granny Smith Mining Company
BASIC VERTEBRATE FAUNA ASSESSMENT FOR EXPANSION OF THE SOLAR POWER FARM PROJECT AREA

FAUNA HABITATS AND HABITAT ASSESSMENT POINTS

Figure 2

Drawn: G. Thompson | Date: 4 Feb 2024 | Job: 2023-0140

Appendix A. Results of the EPBC Act Protected Matters Search

Basic Vertebrate Fauna Assessment
Expansion of the Renewable Energy Zone



Australian Government

Department of Climate Change, Energy, the Environment and Water

EPBC Act Protected Matters Report

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

Report created: 29-Jan-2024

Summary

Details

- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat

Acknowledgements

Summary

Matters of National Environment Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	9
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Lands:	5
Commonwealth Heritage Places:	None
Listed Marine Species:	11
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	6
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		
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	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 likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area
MAMMAL		
Sminthopsis psammophila Sandhill Dunnart [291]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
REPTILE		
Liopholis kintorei		
Great Desert Skink, Tjakura, Warrarna, Mulyamiji, Tjalapa, Nampu [83160]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species

[Resource Information]

Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
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 may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]	Endangered	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
Defence	
Defence - JINDALEE STATION [50257]	WA
Defence - JINDALEE STATION [50256]	WA
Unknown	
Commonwealth Land - [51827]	WA
Commonwealth Land - [51829]	WA
Commonwealth Land - [51828]	WA

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within 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

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

Extra Information

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Mt Weld Rare Earths Project ? Life of Mine Proposal	2023/09681		Referral Decision
Redcliffe Gold Project	2023/09452		Completed
Not controlled action			
Eastern Goldfields Gas Pipeline Construction, WA	2014/7284	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV,	2015/7522	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
sthrn two thirds of Australia			
Murrin Murrin East Nickel and Cobalt Mine Expansion	2008/4140	Not Controlled Action	Completed
Re-establish and Recommencement of Mount Windarra Nickel Mine	2008/4016	Not Controlled Action	Completed

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

Basic Vertebrate Fauna Assessment
Expansion of the Renewable Energy Zone



		Surveys	A																										B										
Family	**Species**	**Common Name**	**Site 1E**	**Site 1W**	**Site SS18**	**Site SS21**	**Site SS1**	**Site 1W08**	**Site LL4**	**Site LL5**	**Site SS19**	**Site SS20**	**Site LL3**	**Site LL6**	**Site SS22**	**Site LL1**	**Site LL2**	**Site SS23**	**Site 2**	**Site 3**	**Site 6**	**Site 7**	**Site 8**	**Site 1**	**Site 4**	**Site 5**	**Pundin**	**Wells**	**Site 2**	**Site 10**	**Site 21**	**Site 18**	**Site 21a**	**Site 9**	**Weebo**	**Site 17**	**Opportunistic**
Frogs																																							
Hylidae	*Cyclorana maini*	Sheep Frog	4	1	2	1																					1	2	4	1	2						
Limnodynastidae	*Neobatrachus kunapalari*	Kunapalari Frog	6	5	7		1	2	1	2	1	4																				1					
	Neobatrachus wilsmorei	Goldfields Bullfrog																												1	8	5	2				
	Platyplectrum spenceri	Spencer's Burrowing Frog																										3		6							
Reptiles																																							
Agamidae	*Ctenophorus caudicinctus*	Ring-tailed Dragon		2			3																				8										
	Ctenophorus fordi	Mallee Dragon	5																											14				19			
	Ctenophorus inermis	Military Dragon	2	6		1					1	1	1															5	1	2			2		1		
	Ctenophorus isolepis	Crested Dragon	7	2		3		1	4					1	3																	4				1	
	Ctenophorus reticulatus	Western Netted Dragon	2	2							2																										
	Ctenophorus salinarum	Saltpan Dragon	3	1												1	5										1							6			
	Ctenophorus scutulatus	Lozenge-marked Dragon	1										1																								
	Diporiphora amphiboluroides	Mulga Dragon		1			1																														
	Moloch horridus	Thorny Devil	3												1															1	1	2	1				
	Pogona minor	Dwarf Bearded Dragon	2	2					2	1			1																2	1							
Carphodactylidae	*Nephrurus vertebralis*	Midline Knob-tail																											1								
	Underwoodisaurus milii	Barking Gecko	1																																		
Diplodactylidae	*Diplodactylus pulcher*	Fine-faced Gecko			1	2																					2										
	Lucasium squarrosum	Mottled Ground Gecko	1													1																	18				

		Surveys	A																									B										
Family	**Species**	**Common Name**	**Site 1E**	**Site 1W**	**Site SS18**	**Site SS21**	**Site SS1**	**Site 1W08**	**Site LL4**	**Site LL5**	**Site SS19**	**Site SS20**	**Site LL3**	**Site LL6**	**Site SS22**	**Site LL1**	**Site LL2**	**Site SS23**	**Site 2**	**Site 3**	**Site 6**	**Site 7**	**Site 8**	**Site 1**	**Site 4**	**Site 5**	**Pundin**	**Wells**	**Site 2**	**Site 10**	**Site 21**	**Site 18**	**Site 21a**	**Site 9**	**Weebo**	**Site 17**	**Opportunistic**
	Strophurus elderi	Jewelled Gecko											1																		1	10				
	Strophurus strophurus	Western Spiny-tailed Gecko	1					1																													
	Strophurus wellingtonae	Shield Spiny-tailed Gecko	1	1	1	1	1																														
Elapidae	*Brachyurophis semifasciata*	Half-girdlerd Snake																											1		1						
	Furina ornata	Orange-naped Snake	2																																		
	Pseudechis australis	Mulga Snake	1																																		
	Pseudonaja mengdeni	Gwardar		1																											1						
	Pseudonaja modesta	Ringed Brown Snake																														1					
	Simoselaps bertholdi	Jan's Banded Snake	1																																		
Gekkonidae	*Gehyra purpurascens*	Purplish Dtella	1							1																		10								3	
	Gehyra variegata	Tree Dtella	25	2		1	8			1			1			1											5	7	3		3	2	1	3		1	
	Heteronotia binoei	Bynoe's Prickly Gecko	5	2			2																					3	1			1					
	Rhynchoedura ornata	Western Beaked Gecko	2	1			4																						2	2	6	3				1	
Pygopodidae	*Delma butleri*	Unbanded Delma			1				1																							1	1				
	Delma nasuta	Sharp-snouted Delma							1				1	3	1			1																			
	Lialis burtonis	Burton's Snake-lizard	1																												1	2	1			1	
	Pygopus nigriceps	Western Hooded Scaly-foot																														1					
Scincidae	*Cryptoblepharus buchananii*	Buchanan's Snake-eyed Skink	3													1																					
	Ctenotus ariadnae	Ariadna's Ctenotus				4																															
	Ctenotus atlas	Southern Mallee Ctenotus																												1							

		Surveys	A																										B											
Family	**Species**	**Common Name**	**Site 1E**	**Site 1W**	**Site SS18**	**Site SS21**	**Site SS1**	**Site 1W08**	**Site LL4**	**Site LL5**	**Site SS19**	**Site SS20**	**Site LL3**	**Site LL6**	**Site SS22**	**Site LL1**	**Site LL2**	**Site SS23**	**Site 2**	**Site 3**	**Site 6**	**Site 7**	**Site 8**	**Site 1**	**Site 4**	**Site 5**	**Pundin**	**Wells**	**Site 2**	**Site 10**	**Site 21**	**Site 18**	**Site 21a**	**Site 9**	**Weebo**	**Site 17**	**Opportunistic**
	Ctenotus calurus	Blue-tailed Finesnout Ctenotus				1																																	
	Ctenotus grandis	Grand Ctenotus		1																										1				1	
	Ctenotus greeri	Spotted-necked Ctenotus							2																												
	Ctenotus helenae	Clay-soil Ctenotus	3	1		2			3																				6		4	1				
	Ctenotus leonhardii	Leonhardi's Ctenotus		2	5	1					2															2		1	5	16	1	1	2			
	Ctenotus pantherinus	Leopard Skink						1	6				1					1																		
	Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus						2							1														1		5					
	Ctenotus schevilli	Scheville's Ctenotus						2							1																					
	Ctenotus schomburgkii	Schomburgk's Ctenotus							3																					3						
	Egernia depressa	Pygmy Spiny-tailed Skink		1	6	2			3		3	1															2									
	Egernia formosa	Goldfields Crevice-skink		2								1																						2		
	Eremiascincus richardsonii	Broad-banded Sand Swimmer					2																													
	Lerista bipes	North-western Sandslider					1																													
	Lerista desertorum	Central Desert Robust Slider	1							1		1	1			1											4	2				2			5	
	Lerista sp.		4								1	1				1	1									1	4	2					2		1	
	Liopholis inornata	Desert Skink																												1	1					
	Liopholis striata	Nocturnal Desert Skink																												1						
	Menetia greyii	Common Dwarf Skink	2										1			1																1				
	Morethia butleri	Woodland Morethia Skink	2	3	1		3																											1		

		Surveys	A																										B										
Family	**Species**	**Common Name**	**Site 1E**	**Site 1W**	**Site SS18**	**Site SS21**	**Site SS1**	**Site 1W08**	**Site LL4**	**Site LL5**	**Site SS19**	**Site SS20**	**Site LL3**	**Site LL6**	**Site SS22**	**Site LL1**	**Site LL2**	**Site SS23**	**Site 2**	**Site 3**	**Site 6**	**Site 7**	**Site 8**	**Site 1**	**Site 4**	**Site 5**	**Pundin**	**Wells**	**Site 2**	**Site 10**	**Site 21**	**Site 18**	**Site 21a**	**Site 9**	**Weebo**	**Site 17**	**Opportunistic**
	Tiliqua multifasciata	Centralian Blue-tongued Lizard		2																																		
	Tiliqua occipitalis	Western Blue-tongued Lizard	2			1																																
Typhlopidae	*Anilios hamatus*	Pale-headed Blind Snake					1						1																	1	1	1	1	2				
	Anilios waitii	Waite's Blind Snake																											2									
Varanidae	*Varanus brevicauda*	Short-tailed Pygmy Monitor							1								1																					
	Varanus caudolineatus	Stripe-tailed Monitor	1		2					1		3																		2		1						
	Varanus eremius	Pygmy Desert Monitor																													4							
	Varanus giganteus	Perentie																										1										
	Varanus gouldii	Gould's Goanna	1																											1	1							
	Varanus panoptes	Yellow-spotted Monitor					1																					1										
	Varanus tristis	Black-headed Monitor																											1									
Cheluidae	*Chelodina steindachneri*	Steindachner's Turtle																											1									
Birds																																						
Casuariidae	*Dromaius novaehollandiae*	Emu				1							2				1																					1
Anatidae	*Tadorna tadornoides*	Australian Shelduck	1	1																									1	1			7				
	Chenonetta jubata	Australian Wood Duck	1																										37									
	Malacorhynchus membranaceus	Pink-eared Duck	1																																			
	Anas gracilis	Grey Teal	1	1																									41									
	Anas superciliosa	Pacific Black Duck	1																																			
Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe	1																										2									

		Surveys	A																										B										
Family	**Species**	**Common Name**	**Site 1E**	**Site 1W**	**Site SS18**	**Site SS21**	**Site SS1**	**Site 1W08**	**Site LL4**	**Site LL5**	**Site SS19**	**Site SS20**	**Site LL3**	**Site LL6**	**Site SS22**	**Site LL1**	**Site LL2**	**Site SS23**	**Site 2**	**Site 3**	**Site 6**	**Site 7**	**Site 8**	**Site 1**	**Site 4**	**Site 5**	**Pundin**	**Wells**	**Site 2**	**Site 10**	**Site 21**	**Site 18**	**Site 21a**	**Site 9**	**Weebo**	**Site 17**	**Opportunistic**
Columbidae	*Phaps chalcoptera*	Common Bronzewing					3			4																					4						54
	Phaps histrionica	Flock Bronzewing																											22		38	21				33	1
	Ocyphaps lophotes	Crested Pigeon		11	5		17		5	4	2					2																						
	Geopelia cuneata	Diamond Dove								8																												
Podargidae	*Podargus strigoides*	Tawny Frogmouth	1																												2						
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar																												1	2						
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar	1								1																				7	2				1	1
Otididae	*Ardeotis australis*	Australian Bustard	1																																		
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant	1																																		
Ardeidae	*Ardea pacifica*	White-necked Heron	1	1																																	1
	Egretta novaehollandiae	White-faced Heron	1																										1								1
Accipitridae	*Haliastur sphenurus*	Whistling Kite																											6	1							
	Accipiter cirrocephalus	Collared Sparrowhawk					2																						5								
	Circus assimilis	Spotted Harrier	1																																		
	Aquila audax	Wedge-tailed Eagle					2						4			8	3												1			1					1
	Hieraaetus morphnoides	Little Eagle	1																										3								
Falconidae	*Falco cenchroides*	Nankeen Kestrel				3	3			1	1	2				1	2													1				1		1	
	Falco berigora	Brown Falcon			4		2				3		1																					1			
	Falco longipennis	Australian Hobby	1																										2								
	Falco peregrinus	Peregrine Falcon																											1								
Rallidae	*Tribonyx ventralis*	Black-tailed Native-hen	1																																		

		Surveys	A																									B										
Family	**Species**	**Common Name**	**Site 1E**	**Site 1W**	**Site SS18**	**Site SS21**	**Site SS1**	**Site 1W08**	**Site LL4**	**Site LL5**	**Site SS19**	**Site SS20**	**Site LL3**	**Site LL6**	**Site SS22**	**Site LL1**	**Site LL2**	**Site SS23**	**Site 2**	**Site 3**	**Site 6**	**Site 7**	**Site 8**	**Site 1**	**Site 4**	**Site 5**	**Pundin**	**Wells**	**Site 2**	**Site 10**	**Site 21**	**Site 18**	**Site 21a**	**Site 9**	**Weebo**	**Site 17**	**Opportunistic**
	Fulica atra	Eurasian Coot	1																																		
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew		1																																	
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt	1																																		
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover	1																																		
	Elseyornis melanops	Black-fronted Dotterel	1																																		
	Vanellus tricolor	Banded Lapwing	1				2																						1								1
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	1																																		
Turnicidae	*Turnix velox*	Little Button-quail																													1		1				
Cacatuidae	*Eolophus roseicapillus*	Galah					124		26	4	19					10													1	1		9				1	1
	Nymphicus hollandicus	Cockatiel				21	4		15	12						20													9	1	1	1		1			1
Psittacidae	*Barnardius zonarius*	Australian Ringneck			2		5		3	4	2	2	3			2													115		7	13				1	1
	Psephotus varius	Mulga Parrot				4				9																											1
	Melopsittacus undulatus	Budgerigar			16	18	5		6	9	5	29	6			5	8												1	1	1	1	1	1		1	1
	Neopsephotus bourkii	Bourke's Parrot			2		3			6																					9						1
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-cuckoo			2	3	1			1																			1	5		1		5			1
	Cacomantis pallidus	Pallid Cuckoo	1			1					1																		1		3						2
Halcyonidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher	1			1																															1
Climacteridae	*Climacteris affinis*	White-browed Treecreeper	1		9																										3	13				2	
Ptilonorhynchidae	*Ptilonorhynchus maculatus*	Spotted Bowerbird					2																								4					4	1
Maluridae	*Malurus leucopterus*	White-winged Fairy-wren										2	69				57													143				142			1
	Malurus lamberti	Variegated Fairy-wren								2																											

		Surveys	A																												B									
Family	**Species**	**Common Name**	**Site 1E**	**Site 1W**	**Site SS18**	**Site SS21**	**Site SS1**	**Site 1W08**	**Site LL4**	**Site LL5**	**Site SS19**	**Site SS20**	**Site LL3**	**Site LL6**	**Site SS22**	**Site LL1**	**Site LL2**	**Site SS23**	**Site 2**	**Site 3**	**Site 6**	**Site 7**	**Site 8**	**Site 1**	**Site 4**	**Site 5**	**Pundin**	**Wells**	**Site 2**	**Site 10**	**Site 21**	**Site 18**	**Site 21a**	**Site 9**	**Weebo**	**Site 17**	**Opportunistic**
Acanthizidae	*Smicrornis brevirostris*	Weebill					10		8	6																			350			5				71	
	Gerygone fusca	Western Gerygone																											17							1	
	Acanthiza robustirostris	Slaty-backed Thornbill					10																														
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill			11		1			3																			30		2	1					1
	Acanthiza uropygialis	Chestnut-rumped Thornbill		1	40	22	19		3	20	8		3																		37				2	1
	Acanthiza apicalis	Inland Thornbill								8																					2						
	Aphelocephala leucopsis	Southern Whiteface			17		2			9	12																										
Pardalotidae	*Pardalotus striatus*	Striated Pardalote		1												2													188			1				4	
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater			1	3			2	4	1	1																			23	7				20	1
	Lichenostomus virescens	Singing Honeyeater			4	4	3			20	1	13	1																1	1		2				6	1
	Lichenostomus penicillatus	White-plumed Honeyeater		1																																	
	Purnella albifrons	White-fronted Honeyeater			2	8	2		33	17		6	40			81	99													1	3	3				2	
	Manorina flavigula	Yellow-throated Miner																											216		9	17				32	1
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater			34	1	11		5	32	2	1	12																1		24	8				23	
	Epthianura tricolor	Crimson Chat				3				11	28	55	43			20														1	47	4		44		1	1
	Epthianura aurifrons	Orange Chat																												8				14			
	Sugomel niger	Black Honeyeater	1																																		
	Lichmera indistincta	Brown Honeyeater		1						1																											
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler					34			22		2																			4						
Psophodidae	*Cinclosoma cinnamomeum*	Cinnamon Quail-thrush					1					2																									
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella				12																															

		Surveys	A																										B										
Family	**Species**	**Common Name**	**Site 1E**	**Site 1W**	**Site SS18**	**Site SS21**	**Site SS1**	**Site 1W08**	**Site LL4**	**Site LL5**	**Site SS19**	**Site SS20**	**Site LL3**	**Site LL6**	**Site SS22**	**Site LL1**	**Site LL2**	**Site SS23**	**Site 2**	**Site 3**	**Site 6**	**Site 7**	**Site 8**	**Site 1**	**Site 4**	**Site 5**	**Pundin**	**Wells**	**Site 2**	**Site 10**	**Site 21**	**Site 18**	**Site 21a**	**Site 9**	**Weebo**	**Site 17**	**Opportunistic**
Campephagidae	*Coracina maxima*	Ground Cuckoo-shrike															3																				1
	Coracina novaehollandiae	Black-faced Cuckoo-shrike			1	1							1			2	2												20		12	1				9	1
	Lalage sueurii	White-winged Triller			2	7				1	1	7	11																								
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler			7	11	1		1	18																			7		12	2	2			6	
	Colluricincla harmonica	Grey Shrike-thrush				1	4			1		1																									
	Oreoica gutturalis	Crested Bellbird			3	8	6		2	18	7	1	17																		15	6				7	
Artamidae	*Artamus personatus*	Masked Woodswallow			99	21	43			1		119																		1	2			20		10	
	Artamus superciliosus	White-browed Woodswallow		1																																	
	Artamus cinereus	Black-faced Woodswallow			3	5			1	1	16	9	23			43	1												1	8	37	27		5		18	1
	Cracticus torquatus	Grey Butcherbird							1																				2		1	6		2		1	1
	Cracticus nigrogularis	Pied Butcherbird			1		5		1	3			15			5	2												55	1		2		3		28	1
	Cracticus tibicen	Australian Magpie	1																										31								1
	Strepera versicolor	Grey Currawong	1				1																														
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail			1	7	4		1	7	2	1	3			2														5	2	2			2	1
Corvidae	*Corvus bennetti*	Little Crow			7		2										10												231	15	48	14		34		46	1
	Corvus orru	Torresian Crow																											1			1		1			
Monarchidae	*Grallina cyanoleuca*	Magpie-lark	1																										17								1
Petroicidae	*Microeca fascinans*	Jacky Winter								3			1																								
	Petroica goodenovii	Red-capped Robin			18	8	11			33	2		12																4	4	22	7		1		4	
	Melanodryas cucullata	Hooded Robin			3	4	3			5	9	6	3																	1	7					4	
Megaluridae	*Cincloramphus mathewsi*	Rufous Songlark	1									1																									

		Surveys	A																										B										
Family	**Species**	**Common Name**	**Site 1E**	**Site 1W**	**Site SS18**	**Site SS21**	**Site SS1**	**Site 1W08**	**Site LL4**	**Site LL5**	**Site SS19**	**Site SS20**	**Site LL3**	**Site LL6**	**Site SS22**	**Site LL1**	**Site LL2**	**Site SS23**	**Site 2**	**Site 3**	**Site 6**	**Site 7**	**Site 8**	**Site 1**	**Site 4**	**Site 5**	**Pundin**	**Wells**	**Site 2**	**Site 10**	**Site 21**	**Site 18**	**Site 21a**	**Site 9**	**Weebo**	**Site 17**	**Opportunistic**
	Cincloramphus cruralis	Brown Songlark	1									1																		23				18			1
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow	1																																		
	Hirundo nigricans	Tree Martin	1																																		1
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird				3	1		4	7																			1		1	4				1	
Estrildidae	*Taeniopygia guttata*	Zebra Finch			12		99			22	2	4																	27		16	8		8		6	1
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit			1					2	1	7	5				4													9				43			1
Mammals																																						
Bovidae	*Bos taurus*	Cow		4																								1						1			
	Capra hircus	Goat																									1	1	1	1	1	1	1	1			
	Ovis aries	Sheep		10																							1	1	1	1	1	1	1	1		1	
Camelidae	*Camelus dromedarius*	Dromedary	1		1						1					1																						
Felidae	*Felis catus*	House Cat	2																												1		1				
Molossidae	*Austronomus australis*	White-striped Free-tail Bat																	1	1	1	1	1														
	Ozimops planiceps	Southern Free-tail Bat	2	3															1		1	1		1													
Pteropodidae	*Syconycteris australis*	Common Blossom-bat	2	9																																	
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	5	14			1				1								1	1	1		1	1	1	1	2			5					1		
	Nyctophilus geoffroyi	Lesser Long-eared Bat	5	13						4									1	1	1		1	1			28			4							
	Scotorepens balstoni	Inland Broad-nosed Bat	6	21			1												1	1	1		1	1	1	1											
	Scotorepens greyii	Little Broad-nosed Bat																									10										
	Vespadelus finlaysoni	Finlayson's Cave Bat		3			1													1	1				1												
	Vespadelus regulus	Southern Forest Bat																									2										

		Surveys	A																										B										
Family	**Species**	**Common Name**	**Site 1E**	**Site 1W**	**Site SS18**	**Site SS21**	**Site SS1**	**Site 1W08**	**Site LL4**	**Site LL5**	**Site SS19**	**Site SS20**	**Site LL3**	**Site LL6**	**Site SS22**	**Site LL1**	**Site LL2**	**Site SS23**	**Site 2**	**Site 3**	**Site 6**	**Site 7**	**Site 8**	**Site 1**	**Site 4**	**Site 5**	**Pundin**	**Wells**	**Site 2**	**Site 10**	**Site 21**	**Site 18**	**Site 21a**	**Site 9**	**Weebo**	**Site 17**	**Opportunistic**
Dasyuridae	*Antechinomys laniger*	Kultarr		2	6	3					2	3																						1			
	Ningaui ridei	Wongai Ningaui		1	2	3	1		5		1	1		1	7														7	2	8	2	4			
	Pseudantechinus woolleyae	Woolley's False Antechinus					1																													
	Sminthopsis crassicaudata	Fat-tailed Dunnart											1			4	7												3							
	Sminthopsis dolichura	Little Long-tailed Dunnart																										1			1					
	Sminthopsis hirtipes	Hairy-footed Dunnart												2	8			1											1			1				
	Sminthopsis macroura	Stripe-faced Dunnart			10					3	7	10	2				1													2			1			
	Sminthopsis ooldea	Ooldea Dunnart				2	2		2		2		1			1												1		2						
Macropodidae	*Osphranter robustus*	Euro	3	12	1		7				1	1			1												1	1			1	1		1			
	Osphranter rufus	Red Kangaroo	38	24	4					1	1	1	2		1	4											1	1			1	1		1	1	1	
Leporidae	*Oryctolagus cuniculus*	European Rabbit	3													1													1								
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna	1				1																														
Equidae	*Equus caballus*	Domestic Horse									1																										
Muridae	*Mus musculus*	House Mouse							2	3		1	3			3	8												2	3				2			
	Notomys alexis	Spinifex Hopping Mouse				1		1			3			1	9			2													1	1					
	Pseudomys hermannsburgensis	Sandy Inland Mouse	1	1	5	6	2		8	1	14	9	6	1	2	1														7	3		3			7	

A McKenzie, N. L., J. K. Rolfe, and K. Youngson. (1994) Vertebrate fauna In: The Biological Survey of the Eastern Goldfields of Western Australia Part 10, Sandstone-Sir Samuel and Laverton-Leonora Study Areas. *Records of the Western Australian Museu*m Supplement No. 47:51-85.

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			A										B																C					
Family	**Species**	**Common Name**	**MME1**	**MME2**	**MME3**	**MME4**	**MME5**	**MME6**	**MME7**	**MME8**	**MME9**	**Opportunistic**	**Site 11**	**Site 11a**	**Site 14**	**Site 14a**	**Site 14b**	**Site 17a**	**Site 19**	**Site 1a**	**Site 20a**	**Site 21**	**Site 21a**	**Site 5a**	**Site 8**	**Site 9**	**Site 9a**	**CM001**	**CM002**	**CM003**	**CM004**	**CM005**	**Opportunistic**
Frogs																																		
Hylidae	*Cyclorana maini*	Sheep Frog										1																						
Limnodynastidae	*Neobatrachus sutor*	Shoemaker Frog	1	1																						5	10							
	Neobatrachus wilsmorei	Goldfields Bullfrog																				2				11					3			
	Platyplectrum spenceri	Spencer's Burrowing Frog														8																		
Myobatrachidae	*Pseudophryne occidentalis*	Orange-crowned Toadlet																						2										
Reptiles																																		
Agamidae	*Ctenophorus caudicinctus*	Ring-tailed Dragon																		12														
	Ctenophorus fordi	Mallee Dragon																				2												
	Ctenophorus inermis	Military Dragon																1																
	Ctenophorus isolepis	Crested Dragon	1																															
	Ctenophorus reticulatus	Western Netted Dragon		1	1		1		3	1		1			2	1		2			4		4	13		2	1							
	Ctenophorus salinarum	Saltpan Dragon											5	1										1	2									
	Ctenophorus vadnappa	Red-barred Dragon																			1	7	2			2	1							
	Moloch horridus	Thorny Devil																						1			1							
	Pogona minor	Dwarf Bearded Dragon									1		2	1	1				2			2	1		2	2								
	Tympanocryptis cephalus	Pebble Dragon												1																	1			
Carphodactylidae	*Nephrurus vertebralis*	Midline Knob-tail											1												2						2			
	Underwoodisaurus milii	Barking Gecko						2										9						2										
Diplodactylidae	*Diplodactylus granariensis*	Wheat-belt Stone Gecko																				2	1						7					

			A										B																C					
Family	**Species**	**Common Name**	**MME1**	**MME2**	**MME3**	**MME4**	**MME5**	**MME6**	**MME7**	**MME8**	**MME9**	**Opportunistic**	**Site 11**	**Site 11a**	**Site 14**	**Site 14a**	**Site 14b**	**Site 17a**	**Site 19**	**Site 1a**	**Site 20a**	**Site 21**	**Site 21a**	**Site 5a**	**Site 8**	**Site 9**	**Site 9a**	**CM001**	**CM002**	**CM003**	**CM004**	**CM005**	**Opportunistic**
	Diplodactylus pulcher	Fine-faced Gecko						1								4		3	1					3					2	1		1	
	Lucasium maini	Main's Ground Gecko																				1											
	Lucasium squarrosum	Mottled Ground Gecko											1	3		1		3			2								6	3		2	
	Strophurus assimilis	Goldfields Spiny-tailed Gecko																											1			1	
	Strophurus ciliaris	Spiny-tailed Gecko														2		1			1			2									
	Strophurus strophurus	Western Spiny-tailed Gecko																							7						4		
	Strophurus wellingtonae	Western Shield Spiny-tailed Gecko		1																											1		
Elapidae	*Brachyurophis fasciolata*	Narrow-banded Burrowing Snake																			1												
	Parasuta monachus	Monk Snake										1				1		3											1		1		
	Pseudechis butleri	Spotted Mulga Snake										1																					
	Simoselaps bertholdi	Jan's Banded Snake																	1														
	Suta fasciata	Rosen's Snake																						2									
Gekkonidae	*Gehyra variegata*	Tree Dtella	3	9	3	16	3	9	2		3	1						15	1	1	1		2	15	1			1		5	2		
	Heteronotia binoei	Bynoe's Prickly Gecko		3		1						1						34					2	7							1	1	
	Rhynchoedura ornata	Western Beaked Gecko																				1			2	1					1		
Pygopodidae	*Pygopus nigriceps*	Western Hooded Scaly-foot																1			1	1											
Scincidae	*Cryptoblepharus buchananii*	Buchanan's Snake-eyed Skink		2								1				1						1	1										
	Ctenotus calurus	Blue-tailed Finesnout Ctenotus																	1														
	Ctenotus greeri	Spotted-necked Ctenotus																	12														

			A										B															C					
Family	**Species**	**Common Name**	**MME1**	**MME2**	**MME3**	**MME4**	**MME5**	**MME6**	**MME7**	**MME8**	**MME9**	**Opportunistic**	**Site 11**	**Site 11a**	**Site 14**	**Site 14a**	**Site 14b**	**Site 17a**	**Site 19**	**Site 1a**	**Site 20a**	**Site 21**	**Site 21a**	**Site 5a**	**Site 8**	**Site 9**	**Site 9a**	**CM001**	**CM002**	**CM003**	**CM004**	**CM005**	**Opportunistic**
	Ctenotus helenae	Clay-soil Ctenotus																	1															
	Ctenotus leonhardii	Leonhardi's Ctenotus			1								5	4											2	5	9							
	Ctenotus pantherinus	Leopard Skink																	4															
	Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus																	11															
	Ctenotus schomburgkii	Schomburgk's Ctenotus	1								2	1	3						11		2	3			15	1								
	Ctenotus severus	Stern Ctenotus																6		1														
	Ctenotus uber	Spotted Ctenotus														3		2			6	1	1											
	Egernia depressa	Pygmy Spiny-tailed Skink						1													4	2									1	1		
	Egernia formosa	Goldfields Crevice-skink																						3										
	Eremiascincus richardsonii	Broad-banded Sand Swimmer														1		1													1	1		
	Lerista desertorum	Central Desert Robust Slider						1			1	1						6	6		2										5			
	Lerista macropisthopus	Unpatterned Robust Slider																						2										
	Lerista muelleri	Wood Mulch-slider																											1		2			
	Lerista picturata	Southern Robust Slider																						2										
	Lerista sp.							2			1	1						9	1			1			5									
	Liopholis inornata	Desert Skink																				1	1											
	Liopholis striata	Nocturnal Desert Skink																			2													
	Menetia greyii	Common Dwarf Skink	4								1	1										1		4		1					2			
	Morethia butleri	Woodland Morethia Skink		2		4	2	3	1	1	1	1			2			6					2	4										
Typhlopidae	*Anilios hamatus*	Pale-headed Blind Snake														1									1									
	Anilios margaretae	Buff-snouted Blind Snake																																

			A										B																C					
Family	**Species**	**Common Name**	**MME1**	**MME2**	**MME3**	**MME4**	**MME5**	**MME6**	**MME7**	**MME8**	**MME9**	**Opportunistic**	**Site 11**	**Site 11a**	**Site 14**	**Site 14a**	**Site 14b**	**Site 17a**	**Site 19**	**Site 1a**	**Site 20a**	**Site 21**	**Site 21a**	**Site 5a**	**Site 8**	**Site 9**	**Site 9a**	**CM001**	**CM002**	**CM003**	**CM004**	**CM005**	**Opportunistic**
	Anilios waitii	Waite's Blind Snake														2									1									
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor		1				1								1					6			2		1		1						
	Varanus giganteus	Perentie																						1										
	Varanus gouldii	Gould's Goanna																1				2	2	1		1	1							
	Varanus panoptes	Yellow-spotted Monitor						1			1	1	1			2					1								1	4	2			
Birds																																		
Casuariidae	*Dromaius novaehollandiae*	Emu	1	1				1		1	1	1		2		1	5		2				1	2		1				1				
Megapodiidae	*Leipoa ocellata*	Malleefowl										1																						
Phasianidae	*Coturnix pectoralis*	Stubble Quail															1																	
Anatidae	*Cygnus atratus*	Black Swan										1																						
	Tadorna tadornoides	Australian Shelduck										1																						
	Malacorhynchus membranaceus	Pink-eared Duck										1																						
	Anas gracilis	Grey Teal										1																						
	Anas superciliosa	Pacific Black Duck										1																						
Columbidae	*Phaps chalcoptera*	Common Bronzewing										1											1		1									
	Ocyphaps lophotes	Crested Pigeon	2					2			3	1			1	5	2	11			7			6	9	6			2		1			
Podargidae	*Podargus strigoides*	Tawny Frogmouth									2										1													
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar																		2				2										
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar													3	3	2								1									
Otididae	*Ardeotis australis*	Australian Bustard												1		4																		
Ardeidae	*Ardea pacifica*	White-necked Heron										1																						

			A										B																C					
Family	**Species**	**Common Name**	**MME1**	**MME2**	**MME3**	**MME4**	**MME5**	**MME6**	**MME7**	**MME8**	**MME9**	**Opportunistic**	**Site 11**	**Site 11a**	**Site 14**	**Site 14a**	**Site 14b**	**Site 17a**	**Site 19**	**Site 1a**	**Site 20a**	**Site 21**	**Site 21a**	**Site 5a**	**Site 8**	**Site 9**	**Site 9a**	**CM001**	**CM002**	**CM003**	**CM004**	**CM005**	**Opportunistic**
	Egretta novaehollandiae	White-faced Heron										1																						
Accipitridae	*Haliaeetus albicilla*	White-bellied Sea-eagle	1		2	1	1	1		1		1																						
	Accipiter fasciatus	Brown Goshawk																	3															
	Circus assimilis	Spotted Harrier															1					1												
	Aquila audax	Wedge-tailed Eagle													6	2		2							3				2					
	Hieraaetus morphnoides	Little Eagle		1															3		1													
Falconidae	*Falco cenchroides*	Nankeen Kestrel									1					5		2	3					4	2					1				
	Falco berigora	Brown Falcon									1					3	1	2	5		3				3					2				
	Falco longipennis	Australian Hobby			1						1														1									
	Falco peregrinus	Peregrine Falcon		1																														
Rallidae	*Tribonyx ventralis*	Black-tailed Native-hen										1																						
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt										1																						
ae	*Recurvirostra novaehollandiae*	Red-necked Avocet										1																						
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover										1																						
	Elseyornis melanops	Black-fronted Dotterel										1																						
	Vanellus tricolor	Banded Lapwing											9				4	4						1										
Turnicidae	*Turnix velox*	Little Button-quail															5				2													
Cacatuidae	*Eolophus roseicapillus*	Galah					15					1		1	44	908	8	2	5		7		62	7	4					3				
	Nymphicus hollandicus	Cockatiel												6		2	4		3				4		35							10		
Psittacidae	*Barnardius zonarius*	Australian Ringneck		1			4	3	2		2	1			25	31	36		16		3	3		1	9	10								
	Psephotus varius	Mulga Parrot			1			5	5			1					11		2		14	2				3								

			A										B																C					
Family	**Species**	**Common Name**	**MME1**	**MME2**	**MME3**	**MME4**	**MME5**	**MME6**	**MME7**	**MME8**	**MME9**	**Opportunistic**	**Site 11**	**Site 11a**	**Site 14**	**Site 14a**	**Site 14b**	**Site 17a**	**Site 19**	**Site 1a**	**Site 20a**	**Site 21**	**Site 21a**	**Site 5a**	**Site 8**	**Site 9**	**Site 9a**	**CM001**	**CM002**	**CM003**	**CM004**	**CM005**	**Opportunistic**
	Melopsittacus undulatus	Budgerigar												20	11	9	15	2	29		17	38			170						6		
	Neopsephotus bourkii	Bourke's Parrot										1									4												
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-cuckoo												3					3				2		1	1							
	Chalcites osculans	Black-eared Cuckoo																	1		2												
	Cacomantis pallidus	Pallid Cuckoo										1			2				1		1	4			1					1			
Halcyonidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher															1	6			1												
Meropidae	*Merops ornatus*	Rainbow Bee-eater																	3		3												
Climacteridae	*Climacteris affinis*	White-browed Treecreeper							2			1									4	1	1										
Maluridae	*Malurus splendens*	Splendid Fairy-wren							9			1																					
	Malurus leucopterus	White-winged Fairy-wren	3								8		3	76		1	2								40	17							
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat				1						1					2					2	1		2								
	Smicrornis brevirostris	Weebill					10					1							98		7	2	2										
	Acanthiza robustirostris	Slaty-backed Thornbill							2			1							3		6												
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill	5	6		6	17	2	4			1							4		8				9	4							
	Acanthiza uropygialis	Chestnut-rumped Thornbill	8	30	2	10	14	15	50			1				3	5		88		126		10	3	53	27							
	Acanthiza apicalis	Inland Thornbill	2					2	6			1							3		2	1	2										
	Aphelocephala leucopsis	Southern Whiteface				4		6	20			1					8		5		52		12		4								
Pardalotidae	*Pardalotus striatus*	Striated Pardalote					3					1					1		2														
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater												2	2																		
	Lichenostomus virescens	Singing Honeyeater		4	2		1	1	1	1	1	1		3	11		3	2	2		3			1	8	4			7	6	2		
	Lichenostomus plumulus	Grey-fronted Honeyeater					7								56				3		2												

			A										B																C					
Family	**Species**	**Common Name**	**MME1**	**MME2**	**MME3**	**MME4**	**MME5**	**MME6**	**MME7**	**MME8**	**MME9**	**Opportunistic**	**Site 11**	**Site 11a**	**Site 14**	**Site 14a**	**Site 14b**	**Site 17a**	**Site 19**	**Site 1a**	**Site 20a**	**Site 21**	**Site 21a**	**Site 5a**	**Site 8**	**Site 9**	**Site 9a**	**CM001**	**CM002**	**CM003**	**CM004**	**CM005**	**Opportunistic**
	Purnella albifrons	White-fronted Honeyeater	80	100	12	40	8	1	10	6	6	1		1	3		1		4			7	6		2	16								
	Manorina flavigula	Yellow-throated Miner	10	5	7		2	10		2	2	1			10	15	98	1	13		41	3			21	109				1	12		6
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater	25	20		1	6	2	1	1	2	1			11	2	2	5	8		10	6	4	2	9	7				1	2		
	Anthochaera carunculata	Red Wattlebird									3								2		3					1								
	Conopophila whitei	Grey Honeyeater															18						17			1								
	Epthianura tricolor	Crimson Chat												18	154	24		6			29				75									
	Epthianura aurifrons	Orange Chat												5																				
Pomatostomidae	*Pomatostomus temporalis*	Grey-crowned Babbler																													12			
	Pomatostomus superciliosus	White-browed Babbler										1					3						3	2											
Psophodidae	*Cinclosoma castaneothorax*	Chestnut-breasted Quail-thrush												2							3									1				
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella															2		6															
Campephagidae	*Coracina maxima*	Ground Cuckoo-shrike												4		31	2	3																
	Coracina novaehollandiae	Black-faced Cuckoo-shrike		2		1						1			4	5	6	1	9		10				7	3			1					
	Lalage sueurii	White-winged Triller														3	9				34		6		39	2								
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler					1	1	1	1		1							8				1											
	Colluricincla harmonica	Grey Shrike-thrush						1	2			1							5				1											
	Oreoica gutturalis	Crested Bellbird	1	3	1	2	1	1	2			1		3	14	5	1		15	2	10		2		6	2			4					
Artamidae	*Artamus personatus*	Masked Woodswallow												2	2		31		2		72													
	Artamus superciliosus	White-browed Woodswallow			4		1	1				1									3													
	Artamus cinereus	Black-faced Woodswallow												7	55	25	6	11			1		1		12				9	2			6
	Cracticus torquatus	Grey Butcherbird	1	1	1		2	1	1		2	1			2	4	7		8		8				4	1			1	1	3			

			A										B																C					
Family	**Species**	**Common Name**	**MME1**	**MME2**	**MME3**	**MME4**	**MME5**	**MME6**	**MME7**	**MME8**	**MME9**	**Opportunistic**	**Site 11**	**Site 11a**	**Site 14**	**Site 14a**	**Site 14b**	**Site 17a**	**Site 19**	**Site 1a**	**Site 20a**	**Site 21**	**Site 21a**	**Site 5a**	**Site 8**	**Site 9**	**Site 9a**	**CM001**	**CM002**	**CM003**	**CM004**	**CM005**	**Opportunistic**
	Cracticus nigrogularis	Pied Butcherbird	2	1	1						1	1			6	23	1		4	1			2	4	13	14				2	2		
	Cracticus tibicen	Australian Magpie	3								3	1				3		9			1					5			1	5		2	
	Strepera versicolor	Grey Currawong			1											2	3		2				1			4							
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail							1																									
	Rhipidura leucophrys	Willie Wagtail	1									1				2	2	1							12	1			1				1
Corvidae	*Corvus bennetti*	Little Crow		2			6		1			1		11	29	50	21	12	24		6			7	36	149				7	4		
	Corvus orru	Torresian Crow		1	2		1	1		2		1		2			2														2		
Monarchidae	*Grallina cyanoleuca*	Magpie-lark		1	2			2			2	1				12	7	2							3								
Petroicidae	*Microeca fascinans*	Jacky Winter														1			22		1												
	Petroica goodenovii	Red-capped Robin	1	2		1		2	6			1			1	5	3	1	29	3	47		4	3	3	4						1	
	Melanodryas cucullata	Hooded Robin			3							1		1	2	1					1		1		2				2				
Megaluridae	*Cincloramphus mathewsi*	Rufous Songlark															3						2										
	Cincloramphus cruralis	Brown Songlark											7	7	3	7		8			1													
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow			2							1						2																
	Hirundo rustica	Barn Swallow						5																										
	Petrochelidon ariel	Fairy Martin																											6					
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird															4					1			5	4								
Estrildidae	*Taeniopygia guttata*	Zebra Finch										1		9	12		4		5						36				6					
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit			4							1	7	18		16	1	36								2			4	1			
Mammals																																		
Bovidae	*Capra hircus*	Goat										1			1	1			1					1										

			A										B														C					
Family	**Species**	**Common Name**	**MME1**	**MME2**	**MME3**	**MME4**	**MME5**	**MME6**	**MME7**	**MME8**	**MME9**	**Opportunistic**	**Site 11**	**Site 11a**	**Site 14**	**Site 14a**	**Site 14b**	**Site 17a**	**Site 19**	**Site 1a**	**Site 20a**	**Site 21**	**Site 21a**	**Site 5a**	**Site 8**	**Site 9**	**Site 9a**	**CM001**	**CM002**	**CM003**	**CM004**	**CM005**	**Opportunistic**
	Ovis aries	Sheep														1			1		1	1				1	1						
Camelidae	*Camelus dromedarius*	Dromedary											1																				
Canidae	*Canis familiaris*	Dog											1																				
	Canis lupus	Dingo										1																					
	Vulpes vulpes	Red Fox										1							1		1		1	1									
Felidae	*Felis catus*	House Cat											1																				
Molossidae	*Austronomus australis*	White-striped Free-tail Bat																						1									
	Ozimops planiceps	Southern Free-tail Bat																						1									
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat														1								3									
	Nyctophilus geoffroyi	Lesser Long-eared Bat														4		9						3									
	Scotorepens balstoni	Inland Broad-nosed Bat														6								1									
Dasyuridae	*Ningaui ridei*	Wongai Ningaui																	5														
	Sminthopsis crassicaudata	Fat-tailed Dunnart	1		1								5								7			1			1						
	Sminthopsis fuliginosus	Grey-bellied Dunnart																															
	Sminthopsis dolichura	Little Long-tailed Dunnart											1			2			1		1	1		1	2								
	Sminthopsis macroura	Stripe-faced Dunnart																											2		2		
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo										1												1	1								
	Osphranter robustus	Euro				1						1						1	1		1	1		1	1								
	Osphranter robustus erubescens	Euro																												1			3
	Osphranter rufus	Red Kangaroo			5						6	1	1	1	1	1		1			1			1	1								
Leporidae	*Oryctolagus cuniculus*	European Rabbit				1						1	1					1						2	1				1				

			A										B																C					
Family	**Species**	**Common Name**	**MME1**	**MME2**	**MME3**	**MME4**	**MME5**	**MME6**	**MME7**	**MME8**	**MME9**	**Opportunistic**	**Site 11**	**Site 11a**	**Site 14**	**Site 14a**	**Site 14b**	**Site 17a**	**Site 19**	**Site 1a**	**Site 20a**	**Site 21**	**Site 21a**	**Site 5a**	**Site 8**	**Site 9**	**Site 9a**	**CM001**	**CM002**	**CM003**	**CM004**	**CM005**	**Opportunistic**
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna		1								1																		1	3	1	
Equidae	*Equus asinus*	Donkey										1																						
Muridae	*Mus musculus*	House Mouse	1	2	2	1	2	2					2					1	3					2										
	Notomys alexis	Spinifex Hopping Mouse	7						2													2			1									
	Notomys mitchellii	Mitchell's Hopping Mouse																				1												
	Pseudomys bolami	Bolam's Mouse																					3											
	Pseudomys hermannsburgensis	Sandy Inland Mouse						1			4		1			1			7		2				1									

A Ninox Wildlife Consulting (1998) *A Vertebrate Fauna Survey of the Murrin Murrin Expansion Project*. Unpublished report for Anaconda Nickel Ltd, Perth.

B 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, 38-77.

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		Surveys	A														B	C																							
Family	**Species**	**Common Name**	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**	**Site 6**	**Site 7**	**Site 8**	**Site 9**	**Site 10**	**Site 11**	**Site 12**	**Site 13**	**Opportunistic**	**Granny Deeps birds**	**Agnew Gold**	**BKBO1**	**BKBO4**	**BKBO5**	**BKBO7**	**BKBO9**	**BKBS04**	**BKBO2**	**BKBO3**	**BKBO12**	**BKBO8**	**BKBO6**	**BKBO10**	**BKBO11**	**BKBS01**	**BKBHarp01**	**BKBS03**
Frogs																																								
Hylidae	*Cyclorana maini*	Sheep Frog		1							11	5	1																										
	Cyclorana platycephala	Water-holding Frog		1	1						5	2		1	1																								
	Litoria rubella	Desert Tree Frog																1																						
Limnodynastidae	*Neobatrachus kunapalari*	Kunapalari Frog									1																												
	Neobatrachus sudelli	Sudell's Frog																	2	1	1	1	2																
	Neobatrachus sutor	Shoemaker Frog	8	2	5	3	1			1	13	2		1																									
Reptiles																																								
Agamidae	*Ctenophorus caudicinctus*	Ring-tailed Dragon																1						1															
	Ctenophorus isolepis	Crested Dragon																1																					
	Ctenophorus reticulatus	Western Netted Dragon																							2	1													
	Ctenophorus scutulatus	Lozenge-marked Dragon																1									3												
	Diporiphora amphiboluroides	Mulga Dragon				2	1	1																															
	Pogona minor	Dwarf Bearded Dragon																1			1																		
	Tympanocryptis cephalus	Pebble Dragon				2	3	1		1																													
Carphodactylidae	*Nephrurus vertebralis*	Midline Knob-tail																	2				1		1														
Diplodactylidae	*Diplodactylus granariensis*	Wheat-belt Stone Gecko										1																1											
	Diplodactylus pulcher	Fine-faced Gecko	2			1	4	3	1			2	1		1					1	2				1	2		3	2										

		Surveys	A														B	C																				
Family	**Species**	**Common Name**	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**	**Site 6**	**Site 7**	**Site 8**	**Site 9**	**Site 10**	**Site 11**	**Site 12**	**Site 13**	**Opportunistic**	**Granny Deeps birds**	**Agnew Gold**	**BKBO1**	**BKBO4**	**BKBO5**	**BKBO7**	**BKBO9**	**BKBS04**	**BKBO2**	**BKBO3**	**BKBO12**	**BKBO8**	**BKBO6**	**BKBO10**	**BKBO11**	**BKBS01**	**BKBHarp01**	**BKBS03**
	Strophurus assimilis	Goldfields Spiny-tailed Gecko																												1	1			
	Strophurus strophurus	Western Spiny-tailed Gecko																				1												
	Strophurus wellingtonae	Shield Spiny-tailed Gecko	4	2											1															1				
Elapidae	*Parasuta monachus*	Monk Snake						1		1																								
	Suta fasciata	Rosen's Snake																					1											
Gekkonidae	*Gehyra variegata*	Tree Dtella		3	2	4		1		3		2	1	2				1																
	Heteronotia binoei	Bynoe's Prickly Gecko	2				1					1	2	1	5			1																
	Rhynchoedura ornata	Western Beaked Gecko	3					2			1								11	5		5	3				6	9	3	1				
Pygopodidae	*Pygopus nigriceps*	Western Hooded Scaly-foot																			1													
Scincidae	*Ctenotus leonhardii*	Leonhardi's Ctenotus	2	2					1		5	9	7	16	27				2	3			1		4	4								
	Ctenotus schomburgkii	Schomburgk's Ctenotus																					2		1	2	4	2						
	Ctenotus severus	Stern Ctenotus																																
	Ctenotus uber	Spotted Ctenotus																				2												
	Egernia depressa	Pygmy Spiny-tailed Skink		1	1	2	2	3	9	6		1																						
	Eremiascincus richardsonii	Broad-banded Sand Swimmer				2									1																			
	Lerista bipes	North-western Sandslider																																
	Lerista desertorum	Central Desert Robust Slider													2															1		1		

		Surveys	A														B	C																							
Family	**Species**	**Common Name**	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**	**Site 6**	**Site 7**	**Site 8**	**Site 9**	**Site 10**	**Site 11**	**Site 12**	**Site 13**	**Opportunistic**	**Granny Deeps birds**	**Agnew Gold**	**BKBO1**	**BKBO4**	**BKBO5**	**BKBO7**	**BKBO9**	**BKBS04**	**BKBO2**	**BKBO3**	**BKBO12**	**BKBO8**	**BKBO6**	**BKBO10**	**BKBO11**	**BKBS01**	**BKBHarp01**	**BKBS03**
	Lerista distinguenda	Orange-tailed Slider													1																									
	Lerista sp.																							2	1	1	1													
	Menetia greyii	Common Dwarf Skink											1											1																	
	Morethia butleri	Woodland Morethia Skink		1		1		2			6	1		3																									
	Tiliqua multifasciata	Centralian Blue-tongued Lizard	1																																					
Typhlopidae	*Anilios australis*	Austral Blind Snake								1	1																													
	Anilios bicolor	Dark-spined Blind Snake			1																																			
	Anilios waitii	Waite's Blind Snake																													1									
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor		2		1	3	1	1			1		2							1	3	1		1				1	3										
	Varanus gouldii	Gould's Goanna																1																							
	Varanus panoptes	Yellow-spotted Monitor	4		7		3	2	2			4	2		6							2						2		1										
Birds																																									
Casuariidae	*Dromaius novaehollandiae*	Emu														3		1				1																			
Anatidae	*Biziura lobata*	Musk Duck														2																									
	Tadorna tadornoides	Australian Shelduck																1																							
	Chenonetta jubata	Australian Wood Duck														77		1																							
	Malacorhynchus membranaceus	Pink-eared Duck														5																									
	Anas gracilis	Grey Teal														74																									

		Surveys	A														B	C																					
Family	**Species**	**Common Name**	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**	**Site 6**	**Site 7**	**Site 8**	**Site 9**	**Site 10**	**Site 11**	**Site 12**	**Site 13**	**Opportunistic**	**Granny Deeps birds**	**Agnew Gold**	**BKBO1**	**BKBO4**	**BKBO5**	**BKBO7**	**BKBO9**	**BKBS04**	**BKBO2**	**BKBO3**	**BKBO12**	**BKBO8**	**BKBO6**	**BKBO10**	**BKBO11**	**BKBS01**	**BKBHarp01**	**BKBS03**
	Anas superciliosa	Pacific Black Duck														13		1																
	Aythya australis	Hardhead														2																		
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe																1																
	Poliocephalus poliocephalus	Hoary-headed Grebe														30		1																
Columbidae	*Phaps chalcoptera*	Common Bronzewing																1																
Columbidae	*Ocyphaps lophotes*	Crested Pigeon																1	6			2						9						
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar																1																
Ardeidae	*Egretta novaehollandiae*	White-faced Heron														2																		
Accipitridae	*Elanus axillaris*	Black-shouldered Kite																1																
	Haliastur sphenurus	Whistling Kite																							1									
	Accipiter fasciatus	Brown Goshawk																1																
	Aquila audax	Wedge-tailed Eagle														2		1					3											
Falconidae	*Falco cenchroides*	Nankeen Kestrel														2		1					1						1					
	Falco berigora	Brown Falcon														1																		
Rallidae	*Fulica atra*	Eurasian Coot														21																		
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt														5																		
	Cladorhynchus leucocephalus	Banded Stilt														14																		
Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel														1		1																

		Surveys	A														B	C																		
Family	**Species**	**Common Name**	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**	**Site 6**	**Site 7**	**Site 8**	**Site 9**	**Site 10**	**Site 11**	**Site 12**	**Site 13**	**Opportunistic**	**Granny Deeps birds**	**Agnew Gold**	**BKBO1**	**BKBO4**	**BKBO5**	**BKBO7**	**BKBO9**	**BKBS04**	**BKBO2**	**BKBO3**	**BKBO12**	**BKBO8**	**BKBO6**	**BKBO10**	**BKBO11**	**BKBS01**	**BKBHarp01**	**BKBS03**
Cacatuidae	*Eolophus roseicapillus*	Galah																											8					
Psittacidae	*Barnardius zonarius*	Australian Ringneck																1	1	2			1					1						
	Psephotus varius	Mulga Parrot														8				2		2												
	Melopsittacus undulatus	Budgerigar																1																
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-cuckoo																			1					1		1						
	Cacomantis pallidus	Pallid Cuckoo														2																		
Meropidae	*Merops ornatus*	Rainbow Bee-eater																1																
Ptilonorhynchidae	*Ptilonorhynchus guttatus*	Western Bowerbird														2	5		1															
Maluridae	*Malurus splendens*	Splendid Fairy-wren															12						8											
	Malurus leucopterus	White-winged Fairy-wren														1	3																	
Maluridae	*Malurus lamberti*	Variegated Fairy-wren																1																
Acanthizidae	*Gerygone fusca*	Western Gerygone																					2					1						
	Acanthiza robustirostris	Slaty-backed Thornbill															68								2					5				
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill															1				2		3		2									
	Acanthiza uropygialis	Chestnut-rumped Thornbill																	16	7	4	23	11		33		2	11		3	9			
	Acanthiza apicalis	Inland Thornbill															12	1	4			5	11				3			2				
	Aphelocephala leucopsis	Southern Whiteface															13	1	1		1		5		4									
Pardalotidae	*Pardalotus striatus*	Striated Pardalote															1																	
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater															2				4													
	Lichenostomus virescens	Singing Honeyeater															68	1	8	9	7	2	1				2	4	3	1				

		Surveys	A														B	C																				
Family	**Species**	**Common Name**	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**	**Site 6**	**Site 7**	**Site 8**	**Site 9**	**Site 10**	**Site 11**	**Site 12**	**Site 13**	**Opportunistic**	**Granny Deeps birds**	**Agnew Gold**	**BKBO1**	**BKBO4**	**BKBO5**	**BKBO7**	**BKBO9**	**BKBS04**	**BKBO2**	**BKBO3**	**BKBO12**	**BKBO8**	**BKBO6**	**BKBO10**	**BKBO11**	**BKBS01**	**BKBHarp01**	**BKBS03**
	Lichenostomus flavicollis	Yellow-throated Honeyeater																	3	4	3	15	4		4		5	9		3	4			
	Manorina flavigula	Yellow-throated Miner														3	38	1																
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater															44	1			2	4			2									
	Epthianura tricolor	Crimson Chat															4				9		1						1					
	Epthianura albifrons	White-fronted Chat																1																
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler															14	1					4											
Psophodidae	*Cinclosoma castanotum*	Chestnut Quail-thrush																	3															
	Cinclosoma castaneothorax	Chestnut-breasted Quail-thrush																			2													
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella																		2														
Campephagidae	*Coracina maxima*	Ground Cuckoo-shrike														2	5												2					
	Coracina novaehollandiae	Black-faced Cuckoo-shrike															7					1						2		1				
	Lalage sueurii	White-winged Triller														4			1															
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler															22		1			1	3		6		1			2				
	Colluricincla harmonica	Grey Shrike-thrush															3	1							1									
	Oreoica gutturalis	Crested Bellbird														1	45	1	6	1	4	2	2		6		1	5	1	4	1			
Artamidae	*Artamus personatus*	Masked Woodswallow														4	23	1																
	Artamus cinereus	Black-faced Woodswallow															6	1	5		9	2	2		1			7	7					
	Artamus minor	Little Woodswallow															2	1																

		Surveys	A														B	C																			
Family	**Species**	**Common Name**	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**	**Site 6**	**Site 7**	**Site 8**	**Site 9**	**Site 10**	**Site 11**	**Site 12**	**Site 13**	**Opportunistic**	**Granny Deeps birds**	**Agnew Gold**	**BKBO1**	**BKBO4**	**BKBO5**	**BKBO7**	**BKBO9**	**BKBS04**	**BKBO2**	**BKBO3**	**BKBO12**	**BKBO8**	**BKBO6**	**BKBO10**	**BKBO11**	**BKBS01**	**BKBHarp01**	**BKBS03**
	Cracticus torquatus	Grey Butcherbird														4	5	1	1											2	1			
	Cracticus nigrogularis	Pied Butcherbird														2	3	1	5		2	1	4					6	1					
	Cracticus tibicen	Australian Magpie														1		1										1						
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail														5	5	1	1			1	2											
Corvidae	*Corvus bennetti*	Little Crow														4	1	1			2						1	6		3				
	Corvus orru	Torresian Crow															2	1							3									
Monarchidae	*Grallina cyanoleuca*	Magpie-lark														6	11	1	3	1								1						
Petroicidae	*Petroica goodenovii*	Red-capped Robin															10	1	5	1	2	1	3		8		3	1		1				
	Melanodryas cucullata	Hooded Robin															7	1	2		4									1				
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow														4	2																	
	Hirundo neoxena	Welcome Swallow														2	4	1																
	Hirundo nigricans	Tree Martin														1	9	1																
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird														2	2																	
Estrildidae	*Taeniopygia guttata*	Zebra Finch														2		1											2					
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit														6	2	1																
Mammals																																		
Bovidae	*Capra hircus*	Goat																1					1											
Molossidae	*Ozimops planiceps*	Southern Free-tail Bat																1																
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat																1																
	Nyctophilus geoffroyi	Lesser Long-eared Bat																1														2		

		Surveys	A														B	C																					
Family	**Species**	**Common Name**	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**	**Site 6**	**Site 7**	**Site 8**	**Site 9**	**Site 10**	**Site 11**	**Site 12**	**Site 13**	**Opportunistic**	**Granny Deeps birds**	**Agnew Gold**	**BKBO1**	**BKBO4**	**BKBO5**	**BKBO7**	**BKBO9**	**BKBS04**	**BKBO2**	**BKBO3**	**BKBO12**	**BKBO8**	**BKBO6**	**BKBO10**	**BKBO11**	**BKBS01**	**BKBHarp01**	**BKBS03**
	Scotorepens balstoni	Inland Broad-nosed Bat																1																
	Vespadelus baverstocki	Inland Forest Bat																1																
	Vespadelus finlaysoni	Finlayson's Cave Bat																1																
Dasyuridae	*Antechinomys laniger*	Kultarr	2	1			3	3	3	2		2			1																			
	Sminthopsis dolichura	Little Long-tailed Dunnart	1	1	3	7	5	4	13	3	5	3		1	1																			
	Sminthopsis hirtipes	Hairy-footed Dunnart				1																												
	Antechinomys longicaudata	Long-tailed Dunnart					1	1							1																			
	Sminthopsis macroura	Stripe-faced Dunnart	2	3		2	1	1	1	1	1	5	5	3	2						3						1	1	2	7				
	Sminthopsis ooldea	Ooldea Dunnart																		1														
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo																1																
	Osphranter robustus	Euro																1				1							1	1				1
	Osphranter rufus	Red Kangaroo																1	4	2		4	1		2				3					
Leporidae	*Oryctolagus cuniculus*	European Rabbit																1																
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna																1					1							1	2			1
Muridae	*Mus musculus*	House Mouse						1					5																					
	Notomys alexis	Spinifex Hopping Mouse	3																															
	Pseudomys desertor	Desert Mouse																		1														
	Pseudomys hermannsburgensis	Sandy Inland Mouse	1	1	1	3					1	2	2	5	6				1		1				1					1				

A Terrestrial Ecosystems (2011a) *Level 2 Fauna Risk Assessment for Granny Deeps Project Area*. Unpublished report for Barrick Gold Corporation, Perth.

B ENV Australia (2008) *Agnew Prospects Fauna Assessment*. Unpublished report for Agnew Gold Mining Company Pty Limited, Perth.

C Biota Environmental Sciences (2007) *Bannockburn Fauna Habitat and Assemblage Survey*. Unpublished report for Jubilee Mines NL, Perth.

		Survey	A																													
Family	**Species**	**Common Name**	**REG Open spinifex 1**	**REG Open spinifex 2**	**REG Open spinifex 3**	**REG Open spinifex 4**	**REG Shrubs over spinifex 1**	**REG Shrubs over spinifex 2**	**REG Shrubs over spinifex 3**	**REG Shrubs over spinifex 4**	**REG Dogbolter 2**	**REG Mulga woodland 1**	**REG Mulga woodland 4**	**REG Eucalypt over spinifex 2**	**REG Eucalypt over spinifex 4**	**REG Eucalypt over spinifex 1**	**REG Dogbolter 1**	**REG Dogbolter 3**	**REG Dogbolter 4**	**REG Eucalypt over spinifex 3**	**REG Mulga woodland 2**	**REG Mulga woodland 3**	**REG Opportunistic**	**REG Open spinifex**	**REG Mulga woodland**	**REG Eucalypt over spinifex**	**REG Shrubs over spinifex**	**REG Mulga thicket 2**	**REG Turkeys**	**REG Mulga thicket 1**	**REG Dogbolter**
Reptiles																																
Agamidae	*Ctenophorus isolepis*	Crested Dragon	1	10	8	2	3	5	1	1																						
	Ctenophorus nuchalis	Central Netted Dragon			1	1																										
	Ctenophorus scutulatus	Lozenge-marked Dragon									2	1	1																			
	Diporiphora amphiboluroides	Mulga Dragon										3	1																			
	Moloch horridus	Thorny Devil							1																							
	Pogona minor	Dwarf Bearded Dragon											1	3	1																	
Carphodactylidae	*Nephrurus laevissimus*	Smooth Knob-tail					2		1																							
	Nephrurus vertebralis	Midline Knob-tail												1		1																
Diplodactylidae	*Diplodactylus pulcher*	Fine-faced Gecko										1	3				1															
	Lucasium squarrosum	Mottled Ground Gecko					2	1	7	2																						
	Strophurus elderi	Jewelled Gecko	2	7						1																						
	Strophurus strophurus	Western Spiny-tailed Gecko					2	1	2	1																						
	Strophurus wellingtonae	Western Shield Spiny-tailed Gecko										3	9	1		1	7	3	1	1	4	2										
Elapidae	*Brachyurophis semifasciata*	Half-girdlerd Snake			1					2				3	6	3																
	Furina ornata	Orange-naped Snake								1		1																				

		Survey	A																															
Family	Species	Common Name	REG Open spinifex 1	REG Open spinifex 2	REG Open spinifex 3	REG Open spinifex 4	REG Shrubs over spinifex 1	REG Shrubs over spinifex 2	REG Shrubs over spinifex 3	REG Shrubs over spinifex 4	REG Dogbolter 2	REG Mulga woodland 1	REG Mulga woodland 4	REG Eucalypt over spinifex 2	REG Eucalypt over spinifex 4	REG Eucalypt over spinifex 1	REG Dogbolter 1	REG Dogbolter 3	REG Dogbolter 4	REG Eucalypt over spinifex 3	REG Mulga woodland 2	REG Mulga woodland 3	REG Opportunistic	REG Open spinifex	REG Mulga woodland	REG Eucalypt over spinifex	REG Shrubs over spinifex	REG Mulga thicket 2	REG Turkeys	REG Mulga thicket 1	REG Dogbolter
	Parasuta monachus	Monk Snake				1			1		2		1		1							1										
	Pseudechis australis	Mulga Snake														2																
	Pseudonaja mengdeni	Gwardar		2																												
	Pseudonaja modesta	Ringed Brown Snake																1														
	Simoselaps bertholdi	Jan's Banded Snake							1																							
Gekkonidae	*Gehyra purpurascens*	Purplish Dtella		1						2					1																
	Gehyra variegata	Tree Dtella	2			1			1	2					1	1	2		1	3	1	10									
	Heteronotia binoei	Bynoe's Prickly Gecko						2							1		1				1	3									
	Rhynchoedura ornata	Western Beaked Gecko											1	1			7	4													
Pygopodidae	*Delma butleri*	Unbanded Delma	1	2	2	1	2	1	3	1		1								1											
	Lialis burtonis	Burton's Snake-lizard												1	2																
	Pygopus nigriceps	Western Hooded Scaly-foot					1	1							1	3															
Scincidae	*Ctenotus ariadnae*	Ariadna's Ctenotus	1		4	3	7	4	6	8					2					4											
	Ctenotus dux	Fine Side-lined Ctenotus		2	2		6	2	13	2				4		14				4											
	Ctenotus grandis grandis	Grand Ctenotus	6	8	9	14	1	3	3	4				4	1																
	Ctenotus greeri	Spotted-necked Ctenotus												9	7	8				6											
	Ctenotus helenae	Clay-soil Ctenotus	1	2			20	23	13	10				20	14	15				26											

		Survey	A																														
Family	Species	Common Name	REG Open spinifex 1	REG Open spinifex 2	REG Open spinifex 3	REG Open spinifex 4	REG Shrubs over spinifex 1	REG Shrubs over spinifex 2	REG Shrubs over spinifex 3	REG Shrubs over spinifex 4	REG Dogbolter 2	REG Mulga woodland 1	REG Mulga woodland 4	REG Eucalypt over spinifex 2	REG Eucalypt over spinifex 4	REG Eucalypt over spinifex 1	REG Dogbolter 1	REG Dogbolter 3	REG Dogbolter 4	REG Eucalypt over spinifex 3	REG Mulga woodland 2	REG Mulga woodland 3	REG Opportunistic	REG Open spinifex	REG Mulga woodland	REG Eucalypt over spinifex	REG Shrubs over spinifex	REG Mulga thicket 2	REG Turkeys	REG Mulga thicket 1	REG Dogbolter
	Ctenotus leonhardii	Leonhardi's Ctenotus	1		4	6					11	6	7	37	16	15	11	20	16	25	6	2									
	Ctenotus pantherinus	Leopard Skink	9		6	3	12	11	1	1				9	3	1				13											
	Ctenotus piankai	Coarse Sands Ctenotus	1	4	3	2		1	1	1																					
	Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus	4	12	3	2	19	16	9	5	4			2	3		1		1	9											
	Ctenotus schomburgkii	Schomburgk's Ctenotus				1					7		3				8	16			1										
	Ctenotus uber	Spotted Ctenotus									2	7	18				1	10	7		8										
	Egernia depressa	Southern Pygmy Spiny-tailed Skink											1	1					1		4	1									
	Egernia formosa	Goldfields Crevice-skink											1	1		1	1					2									
	Eremiascincus richardsonii	Broad-banded Sand Swimmer												2	1							1									
	Lerista bipes	North-western Sandslider	35	37	10	17	5	11	48	56																					
	Lerista desertorum	Central Desert Robust Slider	1	2		1		1		1	1	1	1		3	1				3											
	Lerista muelleri	Wood Mulch-slider										2		1		1		1			1										
	Liopholis inornata	Desert Skink					2	10	14	5																					
	Liopholis striata	Nocturnal Desert Skink	2	2	5	4																									
	Menetia greyii	Common Dwarf Skink	2	4	12	8						2				1		1		2	1										
	Morethia butleri	Woodland Morethia Skink													1					1		1									
	Tiliqua multifasciata	Centralian Blue-tongued Lizard		1	1	1		4																							

		Survey	A																														
Family	Species	Common Name	REG Open spinifex 1	REG Open spinifex 2	REG Open spinifex 3	REG Open spinifex 4	REG Shrubs over spinifex 1	REG Shrubs over spinifex 2	REG Shrubs over spinifex 3	REG Shrubs over spinifex 4	REG Dogbolter 2	REG Mulga woodland 1	REG Mulga woodland 4	REG Eucalypt over spinifex 2	REG Eucalypt over spinifex 4	REG Eucalypt over spinifex 1	REG Dogbolter 1	REG Dogbolter 3	REG Dogbolter 4	REG Eucalypt over spinifex 3	REG Mulga woodland 2	REG Mulga woodland 3	REG Opportunistic	REG Open spinifex	REG Mulga woodland	REG Eucalypt over spinifex	REG Shrubs over spinifex	REG Mulga thicket 2	REG Turkeys	REG Mulga thicket 1	REG Dogbolter
Typhlopidae	*Anilios bicolor*	Dark-spined Blind Snake			3					1			1	1	2					1												
	Anilios hamatus	Pale-headed Blind Snake	1	1		2	1		2	1					1	1				2												
	Anilios waitii	Waite's Blind Snake				1		1	1							1				1												
Varanidae	*Varanus brevicauda*	Short-tailed Pygmy Monitor	1	2	3	3		1							1					1												
	Varanus caudolineatus	Stripe-tailed Monitor									2	5		3	1	1	3	7	2		4	9										
	Varanus eremius	Pygmy Desert Monitor	2		6	2		2																								
	Varanus gouldii	Gould's Goanna	6	8	3	1	15	15	12	8		1	1	2	2	1																
	Varanus panoptes	Yellow-spotted Monitor															4			2		1										
	Varanus tristis	Black-headed Monitor												2																		
Birds																																
Casuariidae	*Dromaius novaehollandiae*	Emu																					5	3								
Columbidae	*Ocyphaps lophotes*	Crested Pigeon																					1		2							
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar																					1									
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar																					1									
Apodidae	*Apus pacificus*	Fork-tailed Swift																							2							
Otididae	*Ardeotis australis*	Australian Bustard																					2									
Accipitridae	*Aquila audax*	Wedge-tailed Eagle																					3	1								

		Survey	A																											
Family	Species	Common Name	REG Open spinifex 1	REG Open spinifex 2	REG Open spinifex 3	REG Open spinifex 4	REG Shrubs over spinifex 1	REG Shrubs over spinifex 2	REG Shrubs over spinifex 3	REG Shrubs over spinifex 4	REG Dogbolter 2	REG Mulga woodland 1	REG Mulga woodland 4	REG Eucalypt over spinifex 2	REG Eucalypt over spinifex 4	REG Eucalypt over spinifex 1	REG Dogbolter 1	REG Dogbolter 3	REG Dogbolter 4	REG Eucalypt over spinifex 3	REG Mulga woodland 2	REG Mulga woodland 3	REG Opportunistic	REG Open spinifex	REG Mulga woodland	REG Eucalypt over spinifex	REG Shrubs over spinifex	REG Mulga thicket 2	REG Turkeys	REG Mulga thicket 1	REG Dogbolter
Falconidae	*Falco cenchroides*	Nankeen Kestrel																					2	1							
	Falco berigora	Brown Falcon																						2							
Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel																					2								
Cacatuidae	*Eolophus roseicapillus*	Galah																					2								
Psittacidae	*Barnardius zonarius*	Australian Ringneck																					10			2	5				
	Psephotus varius	Mulga Parrot																					5								
Meropidae	*Merops ornatus*	Rainbow Bee-eater																					1								
Ptilonorhynchidae	*Ptilonorhynchus guttatus*	Western Bowerbird																					3								
Maluridae	*Malurus splendens*	Splendid Fairy-wren																					4	2	8	13		5	10	5	
	Malurus lamberti	Variegated Fairy-wren																									4				
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat																							1						
	Smicrornis brevirostris	Weebill																					3			13	5				
	Gerygone fusca	Western Gerygone																													1
	Acanthiza robustirostris	Slaty-backed Thornbill																							4				2		6
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill																							2				1		6
	Acanthiza uropygialis	Chestnut-rumped Thornbill																					1		7	5	3		3		8
	Acanthiza apicalis	Inland Thornbill																							8		1	6		6	4

		Survey	A																												
Family	Species	Common Name	REG Open spinifex 1	REG Open spinifex 2	REG Open spinifex 3	REG Open spinifex 4	REG Shrubs over spinifex 1	REG Shrubs over spinifex 2	REG Shrubs over spinifex 3	REG Shrubs over spinifex 4	REG Dogbolter 2	REG Mulga woodland 1	REG Mulga woodland 4	REG Eucalypt over spinifex 2	REG Eucalypt over spinifex 4	REG Eucalypt over spinifex 1	REG Dogbolter 1	REG Dogbolter 3	REG Dogbolter 4	REG Eucalypt over spinifex 3	REG Mulga woodland 2	REG Mulga woodland 3	REG Opportunistic	REG Open spinifex	REG Mulga woodland	REG Eucalypt over spinifex	REG Shrubs over spinifex	REG Mulga thicket 2	REG Turkeys	REG Mulga thicket 1	REG Dogbolter
	Aphelocephala leucopsis	Southern Whiteface																							3			2	1	2	2
Meliphagidae	*Lichenostomus virescens*	Singing Honeyeater																					1	2	3	5	1	2	2	2	1
	Manorina flavigula	Yellow-throated Miner																					3	12	5	5	8	7	3	7	
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler																					3						2		
Psophodidae	*Cinclosoma castaneothorax*	Chestnut-breasted Quail-thrush																										1		1	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike																						2		3			2		
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler																							4	3		3		3	2
	Pachycephala rufiventris	Rufous Whistler																													
	Colluricincla harmonica	Grey Shrike-thrush																								1	1				
	Oreoica gutturalis	Crested Bellbird																						3	3	5	4	1	1	1	3
Artamidae	*Artamus cinereus*	Black-faced Woodswallow																					3								
	Cracticus torquatus	Grey Butcherbird																					3	3	1	2	2	2		2	
	Cracticus nigrogularis	Pied Butcherbird																					2	4	2	2	4	1		1	2
	Cracticus tibicen	Australian Magpie																					2	3	2						
	Strepera versicolor	Grey Currawong																								1	2				
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail																													1
	Rhipidura leucophrys	Willie Wagtail																					3			4					

		Survey	A																												
Family	**Species**	**Common Name**	**REG Open spinifex 1**	**REG Open spinifex 2**	**REG Open spinifex 3**	**REG Open spinifex 4**	**REG Shrubs over spinifex 1**	**REG Shrubs over spinifex 2**	**REG Shrubs over spinifex 3**	**REG Shrubs over spinifex 4**	**REG Dogbolter 2**	**REG Mulga woodland 1**	**REG Mulga woodland 4**	**REG Eucalypt over spinifex 2**	**REG Eucalypt over spinifex 4**	**REG Eucalypt over spinifex 1**	**REG Dogbolter 1**	**REG Dogbolter 3**	**REG Dogbolter 4**	**REG Eucalypt over spinifex 3**	**REG Mulga woodland 2**	**REG Mulga woodland 3**	**REG Opportunistic**	**REG Open spinifex**	**REG Mulga woodland**	**REG Eucalypt over spinifex**	**REG Shrubs over spinifex**	**REG Mulga thicket 2**	**REG Turkeys**	**REG Mulga thicket 1**	**REG Dogbolter**
Corvidae	*Corvus orru*	Torresian Crow																								3					
Monarchidae	*Grallina cyanoleuca*	Magpie-lark																					7		4			3		3	
Petroicidae	*Microeca fascinans*	Jacky Winter																								1	1				
	Petroica goodenovii	Red-capped Robin																									1				
	Melanodryas cucullata	Hooded Robin																									1				1
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit																													1
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheath-tail Bat				1																									
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat								1			1		1																
	Chalinolobus morio	Chocolate Wattled Bat				1							1																		
	Mormopterus sp.	Free-tail Bat Sp.				1				1			1		1																
	Nyctophilus sp.	Long-eared Bat Sp.								1	1		1		1																
	Scotorepens balstoni	Inland Broad-nosed Bat				1				1			1				1														
Dasyuridae	*Dasycercus cristicauda*	Crest-tailed Mulgara		1																											
	Ningaui ridei	Wongai Ningaui	2	3	1	2	1	3	5	1	2				6	2	1		1	2											
	Sminthopsis dolichura	Little Long-tailed Dunnart	1			2						1	1	2	1	5	5	3	3	4	2	3									
	Sminthopsis macroura	Stripe-faced Dunnart		1								2	1					1													
Muridae	*Mus musculus*	House Mouse	7	1	3		2	1		1																					

		Survey	A																																	
Family	**Species**	**Common Name**	**REG Open spinifex 1**	**REG Open spinifex 2**	**REG Open spinifex 3**	**REG Open spinifex 4**	**REG Shrubs over spinifex 1**	**REG Shrubs over spinifex 2**	**REG Shrubs over spinifex 3**	**REG Shrubs over spinifex 4**	**REG Dogbolter 2**	**REG Mulga woodland 1**	**REG Mulga woodland 4**	**REG Eucalypt over spinifex 2**	**REG Eucalypt over spinifex 4**	**REG Eucalypt over spinifex 1**	**REG Dogbolter 1**	**REG Dogbolter 3**	**REG Dogbolter 4**	**REG Eucalypt over spinifex 3**	**REG Mulga woodland 2**	**REG Mulga woodland 3**	**REG Opportunistic**	**REG Open spinifex**	**REG Mulga woodland**	**REG Eucalypt over spinifex**	**REG Shrubs over spinifex**	**REG Mulga thicket 2**	**REG Turkeys**	**REG Mulga thicket 1**	**REG Dogbolter**
	Notomys alexis	Spinifex Hopping Mouse		1			1		4				1																				
	Pseudomys desertor	Desert Mouse	1				1	3		1								1	1	1													
	Pseudomys hermannsburgensis	Sandy Inland Mouse	1		2						1				2						2											

A Coffey Environments (2008) *Level 2 Fauna Assessment for the Duketon Gold Project*. Unpublished report for Regis Resources, Perth.

		Surveys	A							B																
Family	**Species**	**Common Name**	**Site 1**	**Site 2**	**Site 7**	**Site 5**	**Site 6**	**Site 3**	**Site 4**	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**	**Site 6**	**Site 7**	**Site 8**	**Site 9**	**Site 10**	**Site 11**	**Site 12**	**Site 13**	**Site 14**	**Site 15**	**Opportunistic**	**Birds**
Reptiles																										
Agamidae	*Ctenophorus reticulatus*	Western Netted Dragon	1																							
	Diporiphora amphiboluroides	Mulga Dragon										1	2			1	1						1	1		
	Pogona minor	Dwarf Bearded Dragon		1																1						
	Tympanocryptis cephalus	Pebble Dragon								2			2	1												
Boidae	*Antaresia stimsoni*	Stimson's Python			1																					
Carphodactylidae	*Underwoodisaurus milii*	Barking Gecko		1											1											
Diplodactylidae	*Diplodactylus pulcher*	Fine-faced Gecko				1					1	1	3			5	3	2	3	7	4	6	3	3		
	Strophurus assimilis	Goldfields Spiny-tailed Gecko		1																						
	Strophurus wellingtonae	Western Shield Spiny-tailed Gecko								1	2		3	1			3	4	5	1		2	4	1		
Elapidae	*Parasuta monachus*	Monk Snake																		1						
Gekkonidae	*Heteronotia binoei*	Bynoe's Prickly Gecko	1				1				1			1	7	1	1		3	7		7	1	1		
Pygopodidae	*Pygopus nigriceps*	Western Hooded Scaly-foot									1															
Scincidae	*Cryptoblepharus buchananii*	Buchanan's Snake-eyed Skink		1																						
	Cryptoblepharus plagiocephalus	Peron's Snake-eyed Skink																	3				3			
	Ctenotus schomburgkii	Schomburgk's Ctenotus										1														
	Ctenotus uber	Spotted Ctenotus				1				3	1		8	4		2				1		1	2	2		
	Egernia depressa	Pygmy Spiny-tailed Skink			1		1	1	1				1				1				1	1		3		
	Egernia formosa	Goldfields Crevice-skink			1					1	1	1					2	2	4				1			

		Surveys	A							B																
Family	Species	Common Name	Site 1	Site 2	Site 7	Site 5	Site 6	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Opportunistic	Birds
	Eremiascincus richardsonii	Broad-banded Sand Swimmer	1	1								2				1							1			
	Lerista desertorum	Central Desert Robust Slider		1												1		6	2	5		1	2			
	Lerista muelleri	Wood Mulch-slider								2						5				1	1		5	4		
	Lerista sp.					1	1		1																	
	Liopholis striata	Nocturnal Desert Skink					1																			
	Menetia greyii	Common Dwarf Skink	1	1		1										1							1			
	Morethia butleri	Woodland Morethia Skink								1							2	2		2	1	1	1	1		
Typhlopidae	*Anilios australis*	Austral Blind Snake																						1		
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor		1						4		3		3			2		1	1			1			
	Varanus panoptes	Yellow-spotted Monitor													1		1						1			
	Varanus panoptes rubidus	Yellow-spotted Monitor	1	1	1	1	1	1	1																	
Cheluidae	*Chelodina steindachneri*	Steindachner's Turtle	1																							
Birds																										
Casuariidae	*Dromaius novaehollandiae*	Emu	1	1	1	1	1	1	1																1	
Columbidae	*Phaps chalcoptera*	Common Bronzewing	1	1		1	1		1																1	3
Columbidae	*Ocyphaps lophotes*	Crested Pigeon	1	1	1	1	1	1																	1	14
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar																								1
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar						1																		
Otididae	*Ardeotis australis*	Australian Bustard		1																						
Accipitridae	*Accipiter fasciatus*	Brown Goshawk	1																							
	Aquila audax	Wedge-tailed Eagle					1																			

		Surveys	A							B																	
Family	Species	Common Name	Site 1	Site 2	Site 7	Site 5	Site 6	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Opportunistic	Birds
	Hieraaetus morphnoides	Little Eagle		1																						
Falconidae	*Falco cenchroides*	Nankeen Kestrel		1	1	1		1	1																1	
	Falco berigora	Brown Falcon	1	1			1																			
Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel	1																							
Charadriidae	*Vanellus tricolor*	Banded Lapwing					1																			
Turnicidae	*Turnix velox*	Little Button-quail							1																	
Cacatuidae	*Eolophus roseicapillus*	Galah	1	1	1	1	1	1																	1	1
Psittacidae	*Barnardius zonarius*	Australian Ringneck	1			1	1	1																		12
	Psephotus varius	Mulga Parrot	1			1	1																		1	3
	Melopsittacus undulatus	Budgerigar	1	1		1	1	1	1																	
	Neopsephotus bourkii	Bourke's Parrot				1	1																			
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-cuckoo	1	1			1		1																	
	Chalcites osculans	Black-eared Cuckoo		1			1																			
	Cacomantis pallidus	Pallid Cuckoo	1					1	1																	
Halcyonidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher		1				1	1																	
Meropidae	*Merops ornatus*	Rainbow Bee-eater	1					1																		
Climacteridae	*Climacteris affinis*	White-browed Treecreeper				1	1	1	1																1	1
Ptilonorhynchidae	*Ptilonorhynchus maculatus*	Spotted Bowerbird	1					1																		
	Ptilonorhynchus guttatus	Western Bowerbird																							1	3
Maluridae	*Malurus splendens*	Splendid Fairy-wren	1	1			1																			19
	Malurus leucopterus	White-winged Fairy-wren		1				1																		3

		Surveys	A							B																	
Family	Species	Common Name	Site 1	Site 2	Site 7	Site 5	Site 6	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Opportunistic	Birds
	Malurus lamberti	Variegated Fairy-wren	1	1			1																			
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat		1																						
	Smicrornis brevirostris	Weebill		1																						3
	Gerygone fusca	Western Gerygone	1	1																						
	Acanthiza robustirostris	Slaty-backed Thornbill	1		1	1	1	1	1																	34
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill	1		1	1	1	1	1																	1
	Acanthiza uropygialis	Chestnut-rumped Thornbill	1		1	1	1	1	1																	8
	Acanthiza apicalis	Inland Thornbill	1	1	1			1	1																	30
	Aphelocephala leucopsis	Southern Whiteface	1	1	1	1	1	1																		7
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater	1	1		1			1																	
	Lichenostomus virescens	Singing Honeyeater	1	1	1	1	1	1	1																	24
	Purnella albifrons	White-fronted Honeyeater	1	1					1																	
	Manorina flavigula	Yellow-throated Miner	1	1	1	1	1	1	1																1	10
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater	1	1		1	1	1	1																	13
	Epthianura tricolor	Crimson Chat		1		1	1	1	1																	
	Sugomel niger	Black Honeyeater							1																	
	Lichmera indistincta	Brown Honeyeater		1																						
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler	1				1																		1	8
Psophodidae	*Cinclosoma castaneothorax*	Chestnut-breasted Quail-thrush				1	1	1	1																	
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella			1																					

		Surveys	A							B																	
Family	Species	Common Name	Site 1	Site 2	Site 7	Site 5	Site 6	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Opportunistic	Birds
Campephagidae	*Coracina maxima*	Ground Cuckoo-shrike	1	1				1																		
	Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	1		1		1	1																	2
	Lalage sueurii	White-winged Triller		1			1																			
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler	1	1	1	1	1	1	1																	22
	Colluricincla harmonica	Grey Shrike-thrush	1	1	1	1	1	1	1																	13
	Oreoica gutturalis	Crested Bellbird	1	1	1	1	1	1	1																	40
Artamidae	*Artamus cinereus*	Black-faced Woodswallow	1	1		1		1	1																2	3
	Cracticus torquatus	Grey Butcherbird	1	1	1	1	1	1	1																	
	Cracticus nigrogularis	Pied Butcherbird	1	1	1	1	1	1	1																1	2
	Cracticus tibicen	Australian Magpie	1		1		1																			
	Strepera versicolor	Grey Currawong	1																							
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	1	1			1		1																	
Corvidae	*Corvus bennetti*	Little Crow			1	1	1		1																	14
	Corvus orru	Torresian Crow	1	1	1		1	1	1																1	
Monarchidae	*Grallina cyanoleuca*	Magpie-lark	1	1																					1	
Petroicidae	*Petroica goodenovii*	Red-capped Robin	1	1	1	1	1	1	1																	14
	Melanodryas cucullata	Hooded Robin	1	1	1		1	1	1																	3
Megaluridae	*Cincloramphus mathewsi*	Rufous Songlark		1				1																		
Hirundinidae	*Hirundo neoxena*	Welcome Swallow	1				1	1	1																	
	Petrochelidon ariel	Fairy Martin							1																	
	Hirundo nigricans	Tree Martin						1	1																	

		Surveys	A							B																	
Family	**Species**	**Common Name**	**Site 1**	**Site 2**	**Site 7**	**Site 5**	**Site 6**	**Site 3**	**Site 4**	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**	**Site 6**	**Site 7**	**Site 8**	**Site 9**	**Site 10**	**Site 11**	**Site 12**	**Site 13**	**Site 14**	**Site 15**	**Opportunistic**	**Birds**
Estrildidae	*Taeniopygia guttata*	Zebra Finch	1	1	1	1		1	1																	
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit		1				1																	1	
Mammals																										
Bovidae	*Bos taurus*	Cow	1	1	1	1	1	1	1																	
	Capra hircus	Goat	1	1																						
Canidae	*Canis lupus*	Dingo	1																							
	Vulpes vulpes	Red Fox	1																							
Felidae	*Felis catus*	House Cat	1	1																						
Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat																					4			
Dasyuridae	*Sminthopsis crassicaudata*	Fat-tailed Dunnart		1																						
	Sminthopsis dolichura	Little Long-tailed Dunnart								1	5		1	4	4	2			1		1	1	3	2		
	Sminthopsis macroura	Stripe-faced Dunnart				1					1	1			1	3	1		1							
Macropodidae	*Osphranter robustus*	Euro			1																					
	Osphranter rufus	Red Kangaroo	1	1				1																		
Leporidae	*Oryctolagus cuniculus*	European Rabbit	1			1																				
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna			1																					
Equidae	*Equus caballus*	Domestic Horse		1				1																		
Muridae	*Mus musculus*	House Mouse	1	1		1		1	1																	

A Halpern Glick Maunsell (1999) *Rosemont Gold Project Biological Assessment Survey - Phases 1 & 2*. Unpublished report for Johnson's Well Mining NL. Perth.

B Terrestrial Ecosystems (2010) *Level 2 Fauna Risk Assessment for the Garden Well Project Area*. Unpublished report for Regis Resources, Perth.

		Survey	A									
Family	**Species**	**Common Name**	**TM1**	**JS2**	**WM2**	**WS2**	**WM1**	**WS1**	**JS3**	**JS1**	**JS4**	**HB1**
Frogs												
Limnodynastidae	*Neobatrachus sutor*	Shoemaker Frog										
	Neobatrachus wilsmorei	Goldfields Bullfrog	3	1								
	Platyplectrum spenceri	Spencer's Burrowing Frog										
Myobatrachidae	*Pseudophryne occidentalis*	Orange-crowned Toadlet										
Reptiles												
Agamidae	*Ctenophorus caudicinctus*	Ring-tailed Dragon										
	Ctenophorus fordi	Mallee Dragon										
	Ctenophorus inermis	Military Dragon			1							
	Ctenophorus maculatus	Spotted Dragon				2						
	Ctenophorus reticulatus	Western Netted Dragon					1					
	Ctenophorus salinarum	Saltpan Dragon				2		1				
	Ctenophorus vadnappa	Red-barred Dragon										
	Moloch horridus	Thorny Devil										
	Pogona minor	Dwarf Bearded Dragon	1		2				2	1	1	
	Tympanocryptis cephalus	Pebble Dragon										
Carphodactylidae	*Nephrurus vertebralis*	Midline Knob-tail					1		1			
	Underwoodisaurus milii	Barking Gecko										
Diplodactylidae	*Diplodactylus granariensis*	Wheat-belt Stone Gecko										
	Diplodactylus pulcher	Fine-faced Gecko										
	Lucasium maini	Main's Ground Gecko										
	Lucasium squarrosum	Mottled Ground Gecko	2	1	5	2	1					2

		Survey	A									
Family	**Species**	**Common Name**	**TM1**	**JS2**	**WM2**	**WS2**	**WM1**	**WS1**	**JS3**	**JS1**	**JS4**	**HB1**
	Strophurus assimilis	Goldfields Spiny-tailed Gecko										
	Strophurus ciliaris	Spiny-tailed Gecko										
	Strophurus elderi	Jewelled Gecko		1					1	2		
	Strophurus strophurus	Western Spiny-tailed Gecko										
	Strophurus wellingtonae	Western Shield Spiny-tailed Gecko										
Elapidae	*Brachyurophis fasciolata*	Narrow-banded Burrowing Snake										
	Parasuta monachus	Monk Snake										
	Simoselaps bertholdi	Jan's Banded Snake	1									
	Suta fasciata	Rosen's Snake										
Gekkonidae	*Gehyra variegata*	Tree Dtella										
	Gehyra xenopus	Crocodile-faced Dtella		1			1			1	1	
	Heteronotia binoei	Bynoe's Prickly Gecko	1				2				2	3
	Rhynchoedura ornata	Western Beaked Gecko										
Pygopodidae	*Delma nasuta*	Sharp-snouted Delma									1	
	Pygopus nigriceps	Western Hooded Scaly-foot									1	
Scincidae	*Cryptoblepharus buchananii*	Buchanan's Snake-eyed Skink										
	Ctenotus calurus	Blue-tailed Finesnout Ctenotus										
	Ctenotus greeri	Spotted-necked Ctenotus										
	Ctenotus helenae	Clay-soil Ctenotus		2					2	1		
	Ctenotus leonhardii	Leonhardi's Ctenotus	6	3	3	6	7				2	4
	Ctenotus pantherinus	Leopard Skink										
	Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus										

		Survey	A									
Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1
	Ctenotus schomburgkii	Schomburgk's Ctenotus										
	Ctenotus severus	Stern Ctenotus										
	Ctenotus uber	Spotted Ctenotus										
	Egernia depressa	Pygmy Spiny-tailed Skink										
	Egernia formosa	Goldfields Crevice-skink										
	Eremiascincus richardsonii	Broad-banded Sand Swimmer										
	Lerista desertorum	Central Desert Robust Slider	4	1	1				1	2	1	
	Lerista kingi	King's Slider					1					
	Lerista macropisthopus	Unpatterned Robust Slider										
	Lerista muelleri	Wood Mulch-slider										
	Lerista picturata	Southern Robust Slider										
	Lerista sp.											
	Liopholis inornata	Desert Skink										
	Liopholis striata	Nocturnal Desert Skink										
	Menetia greyii	Common Dwarf Skink				1	1					
	Morethia butleri	Woodland Morethia Skink										
Typhlopidae	*Anilios hamatus*	Pale-headed Blind Snake					1				1	
	Anilios waitii	Waite's Blind Snake										
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor			1							
	Varanus giganteus	Perentie										
	Varanus gouldii	Gould's Goanna					1		1			
	Varanus panoptes	Yellow-spotted Monitor										
	Varanus tristis	Black-headed Monitor										

		Survey	A									
Family	**Species**	**Common Name**	**TM1**	**JS2**	**WM2**	**WS2**	**WM1**	**WS1**	**JS3**	**JS1**	**JS4**	**HB1**
Birds												
Casuariidae	*Dromaius novaehollandiae*	Emu										
Phasianidae	*Coturnix pectoralis*	Stubble Quail										
Columbidae	*Phaps chalcoptera*	Common Bronzewing										
	Ocyphaps lophotes	Crested Pigeon										
	Geopelia cuneata	Diamond Dove										
Podargidae	*Podargus strigoides*	Tawny Frogmouth										
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar										
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar										
Otididae	*Ardeotis australis*	Australian Bustard										
Accipitridae	*Accipiter fasciatus*	Brown Goshawk										
	Circus assimilis	Spotted Harrier										
	Aquila audax	Wedge-tailed Eagle										
	Hieraaetus morphnoides	Little Eagle										
Falconidae	*Falco cenchroides*	Nankeen Kestrel										
	Falco berigora	Brown Falcon										
	Falco longipennis	Australian Hobby										
Charadriidae	*Vanellus tricolor*	Banded Lapwing										
Turnicidae	*Turnix velox*	Little Button-quail										
Cacatuidae	*Eolophus roseicapillus*	Galah										
	Nymphicus hollandicus	Cockatiel										
Psittacidae	*Barnardius zonarius*	Australian Ringneck										
	Psephotus varius	Mulga Parrot										

		Survey	A									
Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1
	Melopsittacus undulatus	Budgerigar										
	Neopsephotus bourkii	Bourke's Parrot										
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-cuckoo										
	Chalcites osculans	Black-eared Cuckoo										
	Cacomantis pallidus	Pallid Cuckoo										
Halcyonidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher										
Meropidae	*Merops ornatus*	Rainbow Bee-eater										
Climacteridae	*Climacteris affinis*	White-browed Treecreeper										
Maluridae	*Malurus leucopterus*	White-winged Fairy-wren										
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat										
	Smicrornis brevirostris	Weebill										
	Acanthiza robustirostris	Slaty-backed Thornbill										
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill										
	Acanthiza uropygialis	Chestnut-rumped Thornbill										
	Acanthiza apicalis	Inland Thornbill										
	Aphelocephala leucopsis	Southern Whiteface										
Pardalotidae	*Pardalotus striatus*	Striated Pardalote										
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater										
	Lichenostomus virescens	Singing Honeyeater										
	Lichenostomus plumulus	Grey-fronted Honeyeater										
	Purnella albifrons	White-fronted Honeyeater										
	Manorina flavigula	Yellow-throated Miner										
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater										

		Survey	A									
Family	**Species**	**Common Name**	**TM1**	**JS2**	**WM2**	**WS2**	**WM1**	**WS1**	**JS3**	**JS1**	**JS4**	**HB1**
	Anthochaera carunculata	Red Wattlebird										
	Conopophila whitei	Grey Honeyeater										
	Epthianura tricolor	Crimson Chat										
	Epthianura aurifrons	Orange Chat										
Pomatostomidae	*Pomatostomus temporalis*	Grey-crowned Babbler										
	Pomatostomus superciliosus	White-browed Babbler										
Psophodidae	*Cinclosoma castaneothorax*	Chestnut-breasted Quail-thrush										
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella										
Campephagidae	*Coracina maxima*	Ground Cuckoo-shrike										
	Coracina novaehollandiae	Black-faced Cuckoo-shrike										
	Lalage sueurii	White-winged Triller										
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler										
	Colluricincla harmonica	Grey Shrike-thrush										
	Oreoica gutturalis	Crested Bellbird										
Artamidae	*Artamus personatus*	Masked Woodswallow										
	Artamus superciliosus	White-browed Woodswallow										
	Artamus cinereus	Black-faced Woodswallow										
	Cracticus torquatus	Grey Butcherbird										
	Cracticus nigrogularis	Pied Butcherbird										
	Cracticus tibicen	Australian Magpie										
	Strepera versicolor	Grey Currawong										
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail										
Corvidae	*Corvus bennetti*	Little Crow										

		Survey	A									
Family	**Species**	**Common Name**	**TM1**	**JS2**	**WM2**	**WS2**	**WM1**	**WS1**	**JS3**	**JS1**	**JS4**	**HB1**
	Corvus orru	Torresian Crow										
Monarchidae	*Grallina cyanoleuca*	Magpie-lark										
Petroicidae	*Microeca fascinans*	Jacky Winter										
	Petroica goodenovii	Red-capped Robin										
	Melanodryas cucullata	Hooded Robin										
Megaluridae	*Cincloramphus mathewsi*	Rufous Songlark										
	Cincloramphus cruralis	Brown Songlark										
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow										
	Petrochelidon ariel	Fairy Martin										
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird										
Estrildidae	*Taeniopygia guttata*	Zebra Finch										
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit										
Mammals												
Bovidae	*Capra hircus*	Goat										
	Ovis aries	Sheep										
Camelidae	*Camelus dromedarius*	Dromedary										
	Canis familiaris	Dog										
	Vulpes vulpes	Red Fox										
Felidae	*Felis catus*	House Cat										
Molossidae	*Austronomus australis*	White-striped Free-tail Bat										
	Ozimops planiceps	Southern Free-tail Bat										
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat										
	Nyctophilus geoffroyi	Lesser Long-eared Bat										

		Survey	A									
Family	**Species**	**Common Name**	**TM1**	**JS2**	**WM2**	**WS2**	**WM1**	**WS1**	**JS3**	**JS1**	**JS4**	**HB1**
	Scotorepens balstoni	Inland Broad-nosed Bat										
Dasyuridae	*Ningaui ridei*	Wongai Ningaui							1			
	Sminthopsis crassicaudata	Fat-tailed Dunnart										
	Sminthopsis dolichura	Little Long-tailed Dunnart										
	Sminthopsis macroura	Stripe-faced Dunnart										
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo										
	Osphranter robustus	Euro										
	Osphranter rufus	Red Kangaroo										
Leporidae	*Oryctolagus cuniculus*	European Rabbit										
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna										
Muridae	*Mus musculus*	House Mouse										
	Notomys alexis	Spinifex Hopping Mouse							1			
	Notomys mitchellii	Mitchell's Hopping Mouse										
	Pseudomys bolami	Bolam's Mouse										
	Pseudomys hermannsburgensis	Sandy Inland Mouse										

A Dunlop, J.N. and Payne, W. (1999) *A vertebrate fauna survey of the North Lake Carey region*, Unpublished report for Placer (Granny Smith) and Homestake.

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

Basic Vertebrate Fauna Assessment
Expansion of the Renewable Energy Zone



C.1 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.

Appendix D. Criteria for determining significant impacts on critically endangered, endangered and vulnerable species

Basic Vertebrate Fauna Assessment
Expansion of the Renewable Energy Zone



D.1 DEFINITIONS FOR CRITERIA OF CRITICALLY ENDANGERED, ENDANGERED AND VULNERABLE SPECIES IMPACTS

WHAT IS A POPULATION OF A SPECIES?

A 'population of a species' is defined under the EPBC Act as an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:

- a geographically distinct regional population, or collection of local populations, or
- a population, or collection of local populations, that occurs within a particular bioregion.

WHAT IS AN INVASIVE SPECIES?

An 'invasive species' is an introduced species, including an introduced (translocated) native species, which out-competes native species for space and resources or which is a predator of native species. Introducing an invasive species into an area may result in that species becoming established. An invasive species may harm listed threatened species or ecological communities by direct competition, modification of habitat or predation.

WHAT IS HABITAT CRITICAL TO THE SURVIVAL OF A SPECIES OR ECOLOGICAL COMMUNITY?

'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the minister under the EPBC Act.

WHAT IS AN IMPORTANT POPULATION OF A SPECIES

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

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

Appendix E.
Rapid Habitat Assessment Summary

Basic Vertebrate Fauna Assessment
Expansion of the Renewable Energy Zone



Date: 3/11/2023 Habitat Assessment #: 1 Observer: Dr Scott Thompson

GDA94 51; 433521 mE 6808625 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 2 Observer: Dr Scott Thompson

GDA94 51; 433544 mE 6808857 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 3 Observer: Dr Scott Thompson

GDA94 51; 433544 mE 6809029 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 4 Observer: Dr Scott Thompson

GDA94 51; 433527 mE 6809459 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 5 Observer: Dr Scott Thompson

GDA94 51; 433739 mE 6809451 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod

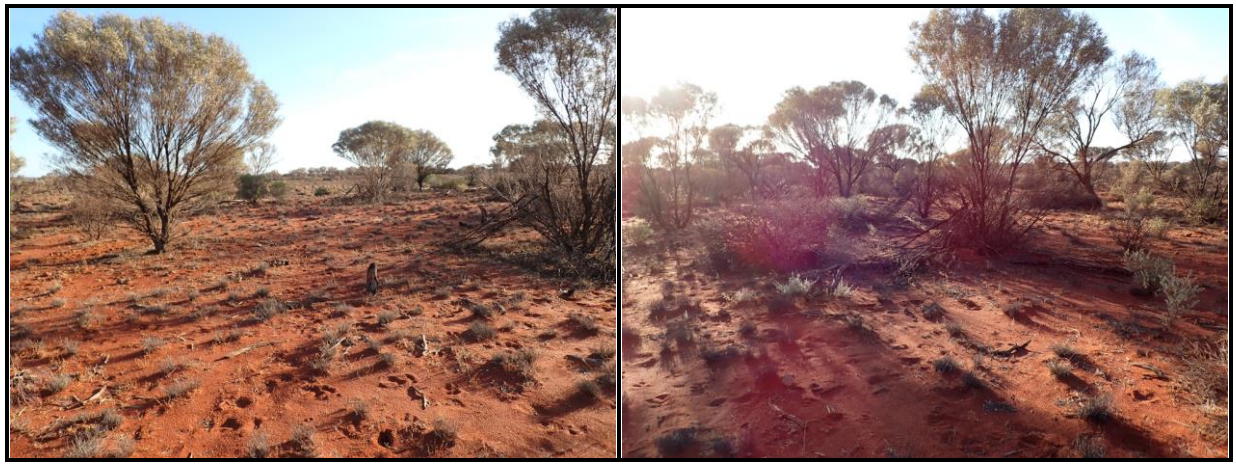


Date: 3/11/2023 Habitat Assessment #: 6 Observer: Dr Scott Thompson

GDA94 51; 433759 mE 6809296 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod

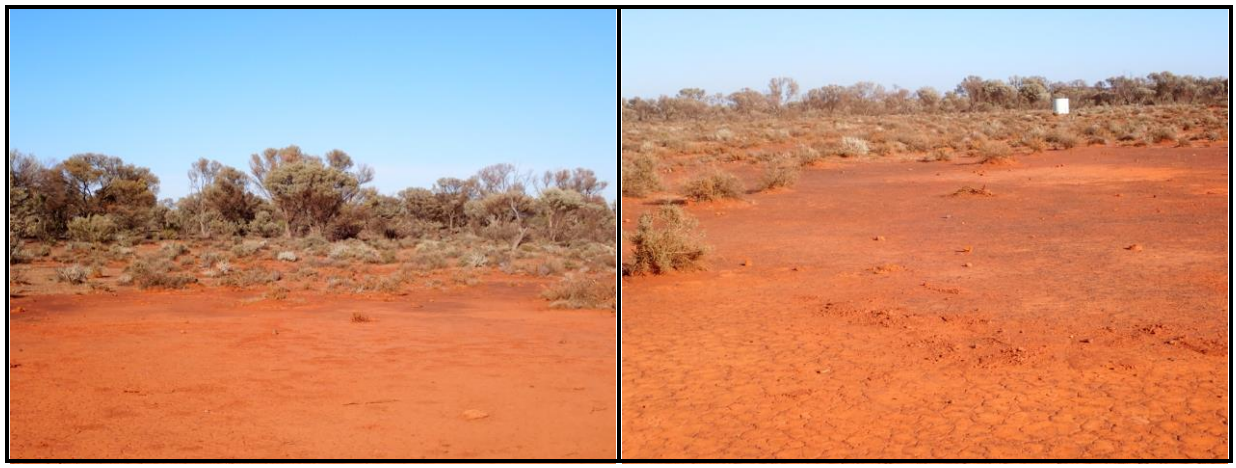


Date: 3/11/2023 Habitat Assessment #: 7 Observer: Dr Scott Thompson

GDA94 51; 433751 mE 6809170 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 8 Observer: Dr Scott Thompson

GDA94 51; 433748 mE 6808888 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 9 Observer: Dr Scott Thompson

GDA94 51; 433745 mE 6808718 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 10 Observer: Dr Scott Thompson

GDA94 51; 433977 mE 6808637 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 11 Observer: Dr Scott Thompson

GDA94 51; 434019 mE 6808784 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 12 Observer: Dr Scott Thompson

GDA94 51; 433994 mE 6808925 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 13 Observer: Dr Scott Thompson

GDA94 51; 434013 mE 6809130 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 14 Observer: Dr Scott Thompson

GDA94 51; 434018 mE 6809305 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 15 Observer: Dr Scott Thompson

GDA94 51; 434023 mE 6809544 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 16 Observer: Dr Scott Thompson

GDA94 51; 434245 mE 6809467 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 17 Observer: Dr Scott Thompson

GDA94 51; 434255 mE 6809277 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 18 Observer: Dr Scott Thompson

GDA94 51; 434240 mE 6809010 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 19 Observer: Dr Scott Thompson

GDA94 51; 434249 mE 6808782 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 20 Observer: Dr Scott Thompson

GDA94 51; 434479 mE 6808675 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 21 Observer: Dr Scott Thompson

GDA94 51; 434473 mE 6808866 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 22 Observer: Dr Scott Thompson

GDA94 51; 434497 mE 6809099 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 23 Observer: Dr Scott Thompson

GDA94 51; 434520 mE 6809289 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 24 Observer: Dr Scott Thompson

GDA94 51; 434520 mE 6809499 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 25 Observer: Dr Scott Thompson

GDA94 51; 434729 mE 6809613 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 26 Observer: Dr Scott Thompson

GDA94 51; 434746 mE 6809327 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 27 Observer: Dr Scott Thompson

GDA94 51; 434769 mE 6809083 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 28 Observer: Dr Scott Thompson

GDA94 51; 434767 mE 6808915 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 29 Observer: Dr Scott Thompson

GDA94 51; 434767 mE 6808720 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 30 Observer: Dr Scott Thompson

GDA94 51; 435009 mE 6808647 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Disturbed Surface: Sand

Habitat Type: Mulga over chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 31 Observer: Dr Scott Thompson

GDA94 51; 435004 mE 6808845 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Open Mulga



Date: 3/11/2023 Habitat Assessment #: 32 Observer: Dr Scott Thompson

GDA94 51; 435022 mE 6809024 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Open Mulga



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 33 Observer: Dr Scott Thompson

GDA94 51; 434983 mE 6809278 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Open Mulga



Date: 3/11/2023 Habitat Assessment #: 34 Observer: Dr Scott Thompson

GDA94 51; 435021 mE 6809469 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Open Mulga



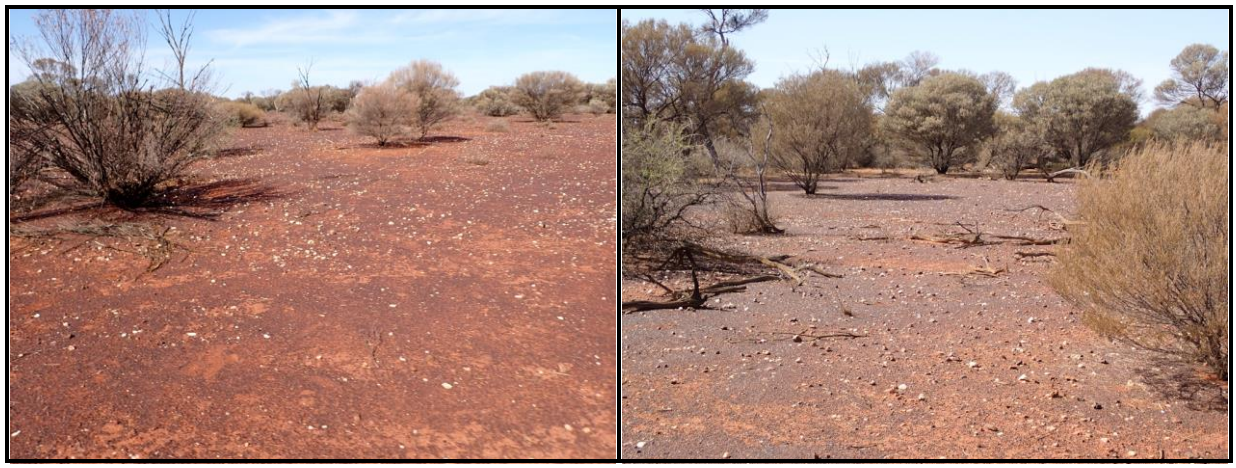
TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 35 Observer: Dr Scott Thompson

GDA94 51; 435218 mE 6809634 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Disturbed Surface: Sand, pebbles

Habitat Type: Open Mulga



Date: 3/11/2023 Habitat Assessment #: 36 Observer: Dr Scott Thompson

GDA94 51; 435240 mE 6809421 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Open Mulga



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 37 Observer: Dr Scott Thompson

GDA94 51; 435261 mE 6809164 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Open Mulga



Date: 3/11/2023 Habitat Assessment #: 38 Observer: Dr Scott Thompson

GDA94 51; 435255 mE 6808990 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Open Mulga



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 39 Observer: Dr Scott Thompson

GDA94 51; 435246 mE 6808836 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Open Mulga



Date: 3/11/2023 Habitat Assessment #: 40 Observer: Dr Scott Thompson

GDA94 51; 435237 mE 6808697 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Open Mulga



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 41 Observer: Dr Scott Thompson

GDA94 51; 435495 mE 6808792 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 42 Observer: Dr Scott Thompson

GDA94 51; 435464 mE 6809051 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Open Mulga



Date: 3/11/2023 Habitat Assessment #: 43 Observer: Dr Scott Thompson

GDA94 51; 435507 mE 6809294 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Open Mulga

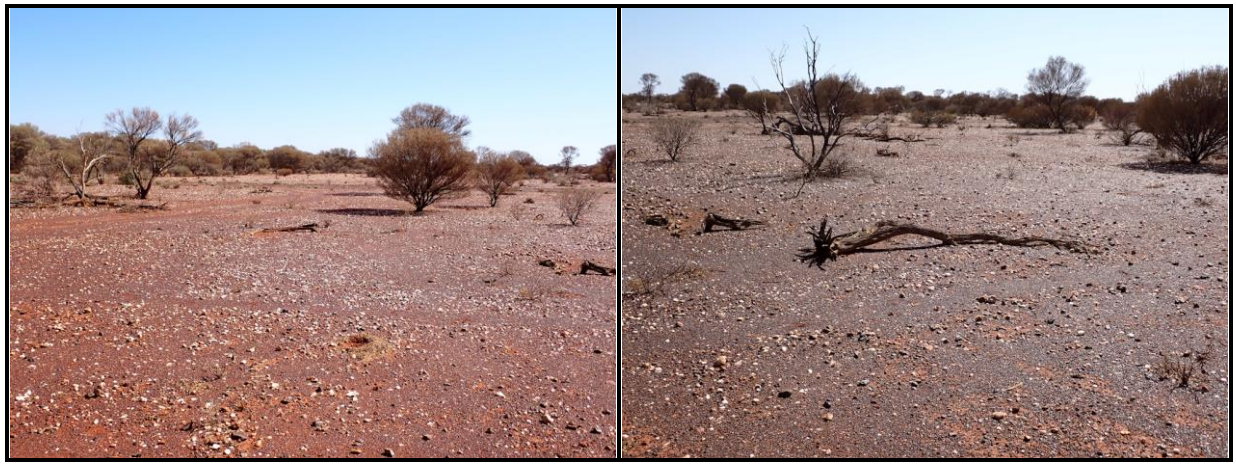


Date: 3/11/2023 Habitat Assessment #: 44 Observer: Dr Scott Thompson

GDA94 51; 435495 mE 6809535 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Open Mulga



Date: 3/11/2023 Habitat Assessment #: 45 Observer: Dr Scott Thompson

GDA94 51; 435569 mE 6809746 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Open Mulga



Date: 3/11/2023 Habitat Assessment #: 46 Observer: Dr Scott Thompson

GDA94 51; 436154 mE 6809819 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Open Mulga



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 47 Observer: Dr Scott Thompson

GDA94 51; 436394 mE 6809833 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Open Mulga

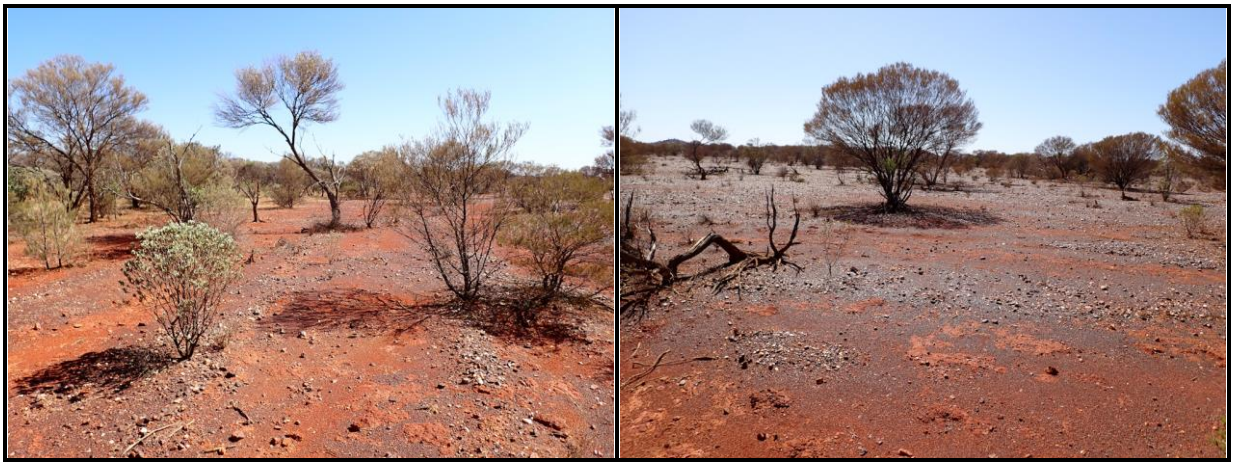


Date: 3/11/2023 Habitat Assessment #: 48 Observer: Dr Scott Thompson

GDA94 51; 436548 mE 6809842 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Open Mulga



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 49 Observer: Dr Scott Thompson

GDA94 51; 436754 mE 6809870 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Open Mulga



Date: 3/11/2023 Habitat Assessment #: 50 Observer: Dr Scott Thompson

GDA94 51; 436889 mE 6809831 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Mulga over chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 51 Observer: Dr Scott Thompson

GDA94 51; 437061 mE 6809894 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles, cobbles

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 52 Observer: Dr Scott Thompson

GDA94 51; 437163 mE 6809890 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Disturbed Surface: Sand, pebbles, cobbles

Habitat Type: Mulga over chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 53 Observer: Dr Scott Thompson

GDA94 51; 437364 mE 6809889 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles, cobbles

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 54 Observer: Dr Scott Thompson

GDA94 51; 437471 mE 6809958 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles, cobbles

Habitat Type: Mulga over ironstone gravel



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 55 Observer: Dr Scott Thompson

GDA94 51; 437624 mE 6809983 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Rocky

Habitat Type: BIF



Date: 3/11/2023 Habitat Assessment #: 56 Observer: Dr Scott Thompson

GDA94 51; 437737 mE 6809870 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles, cobbles

Habitat Type: Mulga over ironstone gravel



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 57 Observer: Dr Scott Thompson

GDA94 51; 437755 mE 6809732 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles, cobbles

Habitat Type: Open Mulga



Date: 3/11/2023 Habitat Assessment #: 58 Observer: Dr Scott Thompson

GDA94 51; 437765 mE 6809659 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles, cobbles

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 59 Observer: Dr Scott Thompson

GDA94 51; 437927 mE 6809558 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Rocky

Habitat Type: BIF



Date: 3/11/2023 Habitat Assessment #: 60 Observer: Dr Scott Thompson

GDA94 51; 438000 mE 6809675 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles, cobbles

Habitat Type: BIF



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 61 Observer: Dr Scott Thompson

GDA94 51; 437995 mE 6809736 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Rocky

Habitat Type: BIF



Date: 3/11/2023 Habitat Assessment #: 62 Observer: Dr Scott Thompson

GDA94 51; 437993 mE 6809832 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles, cobbles

Habitat Type: BIF



Date: 3/11/2023 Habitat Assessment #: 63 Observer: Dr Scott Thompson

GDA94 51; 437981 mE 6809965 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles, cobbles

Habitat Type: Mulga over ironstone gravel



Date: 3/11/2023 Habitat Assessment #: 64 Observer: Dr Scott Thompson

GDA94 51; 437858 mE 6809864 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over ironstone gravel



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 65 Observer: Dr Scott Thompson

GDA94 51; 438085 mE 6809404 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 66 Observer: Dr Scott Thompson

GDA94 51; 438150 mE 6809245 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles, cobbles

Habitat Type: Mulga over ironstone gravel



Date: 3/11/2023 Habitat Assessment #: 67 Observer: Dr Scott Thompson

GDA94 51; 438189 mE 6809122 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles, cobbles

Habitat Type: Mulga over ironstone gravel



Date: 3/11/2023 Habitat Assessment #: 68 Observer: Dr Scott Thompson

GDA94 51; 438213 mE 6809048 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles, cobbles

Habitat Type: Chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 69 Observer: Dr Scott Thompson

GDA94 51; 438279 mE 6808803 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 70 Observer: Dr Scott Thompson

GDA94 51; 438390 mE 6808483 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 71 Observer: Dr Scott Thompson

GDA94 51; 438438 mE 6808250 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 72 Observer: Dr Scott Thompson

GDA94 51; 438491 mE 6808067 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 73 Observer: Dr Scott Thompson

GDA94 51; 438342 mE 6807970 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod

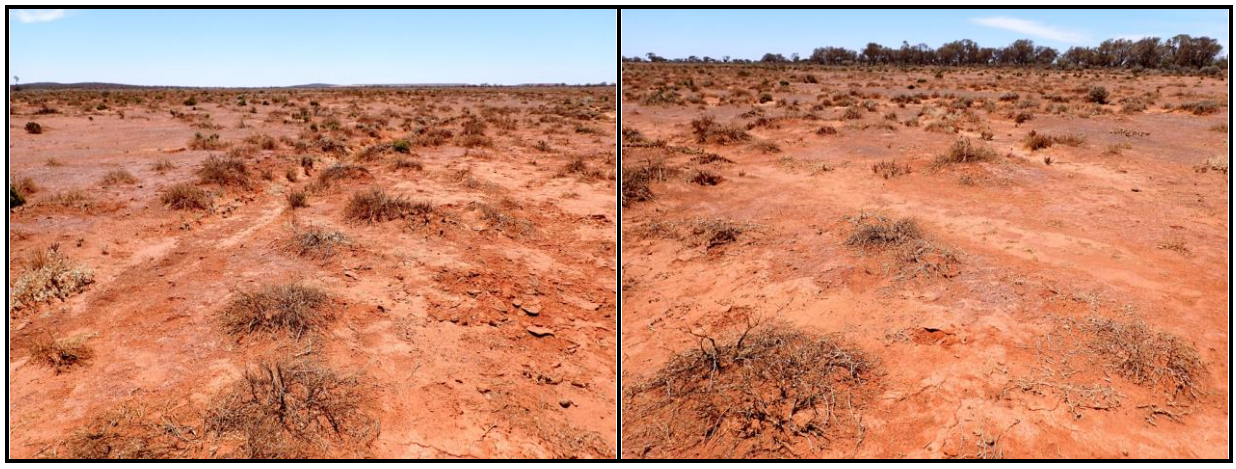


Date: 3/11/2023 Habitat Assessment #: 74 Observer: Dr Scott Thompson

GDA94 51; 438262 mE 6808108 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 75 Observer: Dr Scott Thompson

GDA94 51; 438246 mE 6808276 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over Chenopod



Date: 3/11/2023 Habitat Assessment #: 76 Observer: Dr Scott Thompson

GDA94 51; 438227 mE 6808487 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles, cobbles

Habitat Type: Chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 77 Observer: Dr Scott Thompson

GDA94 51; 438221 mE 6808557 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Rocky

Habitat Type: BIF



Date: 3/11/2023 Habitat Assessment #: 78 Observer: Dr Scott Thompson

GDA94 51; 438083 mE 6808585 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles, cobbles

Habitat Type: Chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 79 Observer: Dr Scott Thompson

GDA94 51; 438007 mE 6809405 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 80 Observer: Dr Scott Thompson

GDA94 51; 437976 mE 6809203 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Disturbed Surface: Sand

Habitat Type: Disturbed



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 81 Observer: Dr Scott Thompson

GDA94 51; 437992 mE 6809077 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles, cobbles

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 82 Observer: Dr Scott Thompson

GDA94 51; 437854 mE 6808892 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles, cobbles

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 83 Observer: Dr Scott Thompson

GDA94 51; 437825 mE 6808691 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 84 Observer: Dr Scott Thompson

GDA94 51; 437876 mE 6808581 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 85 Observer: Dr Scott Thompson

GDA94 51; 437989 mE 6808405 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 86 Observer: Dr Scott Thompson

GDA94 51; 437907 mE 6808285 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 87 Observer: Dr Scott Thompson

GDA94 51; 437796 mE 6808220 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 88 Observer: Dr Scott Thompson

GDA94 51; 437763 mE 6808121 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 89 Observer: Dr Scott Thompson

GDA94 51; 437838 mE 6808015 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 90 Observer: Dr Scott Thompson

GDA94 51; 437898 mE 6807971 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Tecticornia



Date: 3/11/2023 Habitat Assessment #: 91 Observer: Dr Scott Thompson

GDA94 51; 437763 mE 6807787 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Tecticornia

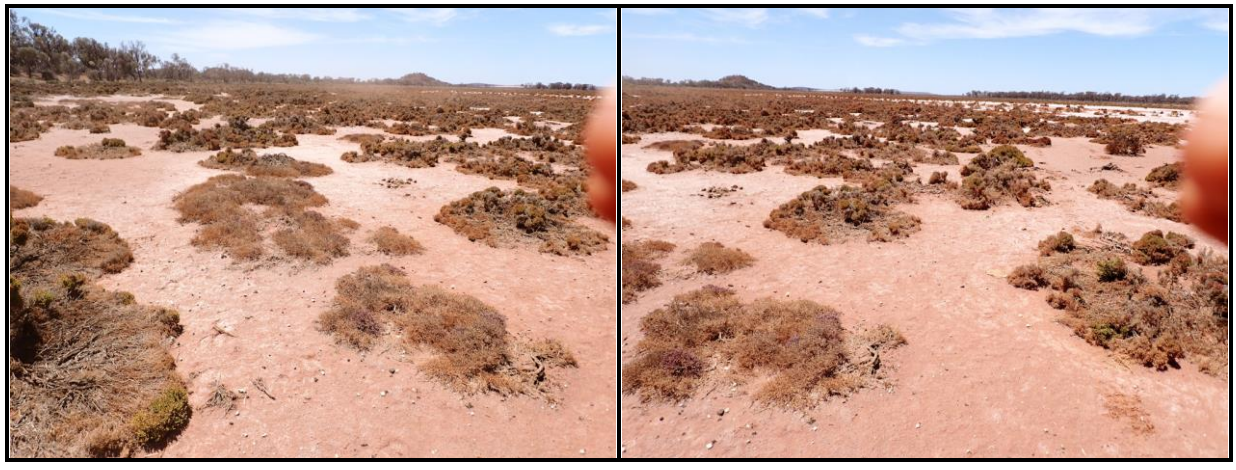


Date: 3/11/2023 Habitat Assessment #: 92 Observer: Dr Scott Thompson

GDA94 51; 437541 mE 6807685 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Tecticornia



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 93 Observer: Dr Scott Thompson

GDA94 51; 437485 mE 6807688 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 94 Observer: Dr Scott Thompson

GDA94 51; 437434 mE 6807781 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles, cobbles

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 95 Observer: Dr Scott Thompson

GDA94 51; 437295 mE 6807828 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Rocky

Habitat Type: BIF



Date: 3/11/2023 Habitat Assessment #: 96 Observer: Dr Scott Thompson

GDA94 51; 437248 mE 6807671 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 97 Observer: Dr Scott Thompson

GDA94 51; 437187 mE 6807659 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Rocky

Habitat Type: BIF



Date: 3/11/2023 Habitat Assessment #: 98 Observer: Dr Scott Thompson

GDA94 51; 437060 mE 6807527 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 99 Observer: Dr Scott Thompson

GDA94 51; 436968 mE 6807613 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 100 Observer: Dr Scott Thompson

GDA94 51; 436807 mE 6807825 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 101 Observer: Dr Scott Thompson

GDA94 51; 436761 mE 6807551 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 102 Observer: Dr Scott Thompson

GDA94 51; 436687 mE 6807397 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 103 Observer: Dr Scott Thompson

GDA94 51; 436495 mE 6807380 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod

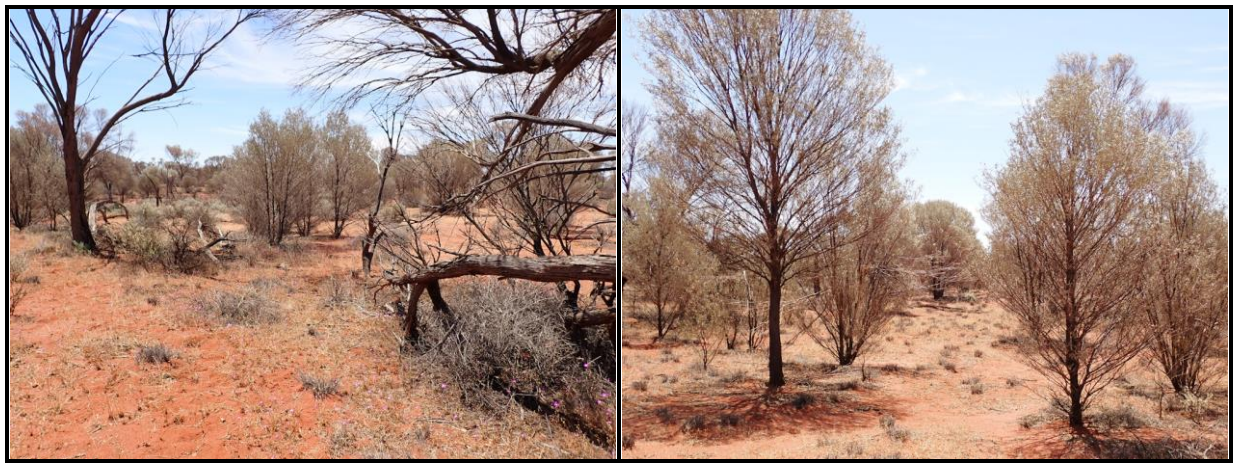


Date: 3/11/2023 Habitat Assessment #: 104 Observer: Dr Scott Thompson

GDA94 51; 436502 mE 6807581 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 105 Observer: Dr Scott Thompson

GDA94 51; 436471 mE 6807787 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 106 Observer: Dr Scott Thompson

GDA94 51; 436263 mE 6807771 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 107 Observer: Dr Scott Thompson

GDA94 51; 436249 mE 6807556 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 108 Observer: Dr Scott Thompson

GDA94 51; 436261 mE 6807407 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 109 Observer: Dr Scott Thompson

GDA94 51; 436031 mE 6807243 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 110 Observer: Dr Scott Thompson

GDA94 51; 435984 mE 6807530 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 111 Observer: Dr Scott Thompson

GDA94 51; 435997 mE 6807809 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 112 Observer: Dr Scott Thompson

GDA94 51; 435772 mE 6807822 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 113 Observer: Dr Scott Thompson

GDA94 51; 435730 mE 6807463 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 114 Observer: Dr Scott Thompson

GDA94 51; 435736 mE 6807227 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 115 Observer: Dr Scott Thompson

GDA94 51; 435579 mE 6807083 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 116 Observer: Dr Scott Thompson

GDA94 51; 435500 mE 6807169 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Tecticornia



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 117 Observer: Dr Scott Thompson

GDA94 51; 435523 mE 6807376 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Tecticornia



Date: 3/11/2023 Habitat Assessment #: 118 Observer: Dr Scott Thompson

GDA94 51; 435490 mE 6807752 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Open Mulga



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 119 Observer: Dr Scott Thompson

GDA94 51; 435557 mE 6808075 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 120 Observer: Dr Scott Thompson

GDA94 51; 435646 mE 6808331 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 121 Observer: Dr Scott Thompson

GDA94 51; 435623 mE 6808475 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 122 Observer: Dr Scott Thompson

GDA94 51; 435512 mE 6808598 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Mulga over chenopod



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 123 Observer: Dr Scott Thompson

GDA94 51; 435282 mE 6808580 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Disturbed Surface: Sand, pebbles

Habitat Type: Mulga over chenopod



Date: 3/11/2023 Habitat Assessment #: 124 Observer: Dr Scott Thompson

GDA94 51; 435240 mE 6808442 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Open Mulga



Date: 3/11/2023 Habitat Assessment #: 125 Observer: Dr Scott Thompson

GDA94 51; 435204 mE 6808197 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Open Mulga



Date: 3/11/2023 Habitat Assessment #: 126 Observer: Dr Scott Thompson

GDA94 51; 435237 mE 6807936 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand, pebbles

Habitat Type: Open Mulga



TERRESTRIAL ECOSYSTEMS

Date: 3/11/2023 Habitat Assessment #: 127 Observer: Dr Scott Thompson

GDA94 51; 435253 mE 6807650 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Chenopod



Date: 3/11/2023 Habitat Assessment #: 128 Observer: Dr Scott Thompson

GDA94 51; 435151 mE 6808438 mN Fire History: > 5yrs Landform: Flat plain

Soil Type: Sandy clay Habitat Quality: Good Surface: Sand

Habitat Type: Mulga over chenopod




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