TERRESTRIAL ECOSYSTEMS

Basic vertebrate fauna survey and risk assessment

Mt Celia Gold Project

Prepared for: Native Vegetation Solutions

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Prepared For: Native Vegetation Solutions
36 Hannan Street
Kalgoorlie WA 6430

Prepared By: Terrestrial Ecosystems
10 Houston Place
Mt Claremont WA 6010
Phone: 08 9385 2398, 0407 385 289
Website: www.terrestrialecosystems.com
ABN: 40921131346

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EXECUTIVE SUMMARY

Native Vegetation Solutions on behalf of Legacy Iron Ore Limited requested a basic vertebrate fauna survey and risk assessment to support a Native Vegetation Clearing Permit Application and Mining Proposal for the Mt Celia mining project which is approximately 175km north, north east of Kalgoorlie (i.e. project area).

The total assessed area was approximately 1,404ha, however, a smaller area will be impacted by the proposed mining development and operations.

No Malleefowl mounds were recorded in the project area, however, Malleefowl tracks were recorded in the project area, indicating that Malleefowl are present in low abundance. Large portions of the habitat in the project area were very open and therefore not suitable for Malleefowl nesting when predators are present in the general area.

Prior to any vegetation clearing or disturbance activity, Legacy Iron Ore Limited should complete a risk assessment to determine if conservation significant fauna are likely to be present, and if present, likely to be impacted. If Malleefowl or its foraging habitat is likely to be significantly impacted, then a referral to the Commonwealth Government under the *EPBC Act 1999* is recommended.

It is likely that Long-tailed Dunnart are present in the breakaway and rocky areas. If these areas are not going to be impacted by mining development or operations, then impacts are likely to be low. The Long-tailed Dunnart is not listed as a threatened species under the *EPBC Act* so there is no reporting requirement under the Commonwealth Act for this species.

It is recommended that:

- Prior to vegetation clearing and disturbance, the mine undertakes a risk assessment to determine if conservation significant fauna are likely to be present, and if present, likely to be impacted;
- if Malleefowl or its foraging habitat are likely to be significantly impacted, as judged by the risk assessment, then the proposed action is referred to the Commonwealth Government under the *EPBC Act 1999* to assess the significance of the potential impact on this species;
- a Malleefowl Management Plan is prepared once more detail is available about the proposed potential impacts on this species. If an *EPBC Act* referral is submitted, then it is recommended that the Malleefowl Management Plan is submitted with the referral to demonstrate how the development will minimise, mitigate and manage potential impacts on the species;
- an induction program that includes a component on managing fauna is mandatory for staff and contractors working in the project area;
- the impact of dust on adjacent vegetation and therefore fauna habitat is managed and monitored against appropriate KPIs; and
- preparation of a Vertebrate Fauna Management Plan prior to vegetation clearing and development is completed.

1. INTRODUCTION

1.1 BACKGROUND

Native Vegetation Solutions, on behalf of Legacy Iron Ore Limited requested a basic vertebrate fauna survey and risk assessment of the proposed Mt Celia mining project area, which is approximately 175km north, north east of Kalgoorlie (i.e. project area; Figure 1). The total assessed area was approximately 1,404ha but only a portion of the area will be disturbed.

1.2 PROJECT OBJECTIVES AND SCOPE OF WORKS

Terrestrial Ecosystems was commissioned to undertake a basic vertebrate fauna survey and risk assessment for the Mt Celia mine project area. The purpose of this fauna survey and risk assessment is to provide information to the proponent on the potential impacts on the vertebrate fauna assemblage in the project area to enable the proposed development to be adequately assessed. The methodology broadly follows that described in the Environmental Protection Authority (2020) *Technical Guidance Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*.

This basic vertebrate fauna survey and risk assessment involved a desktop review and analysis of photos taken on-site. The assessment objectives were to:

- provide an indication of the vertebrate fauna assemblage (reptiles, amphibians, mammals, birds and fish) 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 vertebrate fauna assemblage;
- determine if any additional surveys are required to assess the potential impact on vertebrate fauna assemblage 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 and Department of Biodiversity, Conservation and Attractions (DBCA) records in NatureMap] to identify potential vertebrate fauna within the area;
- searched the DBCA's NatureMap for Threatened and Priority Species;
- 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 Act 1999* (*EPBC Act 1999*) or international migratory bird agreements (JAMBA/CAMBA);
- reviewed previous fauna surveys conducted near the project area and in similar habitat;
- undertook a site reconnaissance survey;
- 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 2016* (*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. Cowan (2003) recorded no threatened ecological communities in the vicinity of the project areas. Threatening process for conservation significant fauna were listed by Cowan (2003) as foxes and cats.

2.2 LAND USE HISTORY

The dominant land uses for the bioregion are native pasture to support grazing on pastoral leases and crown land reserves, and to a much lesser extent mining and exploration. The region surrounding the project area is relatively undisturbed, with a chain of salt lakes approximately 15km to the north-east and south-west (Figure 2).

2.3 CLIMATE

The project area is characterised as semi-arid. As the project area is between two weather stations, we have provided both data sets for comparison. Laverton, ~100km 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, 2020). The lowest mean daily maximum and minimum temperatures occur in July (Chart 1). Average monthly rainfall is heaviest in January - March.

Kalgoorlie, 175km to the south, south-west, has an annual rainfall of approximately 266mm, although this varies considerably from year-to-year. The highest mean maximum and minimum temperatures in Kalgoorlie are in January with an average of 33.7°C and 18.3°C, respectively (Bureau of Meteorology, 2020). The lowest mean daily maximum and minimum temperatures occur in July (Chart 1). Average monthly rainfall is heaviest in January – February, with another peak in May to July.

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.

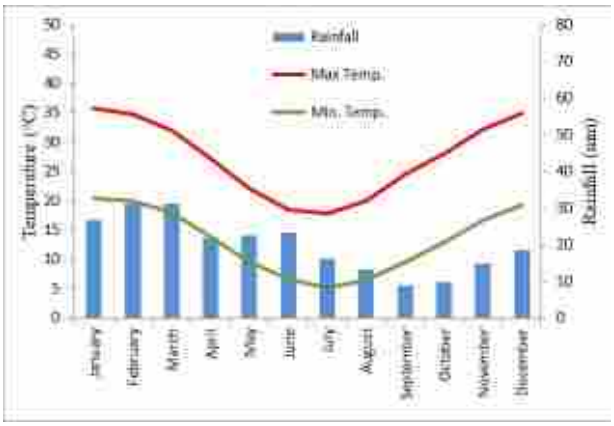

Chart 1. Climatic averages for Laverton

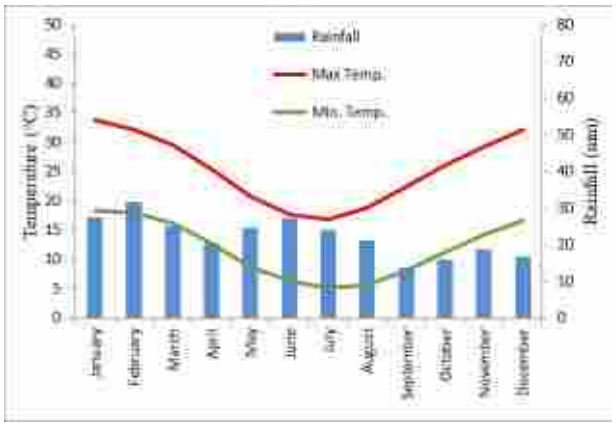

Chart 2. Climatic averages for Kalgoorlie

2.4 REGIONAL BIOLOGICAL FAUNA CONTEXT OF PROJECT AREA

The frogs, reptiles, mammals and birds in the vicinity of the project area have been surveyed for other environmental assessments and research purposes and are therefore known. Fauna surveys and assessments undertaken in the vicinity of the project area that have been reviewed for this assessment 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*, Perth.
- Coffey Environments (2008) *Level 2 Fauna Assessment for the Duketon Gold Project*. Unpublished report for Regis Resources, 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.
- Dunlop, J.N. and Payne, W. (1999) *A vertebrate Fauna Survey of the North Lake Carey Region including Hillside Prospect, Wallaby Prospect and Just in Time / Just in Case and the Teatree Dam Area*, Unpublished report for Placer (Granny Smith) and Homestake, Perth,
- Ecologia Environment (2007) *Jump Up Dam Fauna Assessment*, Unpublished report for Heron Resources Limited, Perth.
- ENV Australia (2008) *Agnew Prospects Fauna Assessment*. Unpublished report for Agnew Gold Mining Company Pty Limited, 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.
- Halpern Glick Maunsell (1999) *Rosemont Gold Project Biological Assessment Survey - Phases 1 & 2*. Unpublished report for Johnson's Well Mining NL, Perth.
- 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.
- Kingfisher Environmental Consulting (2014) *Sunrise Dam - Tropicana Infrastructure Corridor Fauna Survey*, Unpublished report for Anglogold Ashanti Australia, Perth.
- MBS Environmental (2004) *Vegetation and Habitat Assessment of the Euro, Sickle and Admiral Hill Project Areas, Laverton*. Unpublished report for Crescent Gold Limited, Perth.
- 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.
- Minesite Rehabilitation Services Pty Ltd (1997) *Tarmoola Gold Mine Flora and Fauna Survey*, Unpublished report for Mt Edon Gold Mines (Aust) Ltd, Kalgoorlie.
- 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 Murrin Expansion Project*, Unpublished report for Anaconda Nickel Ltd, 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.
- Ninox Wildlife Consulting (2006) *A Vertebrate Fauna Assessment of the Tarmoola Area*, Unpublished report for St Barbara 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.
- Terrestrial Ecosystems (2010) *Level 2 Fauna Risk Assessment for the Garden Well Project Area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2011) *Level 2 Fauna Risk Assessment for the Granny Deeps Project Area*, Unpublished report for Barrick Gold Corporation, 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*. 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*. 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 Granny Smith Mining Pty Ltd, 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 Granny Smith Mining Pty Ltd, 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 (2014) *Level 1 Fauna Risk Assessment for a proposed power station site, Perth*. Unpublished report for Granny Smith Mining Pty Ltd, Perth.
- Terrestrial Ecosystems (2015a) *Fauna risk assessment of the proposed borrow pit expansion*. Unpublished report for Granny Smith Mining Pty 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 (2016d) *Level 1 Fauna Risk Assessment for the Petra Project Area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2016e) *Level 1 Fauna Risk Assessment for the Tooheys Project Area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2017a) *Level 1 Fauna Risk Assessment for the proposal Haul Road to the Baneygo Project Area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2017b) *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 (2018b) *Vertebrate Fauna Risk Assessment for the Granny Smith Solar Power Farm Project*, Unpublished report for Granny Smith Mining Company Pty Ltd, Perth.
- Terrestrial Ecosystems (2018c) *Vertebrate Fauna Risk Assessment for the Petra Mining Project*, Perth.
- Van Leeuwen, S. (1997) *Biological Survey of the Southern Little Sandy Desert*, Department of Conservation and land Management, Perth.
- Volschenk, E. S. (2011) *Granny Deeps Scorpion Identification Report*. Perth.
- Whisson, C. and Slack-Smith, S. (2011) *Land Snails from the area of Laverton, Western Australia (Granny Deeps Project)*, Perth.

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

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*), Giant Desert Skink (*Liopholis kintorei*) and Peregrine Falcon (*Falco peregrinus*). 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. The Cowan (2003) report is now very dated, and DBCA has not updated the biodiversity audit for Western Australia since that report. Since 2003, the Night Parrot has been rediscovered in Western Australia and is also considered a species at risk in the region.

3. METHODOLOGY

3.1 DATABASE SEARCHES

A review of the *EPBC Act 1999* list of protected species was undertaken to identify species of conservation interest to the Commonwealth Government. The search circle had a radius of 100km around a centre point coordinate of 29.4551°S and 122.51685°E (Appendix A). In addition, a desktop search of 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. The DBCA threatened and priority species database was searched via the records in NatureMap.

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 (2006) for reptiles; Johnstone and Storr (1998, 2004) for birds; and Van Dyck and Strahan (2008) for mammals.

Collectively these sources of information were used to create lists of species expected to utilise the project 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. wetland and shore birds). Vagrants can be recorded almost anywhere. Many of the records are historical and the species is no longer present in the area (e.g. Bilby, Lesser Stick-nest Rat). 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 NatureMap, Atlas of Living Australia and the 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 visit was undertaken on 19-23 October 2020 to assess fauna habitat types and condition in the project 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.

The fauna habitat assessment was undertaken for the entire project area. 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.

Dr Scott Thompson, who undertook the site assessment, stopped at multiple locations within the project area and recorded a suite of data about the fauna habitat and its condition. This information included

a description of the habitat structure, habitat condition, landform, soils and vegetation and time since last fire (Table 1).

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 effected by disturbance.	
☐ *Good fauna habitat* – These areas showed signs of disturbance (e.g. grazing, clearing, fragmentation, weeds) but generally retain many of the characteristics of the habitat if it had not been disturbed. The habitat has connectivity with other habitats and fauna assemblages in these areas are likely to be affected by disturbance.	
☐ *Disturbed fauna habitat*– These areas showed signs of significant disturbance. Many of the trees, shrubs and undergrowth are cleared. These areas may be in the early succession and regeneration stages. Areas	

Observer's Name:	
may show signs of significant grazing, containing weeds or have been damaged by vehicle or machinery. Habitats are fragmented or have limited connectivity with other fauna habitats. Fauna assemblages in these areas are likely to differ significantly from what might be expected in the area had the disturbance not occurred.	
☐ *Highly degraded fauna habitat* – These areas often have a significant loss of vegetation, an abundance of weeds, and a large number of vehicle tracks or are completely cleared. Limited or no fauna habitat connectivity. Fauna assemblages in these areas are likely to be significantly different to what might have been in the area pre-disturbance.	
Habitat structure – combined into habitat description	
Upper stratum	
☐ Tall open woodland	☐ Scattered tall trees
☐ Tall woodland	☐ Scattered trees
☐ Open woodland	☐ Scattered low trees
☐ Woodland	☐ Low closed forest
☐ Open forest	☐ Low open forest
☐ Closed forest	☐ Low woodland
☐ Tall closed forest	☐ Low open woodland
☐ Tall open forest	
Middle stratum	
☐ Shrubland	☐ Open heath
☐ Tall shrubland	☐ Low closed heath
☐ Tall open shrubland	☐ Low open heath
☐ Low shrubland	☐ Tall closed scrub
☐ Scattered low shrubs	☐ Tall open scrub
☐ Low open shrubland	☐ Scattered tall shrubs
☐ Scattered tall shrubs	☐ Open shrubland
☐ Closed heath	☐ Scattered shrubs
Lower stratum	
☐ Closed hummock grassland	☐ Closed tussock grassland / sedgeland / herbland
☐ Mid-dense hummock grassland	☐ Tussock grass land / sedgeland / herbland
☐ Hummock grassland	☐ Open tussock grassland / sedgeland / herbland
☐ Open hummock grassland	☐ Scattered tussock / grasses / sedges / herbs
☐ Scattered hummock grassland	☐ Very open tussock grassland / herbland
Soil Type – options	
☐ Sand	☐ Silty loam
☐ Loamy sand	☐ Sand clay loam
☐ Clayey sand	☐ Clay

Observer's Name:	
☐ Clay loam	☐ Peat / organic
☐ Silty clay loam	☐ Stony
☐ Sandy loam	
Soil colour - options	
☐ Black	☐ Red
☐ Brown	☐ White
☐ Grey	☐ Yellow
☐ Orange	
Surface stones – options	
☐ None	☐ Boulders (>250mm)
☐ Pebbles (0-50mm)	☐ Rocks
☐ Cobbles (51-250)	

3.3 SURVEY AND REPORTING STAFF

Dr Scott Thompson undertook the field assessment from 19–23 October 2020. Dr Graham Thompson prepared this report and Dr Scott Thompson reviewed the report before it was sent to the client. Both senior scientists have appropriate relevant post-graduate qualifications, extensive experience in conducting fauna assessments in the Goldfields, have published research articles on biodiversity, fauna assemblages, conservation significant species, trapping techniques and temporal variations in trapped fauna assemblages based on Goldfields surveys and are therefore appropriately trained and experienced for the task of preparing this assessment. Both Scott and Graham have undertaken multiple assessments near Leonora and Laverton and are familiar with the habitat in the project area and surrounds.

3.4 TAXONOMY AND NOMENCLATURE

Taxonomy and nomenclature for fauna species used in this report are generally based on the WA Museum. Terrestrial Ecosystems has presumed that the 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 vertebrate fauna risk assessment is based on a site visit, information contained in the Commonwealth Government database and other published and unpublished fauna survey data for the bioregion. It is acknowledged that multiple surveys conducted in different seasons, repeated over several years are necessary to fully appreciate the fauna assemblage in a project area.

The EPA (2020) *Technical Guidance Terrestrial Fauna Surveys* suggested that fauna surveys may be limited by many variables. Limitations associated with each of these variables are assessed in Table 2.

Table 2. Fauna survey limitations and constraints

Possible limitations	Constraint (yes/no); significant, moderate or negligible	Comment
Availability of data and information	No	There are limited fauna survey data for the adjacent areas.
Competency/experience of the survey team, including experience in the bioregion surveyed	No	The authors of this report have appropriate post-graduate qualifications, 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	
Timing, weather and season	No	The weather and season were both suitable for the field assessment.
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	The project area was comprehensively searched for Malleefowl tracks and mounds, and to complete the fauna habitat assessment.
Access problems	N/A	
Problems with data and analysis, including sampling biases	No	

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

4. RESULTS

4.1 FAUNA HABITAT

There are six broad fauna habitat types:

- Open Mulga shrubland on sandy soil (Plates 1-4);
- Mulga and chenopod shrubland on rocky soil (Plate 5-6);
- Mulga shrubland over rocky soil (Plate 7-8)
- Mulga on rocky slopes and hills (Plates 9-10)
- Shrubs on granite rocks and bedrock (Plates 11-12);
- Mulga drainage lines (Plate 13-14).

There are also areas disturbed by exploration activity and old mining activity (Plate 15-18).

There are drainage lines running in a north-east direction, with the main access road in the area bisecting the project area in a south-east to north-west direction. There are numerous other mining developments within 10km and a number of salt lakes to the north and east.

Plate 1. Open Mulga shrubland on sandy soil

Plate 2. Open Mulga shrubland on sandy soil

Plate 3. Open Mulga shrubland on sandy soil

Plate 4. Open Mulga shrubland on sandy soil

Plate 5. Mulga and chenopod shrubland on rocky soil

Plate 6. Mulga and chenopod shrubland on rocky soil

Plate 7. Mulga shrubland over rocky soil

Plate 8. Mulga shrubland over rocky soil

Plate 9. Mulga on rocky slopes and hills

Plate 10. Mulga on rocky slopes and hills

Plate 11. Shrubs on granite rocks and bedrock

Plate 12. Shrubs on granite rocks and bedrock

Plate 13. Mulga drainage lines

Plate 14. Mulga drainage lines

Plate 15. Disturbed by exploration activity and old mining activity

Plate 16. Disturbed by exploration activity and old mining activity

Plate 17. Disturbed by exploration activity and old mining activity

Plate 18. Disturbed by exploration activity and old mining activity

4.2 MALLEEFOWL

Malleefowl tracks were found in the project area (Plates 25-26). No Malleefowl nests were recorded.

4.3 FERAL PESTS

Rabbit scats (Plate 23-24) and tracks of cats and wild dogs (Plates 19-20) were present in the project area.

Plate 19. Rabbit scats

Plate 20. Rabbit scats

Plate 21. Cat tracks

Plate 22. Dog tracks

4.4 ARID BRONZE AZURE BUTTERFLY

There were a very low number of smooth-barked Eucalypts trees in the project area, which is a requirement for the *Camponotus terebrans* ant to be present.

4.5 FAUNA ASSEMBLAGE

4.6 BIOREGIONAL VERTEBRATE FAUNA ASSEMBLAGE

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 3-6 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. The water and wetland bird species in Table 3 are unlikely to be present in the project area due to a lack of suitable habitat.

Table 3. Birds potentially found near the project area

Family	Species	Common Name
Casuariidae	*Dromaius novaehollandiae*	Emu
Anatidae	*Cygnus atratus*	Black Swan
	Tadorna tadornoides	Australian Shelduck
	Chenonetta jubata	Australian Wood Duck
	Anas superciliosa	Pacific Black Duck
	Anas gracilis	Grey Teal
	Malacorhynchus membranaceus	Pink-eared Duck

Family	Species	Common Name
	Aythya australis	Hardhead
	Biziura lobata	Musk Duck
Megapodiidae	*Leipoa ocellata*	Malleefowl
Phasianidae	*Coturnix pectoralis*	Stubble Quail
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe
	Poliocephalus poliocephalus	Hoary-headed Grebe
Columbidae	*Phaps chalcoptera*	Common Bronzewing
	Ocyphaps lophotes	Crested Pigeon
	Geophaps plumifera	Spinifex Pigeon
	Geopelia cuneata	Diamond Dove
Cuculidae	*Chrysococcyx basalis*	Horsfield's Bronze-Cuckoo
	Chrysococcyx osculans	Black-eared Cuckoo
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar
Podargidae	*Podargus strigoides*	Tawny Frogmouth
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar
	Apus pacificus	Pacific Swift
Rallidae	*Tribonyx ventralis*	Black-tailed Nativehen
	Fulica atra	Eurasian Coot
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt
	Himantopus leucocephalus	Pied Stilt
	Cladorhynchus leucocephalus	Banded Stilt
	Recurvirostra novaehollandiae	Red-necked Avocet
Charadriidae	*Vanellus tricolor*	Banded Lapwing
	Charadrius ruficapillus	Red-capped Plover
	Erythrogonys cinctus	Red-kneed Dotterel
	Elseyornis melanops	Black-fronted Dotterel
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper
Turnicidae	*Turnix velox*	Little Buttonquail

Family	Species	Common Name
Laridae	*Chlidonias hybrida*	Whiskered Tern
Otididae	*Ardeotis australis*	Australian Bustard
Ardeidae	*Ardea pacifica*	White-necked Heron
	Egretta novaehollandiae	White-faced Heron
Accipitridae	*Haliaeetus albicilla*	
Anhingidae	*Anhinga melanogaster*	Australasian Darter
Accipitridae	*Hamirostra melanosternon*	Black-breasted Buzzard
	Hieraaetus morphnoides	Little Eagle
	Aquila audax	Wedge-tailed Eagle
	Circus assimilis	Spotted Harrier
	Accipiter fasciatus	Brown Goshawk
	Accipiter cirrocephalus	Collared Sparrowhawk
	Milvus migrans	Black Kite
	Haliastur sphenurus	Whistling Kite
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo
Strigidae	*Ninox boobook*	Southern Boobook
Alcedinidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher
Meropidae	*Merops ornatus*	Rainbow Bee-eater
Falconidae	*Falco cenchroides*	Nankeen Kestrel
	Falco longipennis	Australian Hobby
	Falco berigora	Brown Falcon
	Falco peregrinus	Peregrine Falcon
Megaluridae	*Poodytes carteri*	Spinifexbird
Cacatuidae	*Eolophus roseicapilla*	Galah
	Cacatua sanguinea	Little Corella
	Nymphicus hollandicus	Cockatiel
Psittaculidae	*Neopsephotus bourkii*	Bourke's Parrot

Family	Species	Common Name
	Barnardius zonarius	Australian Ringneck
	Psephotus varius	Mulga Parrot
	Melopsittacus undulatus	Budgerigar
Ptilonorhynchidae	*Chlamydera guttata*	Western Bowerbird
Climacteridae	*Climacteris affinis*	White-browed Treecreeper
Maluridae	*Amytornis striatus*	Striated Grasswren
	Stipiturus ruficeps	Rufous-crowned Emuwren
	Malurus assimilis	Purple-backed Fairywren
	Malurus lamberti	Variegated Fairywren
	Malurus splendens	Splendid Fairywren
	Malurus leucopterus	White-winged Fairywren
	Malurus leucopterus	White-winged Fairywren
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater
	Purnella albifrons	White-fronted Honeyeater
	Manorina flavigula	Yellow-throated Miner
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater
	Anthochaera carunculata	Red Wattlebird
	Gavicalis virescens	Singing Honeyeater
	Ptilotula penicillata	White-plumed Honeyeater
	Ptilotula keartlandi	Grey-headed Honeyeater
	Conopophila whitei	Grey Honeyeater
	Epthianura tricolor	Crimson Chat
	Epthianura aurifrons	Orange Chat
	Sugomel nigrum	Black Honeyeater
	Lichmera indistincta	Brown Honeyeater
	Nesoptilotis flavicollis	Yellow-throated Honeyeater
Pardalotidae	*Pardalotus striatus*	Striated Pardalote
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat

Family	Species	Common Name
	Acanthiza iredalei	Slender-billed Thornbill
	Acanthiza apicalis	Inland Thornbill
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill
	Acanthiza uropygialis	Chestnut-rumped Thornbill
	Acanthiza robustirostris	Slaty-backed Thornbill
	Smicrornis brevirostris	Weebill
	Gerygone fusca	Western Gerygone
	Aphelocephala leucopsis	Southern Whiteface
	Aphelocephala nigricincta	Banded Whiteface
Pomatostomidae	*Pomatostomus temporalis*	Grey-crowned Babbler
	Pomatostomus superciliosus	White-browed Babbler
Cinclosoma	*castaneothorax*	Chestnut-breasted Quail-thrush
Cinclosoma	*cinnamomeum*	Cinnamon Quail-thrush
Campephagidae	*Coracina maxima*	Ground Cuckooshrike
	Coracina novaehollandiae	Black-faced Cuckooshrike
	Lalage tricolor	White-winged Triller
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella
Oreoicidae	*Oreoica gutturalis*	Crested Bellbird
Pachycephalidae	*Colluricincla harmonica*	Grey Shrikethrush
	Pachycephala rufiventris	Rufous Whistler
Artamidae	*Artamus personatus*	Masked Woodswallow
	Artamus superciliosus	White-browed Woodswallow
	Artamus cinereus	Black-faced Woodswallow
	Artamus cyanopterus	Dusky Woodswallow

Family	Species	Common Name
	Artamus minor	Little Woodswallow
	Cracticus torquatus	Grey Butcherbird
	Cracticus nigrogularis	Pied Butcherbird
	Gymnorhina tibicen	Australian Magpie
	Strepera versicolor	Grey Currawong
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail
	Rhipidura albiscapa	Grey Fantail
Monarchidae	*Grallina cyanoleuca*	Magpie-lark
Corvidae	*Corvus orru*	Torresian Crow
	Corvus bennetti	Little Crow
	Corvus coronoides	Australian Raven
Petroicidae	*Microeca fascinans*	Jacky Winter
	Petroica goodenovii	Red-capped Robin
	Melanodryas cucullata	Hooded Robin
Alaudidae	*Mirafra javanica*	Australasian Bushlark
Locustellidae	*Cincloramphus cruralis*	Brown Songlark
	Cincloramphus mathewsi	Rufous Songlark
Hirundinidae	*Hirundo rustica*	Barn Swallow
	Hirundo neoxena	Welcome Swallow
	Petrochelidon nigricans	Tree Martin
	Cheramoeca leucosterna	White-backed Swallow
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird
Estrildidae	*Emblema pictum*	Painted Finch
	Taeniopygia guttata	Zebra Finch
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit

Table 4. Amphibians potentially found near the project area

Family	Species	Common Name
Limnodynastidae	*Neobatrachus kunapalari*	Wheatbelt Frog
	Neobatrachus sutor	Shoemaker Frog
	Neobatrachus wilsmorei	Plonking Frog
	Notaden nichollsi	Desert Spadefoot
	Platyplectrum spenceri	Spencer's Burrowing Frog
Myobatrachidae	*Pseudophryne occidentalis*	Western Toadlet
Pelodryadidae	*Cyclorana maini*	Main's Frog
	Cyclorana occidentalis	Western Water-holding Frog
	Litoria rubella	Desert Tree Frog

Table 5. Mammals potentially found near the project area

Family	Species	Common Name
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna
Bovidae	*Bos taurus*	Cow
	Capra hircus	Goat
	Ovis aries	Sheep
Camelidae	*Camelus dromedarius*	Dromedary
Canidae	*Canis lupus*	Dingo
	Vulpes vulpes	Red Fox
Felidae	*Felis catus*	Cat
Molossidae	*Austronomus australis*	White-striped Freetail Bat
	Mormopterus planiceps	Southern Free-tail Bat
	Mormopterus sp. 4	South-western Free-tail Bat

Family	Species	Common Name
Vespertilionidae	*Nyctophilus* sp.	Long-eared Bat sp.
	Chalinolobus gouldii	Gould's Wattled Bat
	Chalinolobus morio	Chocolate Wattled Bat
	Nyctophilus geoffroyi	Lesser Long-eared Bat
	Scotorepens balstoni	Inland Broad-nosed Bat
Dasyuridae	*Ningaui sp.*	Ningaui sp.
	Planigale sp.	Planigale sp.
	Antechinomys laniger	Kultarr
	Dasycercus blythi	Brush-tailed Mulgara
	Dasykaluta rosamondae	Kaluta
	Ningaui ridei	Wongai Ningaui
	Ningaui yvonneae	Mallee Ningaui
	Pseudantechinus woolleyae	Woolley's False Antechinus
	Sminthopsis crassicaudata	Fat-tailed Dunnart
	Sminthopsis dolichura	Little Long-tailed Dunnart
	Sminthopsis hirtipes	Hairy-footed Dunnart
	Sminthopsis longicaudata	Long-tailed Dunnart
	Sminthopsis macroura	Stripe-faced Dunnart
	Sminthopsis murina	Slender-tailed Dunnart
	Sminthopsis ooldea	Ooldea Dunnart
	Sminthopsis youngsoni	Lesser Hairy-footed Dunnart
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo
	Osphranter robustus	Euro
	Osphranter rufus	Red Kangaroo
Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Possum
Leporidae	*Oryctolagus cuniculus*	Rabbit
Equidae	*Equus asinus*	Donkey
	Equus caballus	Horse
Muridae	*Leporillus apicalis*	Lesser Stick-nest Rat
	Mus musculus	House Mouse
	Notomys alexis	Spinifex Hopping Mouse

Table 6. Reptiles potentially found near the project area

Family	Species	Common Name
Agamidae	*Ctenophorus caudicinctus*	Ring-tailed Dragon
	Ctenophorus cristatus	Crested Dragon
	Ctenophorus fordi	Mallee Dragon
	Ctenophorus inermis	Military Dragon
	Ctenophorus infans	Ring-tailed Dragon
	Ctenophorus isolepis	Central Military Dragon
	Ctenophorus isolepis	Central Military 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
	Diporiphora valens	Southern Pilbara Tree Dragon
	Gowidon longirostris	Long-nosed Dragon
	Moloch horridus	Thorny Devil
	Pogona minor	Western Bearded Dragon
	Tympanocryptis cephalus	Pebble Dragon
Carphodactylidae	*Nephrurus laevissimus*	Smooth Knob-tail
	Nephrurus levis	Three-lined Knob-tail

Family	Species	Common Name
	Nephrurus vertebralis	Midline Knob-tail
	Underwoodisaurus milii	Barking Gecko
Diplodactylidae	*Diplodactylus conspicillatus*	Fat-tailed Gecko
	Diplodactylus granariensis	Wheatbelt Stone Gecko
	Diplodactylus pulcher	Beautiful Gecko
	Lucasium damaeum	Beaded Gecko
	Lucasium squarrosum	Mottled Ground Gecko
	Lucasium stenodactylum	Crowned Gecko
	Rhynchoedura ornata	Beaked Gecko
	Strophurus ciliaris	Spiny-tailed Gecko
	Strophurus elderi	Jewelled Gecko
	Strophurus strophurus	Western Spiny-tailed Gecko
	Strophurus wellingtonae	Western Shield Spiny-tailed Gecko
Elapidae	*Brachyurophis fasciolatus*	Narrow-banded Burrowing Snake
	Brachyurophis semifasciata	Half-girdled Snake
	Demansia psammophis	Yellow-faced Whipsnake
	Demansia rufescens	Rufous Whipsnake
	Furina ornata	Orange-naped Snake
	Parasuta monachus	Hooded Snake
	Pseudechis australis	Mulga Snake
	Pseudechis butleri	Spotted Mulga Snake
	Pseudonaja mengdeni	Western Brown Snake
	Pseudonaja modesta	Ringed Brown Snake
	Simoselaps anomalus	Desert Banded Snake
	Simoselaps bertholdi	Jan's Banded Snake
	Suta fasciata	Rosen's Snake
Gekkonidae	*Christinus marmoratus*	Marbled Gecko

Family	Species	Common Name
	Gehyra punctata	Spotted Dtella
	Gehyra purpurascens	Purplish Dtella
	Gehyra variegata	Variegated Gehyra
	Heteronotia binoei	Bynoe's Gecko
	Gehyra xenopus	Crocodile-faced Dtella
Pygopodidae	*Aprasia picturata*	Black-headed Worm-lizard
	Delma butleri	Unbanded Delma
	Delma nasuta	Sharp-snouted Delma
	Delma pax	Peace Delma
	Lialis burtonis	Burton's Legless Lizard
	Pygopus nigriceps	Western Hooded Scaly-foot
Pythonidae	*Antaresia perthensis*	Pygmy Python
Scincidae	*Carlia triacantha*	Desert Rainbow-skink
	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
	Cryptoblepharus plagiocephalus	Peron's Snake-eyed Skink
	Ctenotus ariadnae	Ariadna's Ctenotus
	Ctenotus atlas	Southern Mallee Ctenotus
	Ctenotus brooksi	Wedgsnout Ctenotus
	Ctenotus calurus	Blue-tailed Finesnout Ctenotus
	Ctenotus dux	Fine Side-lined Ctenotus
	Ctenotus grandis	Grand Ctenotus
	Ctenotus greeri	Spotted-necked Ctenotus
	Ctenotus helenae	Clay-soil Ctenotus
	Ctenotus leae	Ornage-tailed Finesnout Ctenotus
	Ctenotus leonhardii	Leonhardi's Ctenotus
	Ctenotus nasutus	Nasute Finsnout Ctenotus
	Ctenotus pantherinus	Leopard Ctenotus
	Ctenotus piankai	Coarse Sands Ctenotus
	Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus

Family	Species	Common Name
	Ctenotus schomburgkii	Barred Wedgesnout Ctenotus
	Ctenotus severus	Stern Ctenotus
	Ctenotus uber	Spotted Ctenotus
	Cyclodomorphus melanops	Spinifex Slender Blue-tongue
	Egernia depressa	Southern Pygmy Spiny-tailed Skink
	Egernia formosa	Goldfields Crevice Skink
	Eremiascincus fasciolatus	Narrow-banded Sand Swimmer
	Eremiascincus richardsonii	Broad-banded Sand-swimmer
	Lerista amicorum	Fortescue Slider
	Lerista bipes	North-western Sandslider
	Lerista desertorum	Central Desert Robust Slider
	Lerista distinguenda	South-western Orange-tailed Slider
	Lerista ips	Robust Duneslider
	Lerista kingi	King's Slider
	Lerista macropisthopus	Unpatterned Robust Slider
	Lerista neander	Pilbara Robust Slider
	Lerista picturata	Southern Robust Slider
	Lerista timida	Timid Slider
	Lerista vermicularis	Slender Duneslider

Family	Species	Common Name
	Liopholis striata	Nocturnal Desert Skink
	Menetia greyii	Common Dwarf Skink
	Morethia butleri	Woodland Morethia Skink
	Morethia ruficauda	Lined Fire-tailed Skink
	Proablepharus reginae	Western Soil-crevice Skink
	Tiliqua multifasciata	Central Blue-tongue
	Tiliqua occipitalis	Western Blue-tongued Lizard
	Tiliqua rugosa	Bobtail
Typhlopidae	*Anilios australis*	Austral Blind Snake
	Anilios bicolor	Dark-spined Blind Snake
	Anilios grypus	Long-beaked Blind Snake
	Anilios hamatus	Pale-headed Blind Snake
	Anilios waitii	Waite's Blind Snake
Varanidae	*Varanus acanthurus*	Spiny-tailed Monitor
	Varanus brevicauda	Short-tailed Pygmy Monitor
	Varanus caudolineatus	Stripe-tailed Monitor
	Varanus eremius	Pygmy Desert Monitor
	Varanus giganteus	Perentie
	Varanus gilleni	Pygmy Mulga Monitor
	Varanus gouldii	Gould's Goanna
	Varanus panoptes	Yellow-spotted Monitor
	Varanus tristis	Black-headed Monitor

4.7 CONSERVATION SIGNIFICANT FAUNA

Conservation significant fauna are protected by the Commonwealth *EPBC Act 1999*, and this list includes species covered by international treaties such as the Japan-Australia Migratory Bird Agreement (JAMBA) and China-Australia Migratory Bird Agreement (CAMBA) and the *BC Act 2016*. The *BC 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 *BC Act 2016* imply legislative requirements for the management of anthropogenic impacts to minimise the effects of disturbances on species and their habitats. Priority species have no statutory protection, other than

the DBCA wishes to monitor potential impacts on these species. Environmental consultants and proponents of developments are encouraged to avoid and minimise impacts on these species. Definitions of the significant fauna under the *BC Act 2016* are provided in Appendix C.

Wetland and wetland migratory bird species have been excluded from the following list and assessments as there is no suitable habitat for these species in the project area. Two threatened species of fauna and one migratory/marine species of birds identified under the *EPBC Act 1999* potentially occur in the project area. There are three Schedule species listed under the *BC Act 2016* and one species listed on the DBCA's Priority Fauna List that potentially occur in the project area. The following is an assessment of the likelihood of each of the species listed in Table 7 being found in the project area.

Table 7. Assessment of the potential presence of a conservation significant fauna species in the project area

Species	DBCA Schedule / Priority	Status under Commonwealth EPBC Act	Comment on the potential presence of a species
Night Parrot *Pezoporus occidentalis*	Critically Endangered	Endangered	Highly unlikely to be in the project area due to a lack of suitable habitat (i.e. mature spinifex). The potential for impacting on this species is therefore very low.
Arid Bronze Azure Butterfly *Ogyris subterrestris petrina*	Critically Endangered	Critically Endangered	A lack of smooth-barked Eucalypt trees and thus *Camponotus terebrans* ants means it is highly improbable that the butterfly will be present and therefore impacted.
Sandhill Dunnart *Sminthopsis psammophila*	Endangered	Endangered	Highly unlikely to be in the project area due to a lack of suitable habitat (i.e. mature spinifex). The potential for impacting on this species is therefore very low.
Malleefowl *Leipoa ocellata*	Vulnerable	Vulnerable	No Malleefowl nesting mounds were recorded, however, Malleefowl tracks were present.
Grey Falcon *Falco hypoleucos*	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 very low.
Chuditch *Dasyurus geoffroii*	Vulnerable	Vulnerable	Highly unlikely to occur in the project area. The potential for impacting on this species is therefore very low.
Princess Parrot *Polytelis alexandrae*	Priority 4	Vulnerable	May infrequently be seen in the region, however, clearing vegetation is unlikely to impact on this species.
Mulgara *Dasycercus blythi*	Priority 4		Highly unlikely to be in the project area due to a lack of suitable habitat (i.e. mature spinifex). The potential for impacting on this species is therefore very low.
Oriental Plover *Charadrius veredus*	Migratory	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*	Migratory	Migratory	May very infrequently be seen in the region, however, clearing vegetation is unlikely to impact on this aerial species.
Grey Wagtail *Motacilla cinerea*	Migratory	Migratory	Highly unlikely to be present in the project area. The potential for impacting on this species is therefore low.
Yellow Wagtail *Motacilla flava*	Migratory	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 region, however, clearing vegetation is unlikely to impact on this species.
Long tailed Dunnarts *Sminthopsis longicaudata*	P4		May be present in the breakaway areas and rocky hills in the project area.

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. Prior to 2007 there were very few records of the Night Parrot (Plate 23).

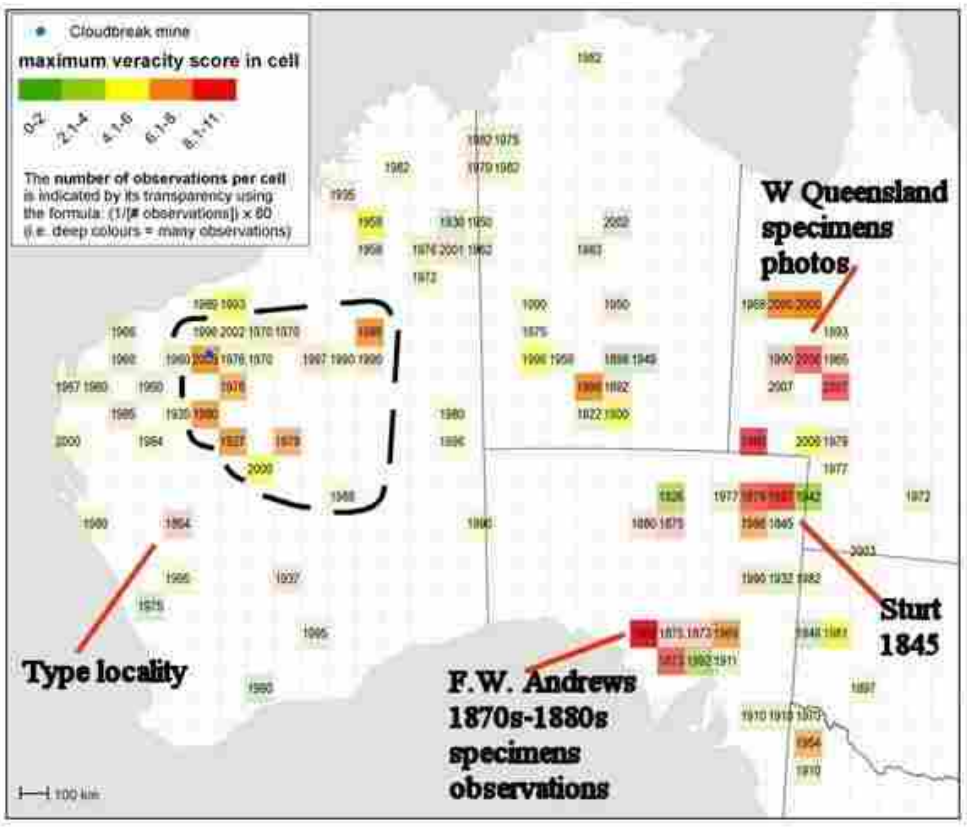

Plate 23. Map of historical Night Parrot records compiled by S. Murphy et al., including records to 2007

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

Wilson's (1937) summary of observations provided information on the early records of Night Parrots' preferred habitat and breeding sites. Recent information indicates its preferred habitat appears to be in Triodia grasslands, chenopod shrublands, shrubby samphire and floristically diverse habitats dominated by large-seeded species (Threatened Species Scientific Committee 2016, McCarthy 2017, Murphy et al. 2017b). At Pullen Pullen Reserve it nests in large, more or less ring-shaped Triodia, and the nest consists of a tunnel (25-30° and

0º to the ground; 20-33cm long) through an apron of dead spinifex leaves that leads to a chamber under a live hummock, with a shallow depression (3-4cm) excavated into the gravelly/sandy soil (Murphy et al. 2017a). In the northern Goldfields the nest was again in a spinifex hummock; it was circular, with an excavated depression (~1.5-2.0cm) in sandy substrate (Hamilton et al. 2017, Jackett et al. 2017). The entrance tunnel was 62cm long, and was downward sloping (27º) with the entrance 28cm above the ground (Hamilton et al. 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 project area is within the high priority area for Night Parrots as indicated by the then Department of Parks and Wildlife (Plate 24; 2017). Both the Commonwealth and State government assessors may require a Night Parrot survey for particular project areas where there is long-unburnt spinifex.

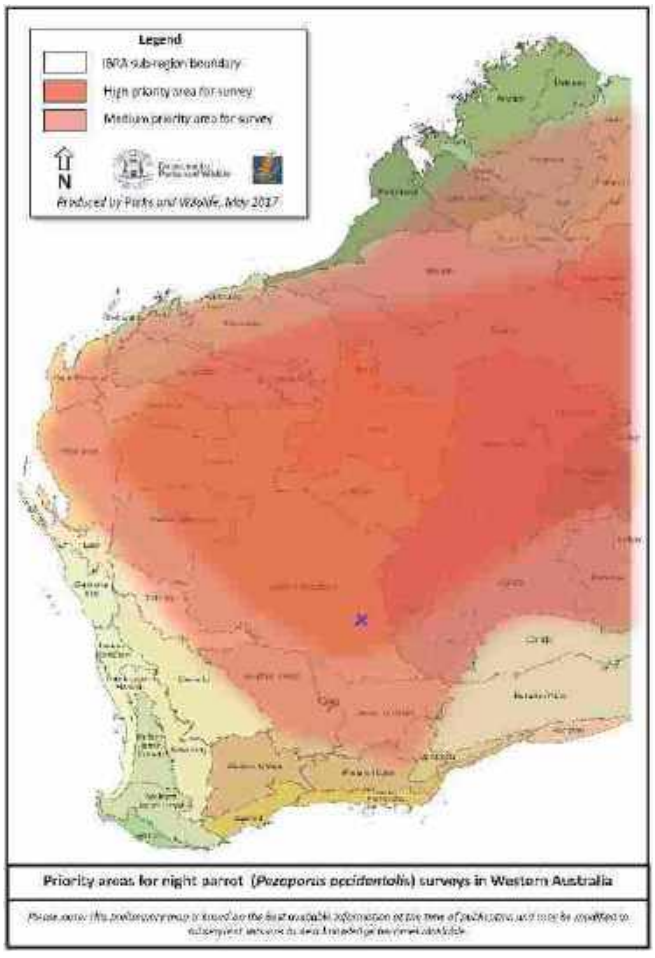

Plate 24. Probability of finding a Night Parrot in Western Australia, with the project area marked as a blue cross

The Night Parrot has been recorded in the northern goldfields and the record is thought to be about 370km north of the project area. There is no mature, ring-forming spinifex in the project area, the preferred roosting and nesting habitat for Night Parrots; therefore it is highly unlikely that it is present in the project area.

Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*) – Critically endangered under the *BC Act 2016* and *EPBC Act 1999*

Arid Bronze Azure Butterfly is associated with colonies of the ant *Camponotus terebrans* in mallee vegetation on sandy soil, often near flood plains, and the ant typically digs its nest at the base of eucalypts (Threatened Species Scientific Committee 2014). Butterfly larvae hatching from eggs laid near an ant nest entrance (often near the bases of various mallee eucalypts) are carried, by the ants, into their nest. Details of *C. terebrans* biology and of any form of herbivory by the larvae are unknown; however, it is likely that the larvae are myrmecophagous. These butterflies fly close to the ground and have been observed flying over agricultural lands near presumed breeding colonies (Williams and Williams 2008). The goldfields population was originally known from Lake Douglas, about 12kms south-west of Kalgoorlie (Field 1999), however, this population is reported to have become extinct (Williams et al. 2008, Williams and Williams 2008, Williams et al. 2018) and also in the Barbalin Nature Reserve (~11km west of Mukinbudin) in the Avon Wheatbelt (Threatened Species Scientific Committee 2014). There is also an additional extant population 100km from Barbalin Nature Reserve but the DBCA have not provided its location.

Camponotus terebrans is typically only found in areas with smooth bark Eucalypts including Gimlet (*Eucalyptus salubris*) and Lake Grace Gum (*Eucalyptus loxophleba* ssp. *gratiae*), but also Wheatbelt Wandoo (*E. capillosa capillosa*) and Salmon Gum (*E. salmonophloia*). At Lake Douglas, the host tree was *Eucalyptus concinna* (Field 1999, Threatened Species Scientific Committee 2014).

Williams and Williams (2008) commented that 'Over 30 surveys have been conducted in the region by DEC staff and experienced volunteers between 1992 and 2008' (p. 8) and 'include extensive surveys between Payne's Find and Kalgoorlie, including most of the major conservation reserves. The surveys have covered extensive parts of the region in which *O. s. petrina* might occur, but have not detected any individuals or additional populations of the butterfly' (p. 8). The fact that further populations have not been located, despite the species being conspicuous, demonstrates the rarity of this butterfly and the significance of the Barbalin site.' (Williams and Williams 2008)(p. 9).

There were only a very small number of smooth-barked Eucalypt trees (i.e. *Eucalyptus salubris*) near the eastern extent of the project area. Due to the lack of suitable habitat *Camponotus terebrans* will not be present, so it is highly improbable that the Arid Bronze Azure Butterfly is present, without *C. terebrans* being present.

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

The Sandhill Dunnart is the second largest of the dunnarts and its three extant populations are in the western Great Victoria Desert, Yellabinna Regional Reserves in the south-eastern Great Victoria Desert and the Eyre Peninsula in South Australia. In WA its habitat is sandplains and dunes with mature hummock grassland often in association with Mallee, Marble Gum and Callitris (GHD 2020). This is a highly mobile species that typically shelters during the day in stands of mature spinifex.

There is no mature spinifex hummocks in the project area nor is there any sand dunes, so it is highly improbable that the Sandhill Dunnart is present in the project area.

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

Malleefowl are large, ground-dwelling birds that rarely fly unless alarmed or are perching for the night. Historically, Malleefowl have been found in mallee regions of southern Australia from approximately the 26th parallel of latitude southwards. Prior to vegetation clearing for agriculture, Malleefowl were abundant in the WA Wheatbelt. Vegetation clearing for agriculture also opened adjacent bushland to predators, and in the south-west of WA, Malleefowl often only persist in isolated remnant patches of native vegetation. Sheep and other herbivores (e.g. goats, kangaroos) grazing in remnant vegetation removes or thins the undergrowth, and they also compete with Malleefowl for herbaceous foods and can cause changes to the structure and floristic diversity of foraging habitats (Benshemesh 2007).

Malleefowl and their eggs are vulnerable to predation by foxes, and newly hatched chicks are vulnerable to foxes, cats and raptors (Priddel and Wheeler 1990, Benshemesh and Burton 1999, Benshemesh 2007, Lewis and Hines 2014). Their abundance in the Goldfields is low and they are sparsely distributed, favouring those areas that are more densely vegetated. Malleefowl build distinctive nests that comprise a large mound of soil/rock covering a central core of leaf litter. These nest mounds range in diameter but can span more than five metres and may be up to one metre high. Malleefowl are generally monogamous and once breeding commences they pair for life. The presence of nest mounds provides an indication of the presence of Malleefowl in the area.

Malleefowl have been found in mallee regions of southern Australia from approximately the 26th parallel of latitude southwards. 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.

Malleefowl have been observed in the bioregion, however, there are no recent records of active breeding mounds in the vicinity of the project area. Although no Malleefowl mounds were recorded, Malleefowl tracks were relatively common in the Open Mulga with sandy soil, indicating that they are forging in the project area (Plates 25 and 26).

Plate 25. Malleefowl tracks

Plate 26. Malleefowl tracks

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

The Grey Falcon is a moderately large raptor that is found mostly in the northern half of Western Australia, mostly in lightly wooded, coastal or riverine areas.

There are multiple records of the Grey Falcon in the Pilbara, but very few in the Goldfields. They are mostly recorded along the drainage lines and around the permanent or semi-permanent pools.

It is highly unlikely that the Grey Falcon is in the project area.

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

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 further to the east.

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 multiple records south of Southern Cross and Marvel Loch and there have been other reported sightings east of Kambalda and near Norseman but Terrestrial Ecosystems can find none north of Kalgoorlie. It is therefore highly unlikely that the Chuditch will be found as far north at Leonora and in atypical habitat. As the project area is a significantly long way north-east of the species known distribution it is unlikely that the Chuditch would be found in the project area and the habitat is not suitable. As a consequence, Terrestrial Ecosystems' assessment is that any development is unlikely to have a significant impact on this species.

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

The species is found mostly in the inland arid areas of Australia, and in Western Australia in the Gibson, Little Sandy and Great Victoria Deserts (Johnstone and Storr 1998, Pavey et al. 2014). However, they occasionally occurred in lightly wooded areas adjacent to the sandy deserts (Moriarty 1972).

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.

It is a nomadic species that moves around the arid interior of Australia in search of resources. If it was present any proposed development is unlikely to significantly impact on this species as it will move away to other areas if it is disturbed.

Long-tailed Dunnart (*Sminthopsis longicaudata*) - Priority 4 with the DBCA

The Long-tailed Dunnart (*Sminthopsis longicaudata*) is listed as a Priority 4 species with the Department of Environment and Conservation. Burbidge et al. (2008) summarised its habitat as widely scattered in the arid zone where it inhabits rugged rocky areas. They went on to suggest that its striated foot-pads, 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. All previous capture sites for Long-tailed Dunnarts were 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 Mt Ida and Bottle Creek, and an unnamed mine east of Granny Smith (pers. comm.). There are also other unpublished records in the vicinity of the project area. This dunnart is likely to be in the project area in the breakaway and rocky areas. If the proposed development and mining area does not impact on the breakaway and rocky areas, then it is unlikely that it will have a significant impact on this species.

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 1998, 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 generally not suitable for Mulgara (i.e. lack of spinifex hummocks), so it is highly unlikely that Mulgara are present 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.

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

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 an almost exclusively an aerial species, foraging and sleeping on the wing. It rarely comes to earth, usually only for breeding. It is common in the Kimberley, uncommon to moderately common near northwest, west and southeast coasts and rare to scarce elsewhere. It is rarely seen in the Goldfields (Plate 27), so it is unlikely to be impacted by the proposed development.

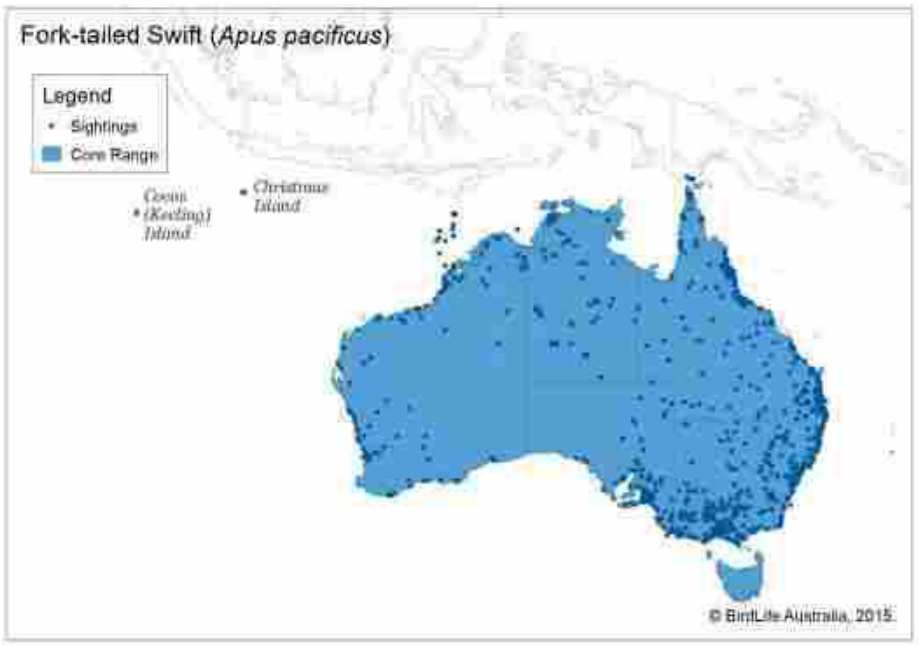

Plate 27. Range and actual reported sightings of the Fork-tailed Swift

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

Grey Wagtail (*Motacilla cinerea*) - Migratory 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 28) so it is unlikely to be impacted by the proposed development.

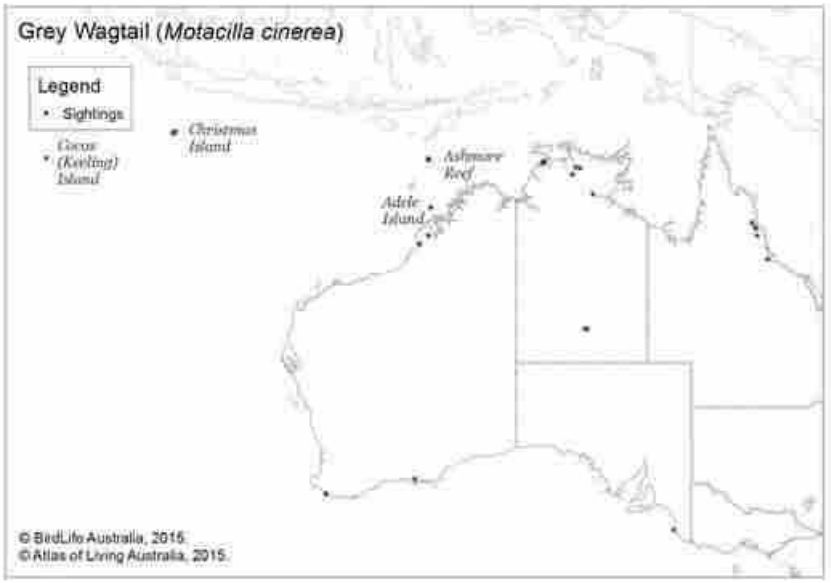

Plate 28. Reported sightings of the Grey Wagtail

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

Yellow Wagtail (*Motacilla flava*) - Migratory 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 29), therefore it is highly unlikely to be impacted by the proposed development.

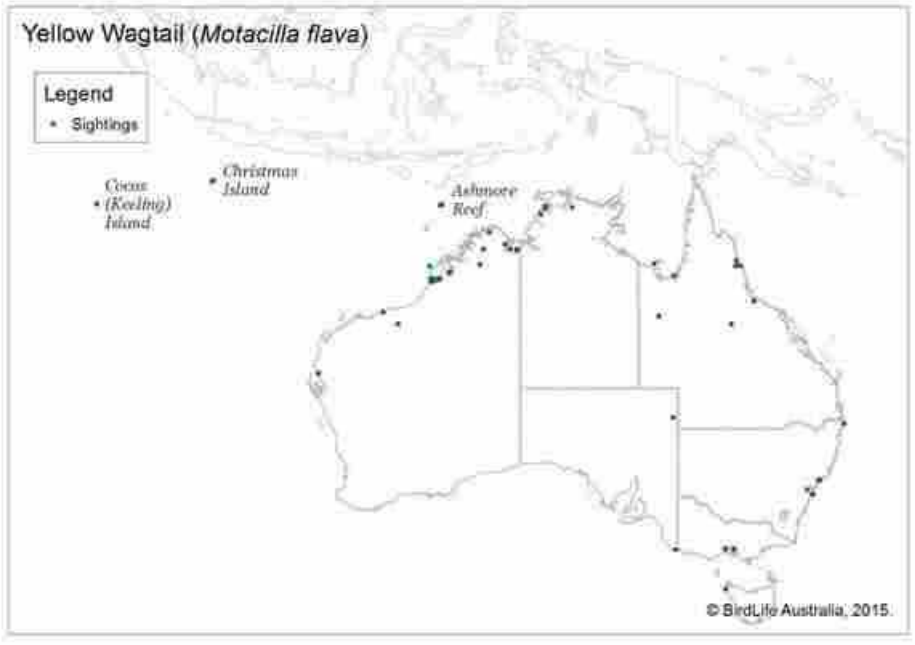

Plate 29. Reported sightings of the Yellow Wagtail

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

Peregrine Falcon (*Falco peregrinus*) - Otherwise specially protected 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, development is unlikely to have a significant impact on this species as it will readily move away from disturbance and there are abundant areas of similar habitat in the region.

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 project area is 1,404ha in an area where there is very little quantified fauna survey data for similar habitat in adjacent area. The project area has been partially disturbed for mining activity and exploration machinery were on-site during the field work undertaking exploratory drilling. There is a vast quantity of similar habitat in adjacent areas, so the fauna assemblage in the project area will be similar to that in adjacent areas. It is unlikely that further survey effort in the project area will provide new species not previously identified for this region.

5.1.1 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* could also be found in the general area. These species, other than *P. occidentalis* and *L. rubella*, burrow into the ground and aestivate between rainfall events. *Pseudophryne occidentalis* and *L. rubella* find shelter under rocks and in crevices during the dry periods and enter temporary ponds to breed after major rainfall events. All species have a wide-spread distribution and are abundant. Development of the project area 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.

5.1.2 Reptiles

Typically, between 25 and 35 species of reptiles are caught in open Acacia woodland (Coffey Environments 2008, Terrestrial Ecosystems 2010, 2011a, 2020). However, the sparse ground cover and lack of leaf litter in much of the project area will mean the terrestrial vertebrate fauna will be in low abundance. None of the species likely to be in the project area are of conservation significance. Given that there were large expanses of similar habitat in adjacent areas, development of the project area is unlikely to have significant impact on reptiles when assessed in a regional context.

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

5.1.3 Birds

The number of birds and bird species in the northern Goldfields fluctuates based on seasons and recent rainfall (Craig and Chapman 2003). 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 a large number 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.

Malleefowl are present in the area, but no breeding mounds were found after an extensive search. Given the sparseness of the vegetation and the presence of wild dogs and feral cats, Malleefowl are likely to be in low abundance. The Peregrine Falcon and Princess Parrot may infrequently be seen in the project 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.

Terrestrial Ecosystems' view is that the proposed development is unlikely to significantly impact on the avian fauna of the bioregion, however, plans to avoid, minimise and mitigate impacts on Malleefowl are recommended.

5.1.4 Mammals

The diversity of small terrestrial mammals potentially caught in the project area would be typical of that found in a diverse habitat in the sandy-clay with occasional rocky breakaways and ridges with limited vegetation. Wild dogs and feral cats are present in the area.

It is likely that the breakaway and rocky areas support Long-tailed Dunnarts, as this is its preferred habitat. Long-tailed Dunnarts have been recorded at the Granny Smith mine and another unnamed mine to the east, and other unnamed projects in the vicinity of the project area. If the proposed development and mining area does not impact on the breakaway and rocky areas, then it is unlikely that the project will have a significant impact on this species.

Terrestrial Ecosystems' view is that the development of the project area is unlikely to significantly impact on the mammal fauna of the bioregion, other than Long-tailed Dunnarts which are discussed above. Management of wild dogs and feral cats would see an increase in the native vertebrate fauna over a period of years.

5.2 BIODIVERSITY VALUE

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

There is a variety of fauna habitats in the project area, which is typical for this part of the bioregion. Fauna habitats represented in the project area are abundant and in reasonable condition in adjacent areas. The most significant impact on the vertebrate fauna community in this area would be the presence of feral cats and wild dogs. The fauna assemblage that is present in the project area will also be present and abundant in the adjacent areas. The available fauna survey data (Appendix B) provides a good indication of the vertebrate fauna that are potentially in the project area.

5.2.1 Ecological functional value at the ecosystem level

Some of the project area has been disturbed by previous and the current exploration activity and mining, with the consequence that these areas and surrounds will have a depleted vertebrate fauna assemblage. The most significant impact on vertebrate fauna in the project area and surrounds will have been feral cats and wild dogs.

This site supports the conservation significant Malleefowl in low abundance.

5.2.2 Maintenance of threatened ecological communities

No Malleefowl mounds were recorded in the project area, however, the presence of Malleefowl tracks indicates that they are foraging in the project area.

5.2.3 Condition of fauna habitat

Some of the project area has been disturbed due to historical and current exploration activity (i.e. tracks, drill holes, bag farms and dilapidated buildings) and past mining. The uncleared fauna habitat present in the project area is similar to many square kilometres of adjacent habitat. The proposed development is therefore unlikely to have a significant impact on the vertebrate fauna when considered in a bioregional context.

5.2.4 Ecological linkages

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

5.2.5 Size and scale of the proposed disturbance

The project area is a small proportion of similar fauna habitat found in the adjacent area and region. Given the available fauna survey data for these habitat types, no additional surveys are warranted.

5.2.6 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 similar to the many square kilometres of similar habitat in adjacent areas and the bioregion.

5.2.7 Potential impacts on ecosystem function

Clearing native vegetation 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 most of the birds will move into adjacent areas once clearing commences. Shifting animals into adjacent areas will increase the pressure on resources in those areas and it is likely that there will be some disruption to the ecosystems in these areas for a short period until a balance is restored.

Impacts associated with clearing vegetation and development in the project area in a landscape or bioregional context on the vertebrate fauna are likely to be low as the proposed disturbance area is small relative to the quantity of similar habitat in the bioregion.

The impact of feral and pest fauna which are present in the project area will be doing more environmental damage than the combined impacts of proposed development, vegetation clearing and fragmentation of the project area.

6. POTENTIAL ENVIRONMENTAL IMPACTS

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 vegetation creates 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. However, for this project area, the sparseness of vegetation and ground cover mean there will be few 'edge effects' as a consequence of vegetation clearing.

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 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

There are numerous potential threats associated with vegetation clearing and development that could have an impact on the vertebrate fauna in the project 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, so the impacts associated with habitat fragmentation due to additional vehicle tracks would therefore be very low.

6.2.2 Introduced fauna and weeds

Increased habitat fragmentation and human activity often results in an increase in the abundance of introduced species such as the house mice (*Mus musculus*), feral cats (*Felis catus*) and wild dogs (*Canis lupus*). This increase may be due to a decline in habitat health, increased road kills, poor disposal of waste and easier access to areas via tracks.

House mice, cats and wild dogs are known to be established in the area, although in low abundance. In many situations they have become a 'naturalised' species in the Australian bush. Increases in 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 are under control.

Dog and cat tracks indicate there is a low abundance of cats and wild dogs in the project area. These dogs and cats will almost certainly have very large home ranges, part of which will include the project area. Infrastructure known to support feral species, such as rubbish disposal sites and bins, and permanent water should be managed to minimise increases in these populations.

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, in particular, 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, the impacts of road fauna deaths are likely to be low.

6.2.4 Fire

Increased human activity is often associated with an altered fire regime which can lead 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.

6.2.7 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 8, 9 and 10 provide a summary of the risk assessment associated with this project.

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

Table 8. Fauna impact risk assessment descriptors

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

Table 9. Levels of acceptable risk

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

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

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

			Before management				With management		
	Arid Broze Azure	Loss of a Arid Bronze Azure Butterfly or small population of Arid Bronze Azure Butterfly	A	3	Low				
	Chuditch	Loss of a Chuditch or small population of Chuditch	A	2	Low				
	Princess Parrot	Loss of a Princess Parrot or small population of Princess Parrot	A	2	Low				
	Mulgara	Loss of a Mulgara or small population of Mulgara	A	2	Low				
	Oriental Plover	Loss of a Oriental Plover or small population of Oriental Plover	A	2	Low				
	Fork-tailed Swift	Loss of a Fork-tailed Swift or small population of Fork-tailed Swift	A	2	Low				
	Grey Wagtail	Loss of a Grey Wagtail or small population of Grey Wagtail	A	2	Low				
	Yellow Wagtail	Loss of a Yellow Wagtail or small population of Yellow Wagtail	A	2	Low				
	Peregrine Falcon	Loss of a Peregrine Falcon or small population of Peregrine Falcon	A	2	Low				
Human impacts	Increase or spread of weeds	Changed vegetation and a resulting loss of fauna habitat.	E	2	Mod.	Implementation of a weed management plan.	D	2	Low
	Road kills	Animals being killed by vehicles as they cross roads	E	1	Low	Limiting speeds	E	1	Low
	Increase in feral mammals, specifically the dog and cat	Increased predation on the native fauna	C	2	Low				

6.3 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 11). Where possible, native vegetation should not be cleared if any of the following principles are comprised.

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

Principle	Response
It comprises a high level of biological diversity.	Clearing vegetation will not comprise a high level of biodiversity. Malleefowl (listed as Vulnerable under the *EPBC Act* and *BC Act*) are present in the project area, and probably in the adjacent areas. A vertebrate fauna management plan will need to be prepared and implemented for this species to avoid, minimise and mitigate any impacts. If mining was to occur in the breakaway and rocky areas, then it is likely that it could impact on Long-tailed Dunnarts (listed as a Priority 4 species with DBCA). As a priority species, there is no special legislative protection for 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 could however, impact on a low number of Malleefowl and Long-tailed Dunnarts. Neither species are dependent on this habitat for their long-term survival.
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 of native vegetation.
It is growing in, or in association with, an environment associated with a watercourses or wetland.	The area does not contain a natural wetland.
The clearing of the vegetation is likely to cause appreciable land degradation.	N/A
The clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	Clearing of vegetation is unlikely to impact on the environmental values of the bioregion.
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

6.4 REFERRAL UNDER THE EPBC ACT

No Malleefowl mounds were recorded in the project area, however, Malleefowl tracks were recorded in the project area, indicating that Malleefowl are present in low abundance. Large portions of the habitat in the project area were very open and therefore not suitable for Malleefowl nesting when predators are present in the general area.

The potential impact on this species is unknown until more is known about the proposed development and its operation. Prior to any vegetation clearing or disturbance activity, Legacy Iron Ore Limited should undertake a risk assessment to determine if conservation significant fauna are likely to be present, and if present, likely to be impacted. If Malleefowl or their foraging habitat are likely to be significantly impacted, then a referral to the Commonwealth Government under the *EPBC Act 1999* is recommended.

7. SUMMARY

The total assessed area is 1,404ha but the development area is likely to be substantially less. There are six broad fauna habitats:

- Open Mulga shrubland on sandy soil;
- Mulga and chenopod shrubland on rocky soil;
- Mulga shrubland over rocky soil;
- Mulga on rocky slopes and hills;
- Shrubs on granite rocks and bedrock;
- Mulga drainage lines.

There are also areas disturbed by exploration activity and old mining activity. The habitat substrate varies from red sandplain with no stones/pebbles to an abundance of stones/pebbles, to rocky ridges and breakaways.

No Malleefowl mounds were recorded in the project area, however, Malleefowl tracks were recorded in the project area, indicating that Malleefowl are present in low abundance. Large portions of the habitat in the project area were very open and therefore not suitable for Malleefowl nesting when predators are present in the general area.

Prior to any vegetation clearing or disturbance activity, Legacy Iron Ore Limited should undertake a risk assessment to determine if conservation significant fauna are likely to be present, and if present, likely to be impacted. If Malleefowl or its foraging habitat is likely to be significantly impacted, then a referral to the Commonwealth Government under the *EPBC Act 1999* is recommended.

It is likely that Long-tailed Dunnart are present in the breakaway and rocky areas. If these areas are not going to be impacted by mining development or operations, then impacts are likely to be low. The Long-tailed Dunnart is not listed as a threatened species under the *EPBC Act* so there is no reporting requirement under the Commonwealth Act for this species.

Clearing native vegetation in the project area is likely to result in the loss of small vertebrate fauna on-site that are unable to move away during the clearing process, however, this loss is not likely to be significant when viewed in a bioregional context. The few larger animals, such as kangaroos, large goannas and snakes, and most of the birds will move into adjacent areas once vegetation clearing commences, so potential impacts will be low. There may be an on-going loss of small native fauna to vehicle strikes on access tracks, but overall, this impact will be very low. Forced fauna migrants as a result of vegetation clearing increase competition for resources, which may result in the subsequent loss of migrants or local individuals. Individuals shifted out of their established activity areas are also vulnerable to predation until they have become established in their new areas.

Impacts on vertebrate fauna associated with clearing vegetation in the project area in a landscape or bioregional context are likely to be low as there are vast tracts of similar fauna habitat in adjacent areas, and the sparseness of the vegetation and ground cover mean the abundance of terrestrial vertebrate in the project area will be low.

8. 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 and Construction Environmental Management Plan.

8.1 PRESENCE OF MALLEEFOWL

No Malleefowl mounds were recorded in the project area, however, Malleefowl tracks were recorded in the project area, indicating that Malleefowl are present in low abundance. Large portions of the habitat in the project area were very open and therefore not suitable for Malleefowl nesting when predators are present in the general area. Prior to any vegetation clearing or disturbance activity, Legacy Iron Ore Limited should undertake a risk assessment to determine if conservation significant fauna are likely to be present, and if present, likely to be impacted. If Malleefowl or their foraging habitat are likely to be significantly impacted, then a referral to the Commonwealth Government under the *EPBC Act 1999* is recommended.

> **Recommendation 1:** Prior to any vegetation clearing or disturbance activity, Legacy Iron Ore Limited undertake a risk assessment to determine if conservation significant fauna are likely to be present, and if present, likely to be impacted.

> **Recommendation 2:** If Malleefowl or its foraging habitat are likely to be significantly impacted, then the proposed action is referred to the Commonwealth Government under the *EPBC Act 1999* to assess the significance of the potential impact on this species.

> **Recommendation 3:** A Malleefowl Management Plan is prepared once more detail is available about the proposed potential impacts on this species. If an *EPBC Act* referral is submitted, then it is recommended that the Malleefowl Management Plan is submitted with the referral to demonstrate how the operations will avoid, minimise and mitigate impacts on Malleefowl.

8.2 INDUCTION AND AWARENESS

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

> **Recommendation 4:** An induction program that includes a component on managing fauna is a mandatory for staff working in the project area. A Malleefowl Management Plan will also have requirements that staff and contractors should be aware of and this information should be conveyed to these people as part of the induction.

8.3 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 mining impacts on fauna during the construction program.

> **Recommendation 5:** The impact of dust on adjacent vegetation and fauna habitat is managed against appropriate KPIs and in accordance with the clients' Construction Environmental Management Plan.

8.4 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 if they appreciably increase then culled. 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 wild dog and feral cat tracks recorded in the project reducing the impacts of these pest species will reduce the stress on fauna and fauna assemblages in the area, and in particular it will reduce predation pressure on Malleefowl. Increased anthropogenic activity will result in increased traffic and a consequential increase in the fauna deaths on tracks. Limiting vehicle speed on mine 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.

Management of secondary impacts on habitat and fauna should be addressed in a Vertebrate Fauna Management Plan. The plan should include:

- Control and reduction methods for feral and pest fauna;
- Management of pets on site;
- Strategies to minimise habitat fragmentation and barriers to fauna movement (e.g. fencing);
- Vegetation clearing and development protocols;
- Vehicle impacts on vertebrate fauna (short and long term);
- Vehicle speed limits on site; and
- Anthropogenic activity.

> **Recommendation 6:** Preparation of a Vertebrate Fauna Management prior to vegetation clearing and development is completed.

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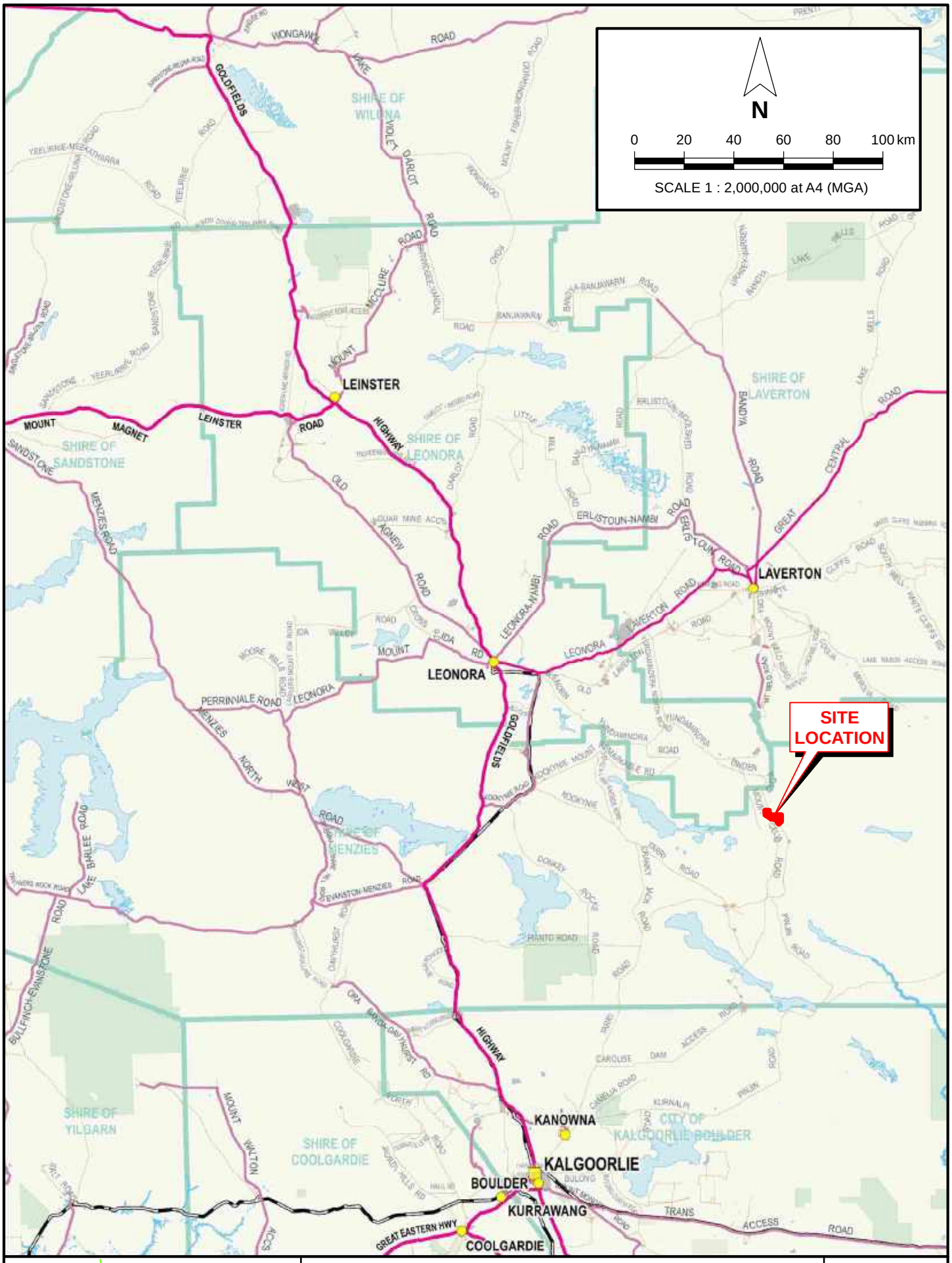
Figures

Basic vertebrate fauna survey and risk assessment
Mt Celia Gold Project



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TERRESTRIAL ECOSYSTEMS

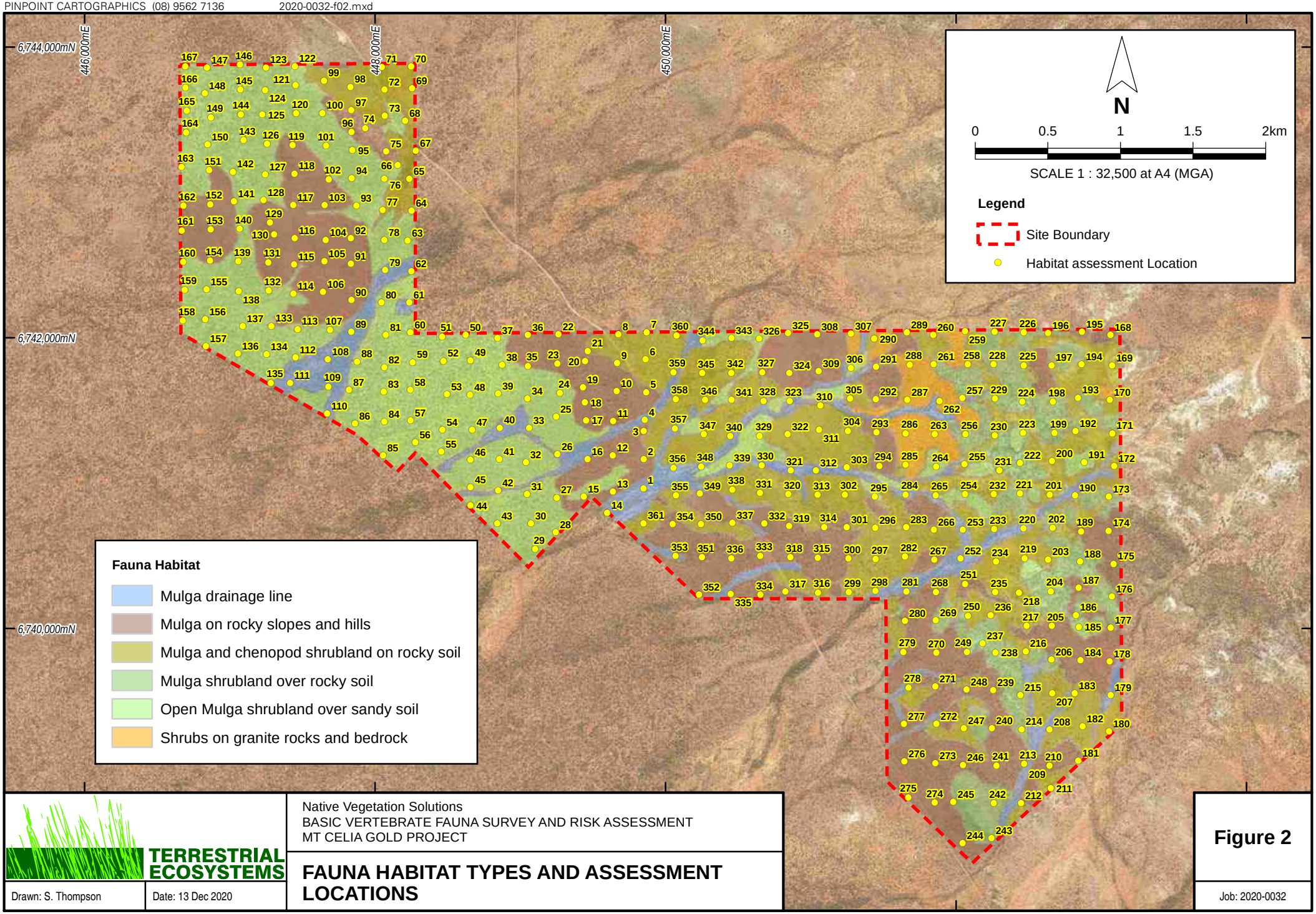
Native Vegetation Solutions
BASIC VERTEBRATE FAUNA SURVEY AND RISK ASSESSMENT
MT CELIA GOLD PROJECT

Figure 1

REGIONAL LOCATION

Drawn: S. Thompson | Date: 29 Nov 2020 | Job: 2020-0032

PINPOINT CARTOGRAPHICS (08) 9562 7136 2020-0032-f02.mxd



TERRESTRIAL ECOSYSTEMS

Drawn: S. Thompson | Date: 13 Dec 2020

Native Vegetation Solutions
BASIC VERTEBRATE FAUNA SURVEY AND RISK ASSESSMENT
MT CELIA GOLD PROJECT

FAUNA HABITAT TYPES AND ASSESSMENT LOCATIONS

Figure 2

Job: 2020-0032

Appendix A.

Results of the EPBC Act Protected Matters Search

Basic vertebrate fauna survey and risk assessment
Mt Celia Gold Project

Australian Government
Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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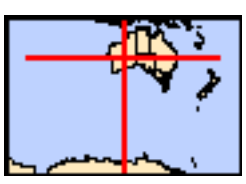
Coordinates
Buffer: 100.0Km



Summary

Matters of National Environmental Significance

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

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

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	13
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	14
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat known to occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
Sminthopsis psammophila Sandhill Dunnart [291]	Endangered	Species or species habitat likely to occur within area
Plants		
Hibbertia crispula Ooldea Guinea-flower [15222]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
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]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [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.

Name
Commonwealth Land -

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
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
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

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

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

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

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

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

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

Coordinates

-29.4551 122.51685

Acknowledgements

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

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

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

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

Department of Agriculture Water and the Environment
GPO Box 858
Canberra City ACT 2601 Australia
+61 2 6274 1111

Appendix B.

Vertebrate Fauna Recorded in Biological Surveys in the Region

Basic vertebrate fauna survey and risk assessment
Mt Celia Gold Project

B.1 VERTEBRATE FAUNA RECORDED IN BIOLOGICAL SURVEYS IN THE REGION

		Surveys	A	B															C									
Family	**Species**	**Common Name**		**Site 9**	**Site 10**	**Site 2**	**Site 3**	**Site 12**	**Site 4**	**Site 5**	**Site 1**	**Site 8**	**Site 11**	**Site 13**	**Site 6**	**Site 7**	**Opportunistic**	**Birds**	**MME1**	**MME2**	**Opportunistic**	**MME3**	**MME5**	**MME7**	**MME8**	**MME9**	**MME6**	**MME4**
Amphibians																												
Limnodynastidae	*Neobatrachus kunapalari*	Wheatbelt Frog	X	1																								
	Neobatrachus sutor	Shoemaker Frog		13	2	2	5	1	3	1	8	1							1	1								
	Platyplectrum spenceri	Spencer's Burrowing Frog	X																									
Pelodryadidae	*Cyclorana maini*	Main's Frog		11	5	1							1								1							
	Cyclorana occidentalis	Western Water-holding Frog		5	2	1	1	1						1														
Reptiles																												
Agamidae	*Ctenophorus cristatus*	Crested Dragon	X																									
	Ctenophorus fordi	Mallee Dragon	X																									
	Ctenophorus infans	Ring-tailed Dragon	X																									
	Ctenophorus isolepis	Central Military Dragon	X																1									
	Ctenophorus nuchalis	Central Netted Dragon	X																									
	Ctenophorus reticulatus	Western Netted Dragon	X																	1	1	1	1	3	1			
	Ctenophorus salinarum	Saltpan Dragon	X																									
	Ctenophorus scutulatus	Lozenge-marked Dragon	X																									
	Diporiphora amphiboluroides	Mulga Dragon	X						2	1					1													
	Moloch horridus	Thorny Devil	X																									
	Pogona minor	Western Bearded Dragon	X																						1			
	Tympanocryptis cephalus	Pebble Dragon	X						2	3		1			1													
Carphodactylidae	*Nephrurus vertebralis*	Midline Knob-tail	X																									
	Underwoodisaurus milii	Barking Gecko	X																							2		

		Surveys	A	B																C										
Family	Species	Common Name		Site 9	Site 10	Site 2	Site 3	Site 12	Site 4	Site 5	Site 1	Site 8	Site 11	Site 13	Site 6	Site 7	Opportunistic	Birds	MME1	MME2	Opportunistic	MME3	MME5	MME7	MME8	MME9	MME6	MME4
Diplodactylidae	*Diplodactylus conspicillatus*	Fat-tailed Gecko	X																											
	Diplodactylus granariensis	Wheatbelt Stone Gecko			1																									
	Diplodactylus pulcher	Beautiful Gecko	X		2				1	4	2		1	1	3	1											1			
	Lucasium damaeum	Beaded Gecko	X																											
	Lucasium squarrosum	Mottled Ground Gecko	X																											
	Rhynchoedura ornata	Beaked Gecko	X	1							3				2															
	Strophurus elderi	Jewelled Gecko	X																											
	Strophurus strophurus	Western Spiny-tailed Gecko	X																											
	Strophurus wellingtonae	Western Shield Spiny-tailed Gecko	X			2					4			1						1										
Elapidae	*Brachyurophis fasciolatus*	Narrow-banded Burrowing Snake	X																											
	Parasuta monachus	Hooded Snake	X									1			1						1									
	Pseudechis australis	Mulga Snake	X																											
	Pseudechis butleri	Spotted Mulga Snake	X																		1									
	Pseudonaja mengdeni	Western Brown Snake	X																											
	Pseudonaja modesta	Ringed Brown Snake	X																											
	Simoselaps bertholdi	Jan's Banded Snake	X																											
	Suta fasciata	Rosen's Snake	X																											
Gekkonidae	*Christinus marmoratus*	Marbled Gecko	X																											
	Gehyra purpurascens	Purplish Dtella	X																											
	Gehyra variegata	Variegated Gehyra	X		2	3	2	2	4			3	1		1				3	9	1	3	3	2		3	9	16
	Heteronotia binoei	Bynoe's Gecko	X		1			1		1	2		2	5						3	1								1
Pygopodidae	*Aprasia picturata*	Black-headed Worm-lizard	X																											
Pygopodidae	*Delma nasuta*	Sharp-snouted Delma	X																											

		Surveys	A	B																C										
Family	Species	Common Name		Site 9	Site 10	Site 2	Site 3	Site 12	Site 4	Site 5	Site 1	Site 8	Site 11	Site 13	Site 6	Site 7	Opportunistic	Birds	MME1	MME2	Opportunistic	MME3	MME5	MME7	MME8	MME9	MME6	MME4	
	Lialis burtonis	Burton's Legless Lizard	X																											
	Pygopus nigriceps	Western Hooded Scaly-foot	X																											
Scincidae	*Cryptoblepharus buchananii*	Buchanan's Snake-eyed Skink	X																	2	1									
	Ctenotus calurus	Blue-tailed Finesnout Ctenotus	X																											
	Ctenotus greeri	Spotted-necked Ctenotus	X																											
	Ctenotus helenae	Clay-soil Ctenotus	X																											
	Ctenotus leonhardii	Leonhardi's Ctenotus	X	5	9	2		16			2		7	27		1						1								
	Ctenotus pantherinus	Leopard Ctenotus	X																											
	Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus	X																											
	Ctenotus schomburgkii	Barred Wedgesnout Ctenotus	X																1		1					2				
	Ctenotus severus	Stern Ctenotus	X																											
	Ctenotus uber	Spotted Ctenotus	X																											
	Cyclodomorphus melanops	Spinifex Slender Blue-tongue	X																											
	Egernia depressa	Southern Pygmy Spiny-tailed Skink	X		1	1	1		2	2		6			3	9											1			
	Egernia formosa	Goldfields Crevice Skink	X																											
	Eremiascincus richardsonii	Broad-banded Sand-swimmer	X						2					1																
	Lerista bipes	North-western Sandslider	X																											
	Lerista desertorum	Central Desert Robust Slider	X											2							1					1	1			
	Lerista distinguenda	South-western Orange-tailed Slider												1																
	Lerista picturata	Southern Robust Slider	X																											
	Lerista timida	Timid Slider	X																											
	Liopholis striata	Nocturnal Desert Skink	X																											
	Menetia greyii	Common Dwarf Skink	X										1						4		1					1				

		Surveys	A	B																C										
Family	Species	Common Name		Site 9	Site 10	Site 2	Site 3	Site 12	Site 4	Site 5	Site 1	Site 8	Site 11	Site 13	Site 6	Site 7	Opportunistic	Birds	MME1	MME2	Opportunistic	MME3	MME5	MME7	MME8	MME9	MME6	MME4		
	Morethia butleri	Woodland Morethia Skink	X	6	1	1		3	1						2					2	1		2	1	1	1	3	4		
	Tiliqua multifasciata	Central Blue-tongue									1																			
	Tiliqua occipitalis	Western Blue-tongued Lizard	X																											
	Tiliqua rugosa	Bobtail	X																											
Typhlopidae	*Anilios australis*	Austral Blind Snake		1								1																		
	Anilios bicolor	Dark-spined Blind Snake					1																							
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor	X		1	2		2	1	3					1	1				1							1			
	Varanus gouldii	Gould's Goanna	X																											
	Varanus panoptes	Yellow-spotted Monitor	X		4		7			3	4		2	6	2	2					1					1	1			
	Varanus tristis	Black-headed Monitor	X																											
Birds																														
Casuariidae	*Dromaius novaehollandiae*	Emu															3	1	1	1	1				1	1	1			
Anatidae	*Cygnus atratus*	Black Swan																			1									
	Tadorna tadornoides	Australian Shelduck																			1									
	Chenonetta jubata	Australian Wood Duck															77	4												
	Anas superciliosa	Pacific Black Duck															13				1									
	Anas gracilis	Grey Teal															74				1									
	Malacorhynchus membranaceus	Pink-eared Duck															5				1									
	Aythya australis	Hardhead															2													
	Biziura lobata	Musk Duck															2													
Megapodiidae	*Leipoa ocellata*	Malleefowl																			1									
Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe															30													
Columbidae	*Phaps chalcoptera*	Common Bronzewing																6			1									

		Surveys	A	B																C										
Family	Species	Common Name		Site 9	Site 10	Site 2	Site 3	Site 12	Site 4	Site 5	Site 1	Site 8	Site 11	Site 13	Site 6	Site 7	Opportunistic	Birds	MME1	MME2	Opportunistic	MME3	MME5	MME7	MME8	MME9	MME6	MME4
	Ocyphaps lophotes	Crested Pigeon																21	2		1					3	2	
Podargidae	*Podargus strigoides*	Tawny Frogmouth																								2		
Rallidae	*Tribonyx ventralis*	Black-tailed Nativehen																			1							
	Fulica atra	Eurasian Coot															21											
Recurvirostridae	*Himantopus leucocephalus*	Pied Stilt															5				1							
	Cladorhynchus leucocephalus	Banded Stilt															14											
	Recurvirostra novaehollandiae	Red-necked Avocet																			1							
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover																			1							
	Elseyornis melanops	Black-fronted Dotterel															1	3			1							
Ardeidae	*Ardea pacifica*	White-necked Heron																			1							
	Egretta novaehollandiae	White-faced Heron															2				1							
Accipitridae	*Haliaeetus albicilla*																		1		1	2	1		1		1	1
	Hieraaetus morphnoides	Little Eagle																		1								
	Aquila audax	Wedge-tailed Eagle															2	1										
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo															2	1			1							
Alcedinidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher																1										
Falconidae	*Falco cenchroides*	Nankeen Kestrel															2									1		
	Falco longipennis	Australian Hobby																				1				1		
	Falco berigora	Brown Falcon															1									1		
	Falco peregrinus	Peregrine Falcon																		1								
Cacatuidae	*Eolophus roseicapilla*	Galah																			1		15					
Psittaculidae	*Neopsephotus bourkii*	Bourke's Parrot																			1							
	Barnardius zonarius	Australian Ringneck																6		1	1		4	2		2	3	

		Surveys	A	B															C										
Family	Species	Common Name		Site 9	Site 10	Site 2	Site 3	Site 12	Site 4	Site 5	Site 1	Site 8	Site 11	Site 13	Site 6	Site 7	Opportunistic	Birds	MME1	MME2	Opportunistic	MME3	MME5	MME7	MME8	MME9	MME6	MME4
	Barnardius zonarius	Australian Ringneck																											
	Psephotus varius	Mulga Parrot															8	12			1	1		5			5	
Ptilonorhynchidae	*Chlamydera guttata*	Western Bowerbird	X														2	5											
Climacteridae	*Climacteris affinis*	White-browed Treecreeper	X																		1			2					
Maluridae	*Malurus splendens*	Splendid Fairywren																12			1			9					
	Malurus splendens	Splendid Fairywren	X																										
	Malurus leucopterus	White-winged Fairywren	X														1	3	3								8		
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater	X															2											
	Purnella albifrons	White-fronted Honeyeater	X																80	100	1	12	8	10	6	6	1	40
	Manorina flavigula	Yellow-throated Miner	X														3	38	10	5	1	7	2		2	2	10	
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater	X															44	25	20	1		6	1	1	2	2	1
	Anthochaera carunculata	Red Wattlebird	X																							3		
	Gavicalis virescens	Singing Honeyeater	X															68		4	1	2	1	1	1	1	1	
	Ptilotula plumula	Grey-fronted Honeyeater																					7					
	Epthianura tricolor	Crimson Chat	X															4											
	Epthianura aurifrons	Orange Chat	X																										
	Sugomel nigrum	Black Honeyeater	X																										
	Lichmera indistincta	Brown Honeyeater	X																										
Pardalotidae	*Pardalotus striatus*	Striated Pardalote	X															1			1		3						
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat	X																		1							1
	Acanthiza iredalei	Slender-billed Thornbill	X																										
	Acanthiza apicalis	Inland Thornbill	X															12	2		1			6			2		
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill																1	5	6	1		17	4			2	6

		Surveys	A	B																C									
Family	Species	Common Name		Site 9	Site 10	Site 2	Site 3	Site 12	Site 4	Site 5	Site 1	Site 8	Site 11	Site 13	Site 6	Site 7	Opportunistic	Birds	MME1	MME2	Opportunistic	MME3	MME5	MME7	MME8	MME9	MME6	MME4
	Acanthiza uropygialis	Chestnut-rumped Thornbill	X																8	30	1	2	14	50			15	10
	Acanthiza robustirostris	Slaty-backed Thornbill	X															68			1			2				
	Smicrornis brevirostris	Weebill	X																		1		10					
	Gerygone fusca	Western Gerygone	X																									
	Aphelocephala leucopsis	Southern Whiteface																13			1			20			6	4
	Aphelocephala leucopsis	Southern Whiteface (Southwest)	X																									
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler	X															14			1							
Cinclosoma	*castaneothorax*	Chestnut-breasted Quail-thrush	X																									
Campephagidae	*Coracina maxima*	Ground Cuckooshrike	X														2	5										
	Coracina novaehollandiae	Black-faced Cuckooshrike	X															7		2	1							1
	Lalage tricolor	White-winged Triller	X														4											
Oreoicidae	*Oreoica gutturalis*	Crested Bellbird	X														1	45	1	3	1	1	1	2			1	2
Pachycephalidae	*Colluricincla harmonica*	Grey Shrikethrush	X															3			1			2			1	
	Pachycephala rufiventris	Rufous Whistler	X															22			1		1	1	1		1	
Artamidae	*Artamus personatus*	Masked Woodswallow	X														4	23										
	Artamus superciliosus	White-browed Woodswallow																			1	4	1				1	
	Artamus cinereus	Black-faced Woodswallow	X															6										
	Artamus cyanopterus	Dusky Woodswallow	X																									
	Artamus minor	Little Woodswallow	X															2										
	Cracticus torquatus	Grey Butcherbird	X														4	5	1	1	1	1	2	1		2	1	
	Cracticus nigrogularis	Pied Butcherbird	X														2	3	2	1	1	1				1		
	Gymnorhina tibicen	Australian Magpie	X														1		3		1					3		
	Strepera versicolor	Grey Currawong	X																			1						

		Surveys	A	B																C										
Family	Species	Common Name		Site 9	Site 10	Site 2	Site 3	Site 12	Site 4	Site 5	Site 1	Site 8	Site 11	Site 13	Site 6	Site 7	Opportunistic	Birds	MME1	MME2	Opportunistic	MME3	MME5	MME7	MME8	MME9	MME6	MME4
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	X														5	5	1		1							
	Rhipidura albiscapa	Grey Fantail	X																					1				
Monarchidae	*Grallina cyanoleuca*	Magpie-lark	X														6	11		1	1	2				2	2	
Corvidae	*Corvus orru*	Torresian Crow	X															2		1	1	2	1		2		1	
	Corvus bennetti	Little Crow	X														4	1		2	1		6	1				
	Corvus coronoides	Australian Raven	X																									
Petroicidae	*Microeca fascinans*	Jacky Winter	X																									
	Petroica goodenovii	Red-capped Robin	X															10	1	2	1			6			2	1
	Melanodryas cucullata	Hooded Robin	X															7			1	3						
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark	X																									
Hirundinidae	*Hirundo rustica*	Barn Swallow																									5	
	Hirundo neoxena	Welcome Swallow	X														2	4										
	Petrochelidon nigricans	Tree Martin	X														1	9										
	Cheramoeca leucosterna	White-backed Swallow	X														4	2			1	2						
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird	X														2	2										
Estrildidae	*Taeniopygia guttata*	Zebra Finch	X														2				1							
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit	X														6	2			1	4						
Mammals																												
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna																		1	1							
Bovidae	*Capra hircus*	Goat																			1							
Canidae	*Canis lupus*	Dingo	X																		1							
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	X																									
	Nyctophilus geoffroyi	Lesser Long-eared Bat	X																									

		Surveys	A	B																C										
Family	**Species**	**Common Name**		**Site 9**	**Site 10**	**Site 2**	**Site 3**	**Site 12**	**Site 4**	**Site 5**	**Site 1**	**Site 8**	**Site 11**	**Site 13**	**Site 6**	**Site 7**	**Opportunistic**	**Birds**	**MME1**	**MME2**	**Opportunistic**	**MME3**	**MME5**	**MME7**	**MME8**	**MME9**	**MME6**	**MME4**
	Scotorepens balstoni	Inland Broad-nosed Bat	X																											
Dasyuridae	*Antechinomys laniger*	Kultarr			2	1				3	2	2		1	3	3														
	Ningaui ridei	Wongai Ningaui	X																											
	Ningaui yvonneae	Mallee Ningaui	X																											
	Sminthopsis crassicaudata	Fat-tailed Dunnart	X																											
	Sminthopsis dolichura	Little Long-tailed Dunnart	X	5	3	1	3	1	7	5	1	3		1	4	13														
	Sminthopsis hirtipes	Hairy-footed Dunnart	X						1																					
	Sminthopsis longicaudata	Long-tailed Dunnart								1				1	1															
	Sminthopsis macroura	Stripe-faced Dunnart		1	5	3		3	2	1	2	1	5	2	1	1														
	Sminthopsis murina	Slender-tailed Dunnart	X																											
	Sminthopsis ooldea	Ooldea Dunnart	X																											
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo	X																											
	Osphranter robustus	Euro	X																		1									1
	Osphranter rufus	Red Kangaroo	X																		1	5				6				
Leporidae	*Oryctolagus cuniculus*	Rabbit	X																		1									1
Equidae	*Equus asinus*	Donkey																			1									
Muridae	*Mus musculus*	House Mouse	X										5		1				1	2		2	2				2	1
	Notomys alexis	Spinifex Hopping Mouse	X								3								7					2						
	Pseudomys hermannsburgensis	Sandy Inland Mouse	X	1	2	1	1	5	3		1		2	6													4	1		

A Atlas of Living Australia

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

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

B2. VERTEBRATE FAUNA RECORDED IN BIOLOGICAL SURVEYS IN THE REGION

		Surveys	A										B	C											D				E
Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1	Unknown	Site 14a	Site 5a	Site 1a	Site 17a	Site 14	Site 20a	Site 11	Site 11a	Site 8	Site 19	Site 14b	Site 1 13	Site 3 13	Site 2 13	Unknown	Jump Up
Amphibians																													
Limnodynastidae	*Neobatrachus kunapalari*	Wheatbelt Frog																											
	Neobatrachus sutor	Shoemaker Frog																											
	Neobatrachus wilsmorei	Plonking Frog	3	1																									
	Notaden nichollsi	Desert Spadefoot											X																
	Platyplectrum spenceri	Spencer's Burrowing Frog												8															
Myobatrachidae	*Pseudophryne occidentalis*	Western Toadlet													2														
Pelodryadidae	*Cyclorana maini*	Main's Frog											X																
	Cyclorana occidentalis	Western Water-holding Frog																											
	Litoria rubella	Desert Tree Frog											X																
Reptiles																													
Agamidae	*Ctenophorus caudicinctus*	Ring-tailed Dragon														12													
	Ctenophorus caudicinctus	Ring-tailed Dragon											X																
	Ctenophorus cristatus	Crested Dragon																											
	Ctenophorus fordi	Mallee Dragon																											
	Ctenophorus inermis	Military Dragon			1								X				1												
	Ctenophorus infans	Ring-tailed Dragon																											
	Ctenophorus isolepis	Central Military Dragon																											
	Ctenophorus isolepis	Central Military Dragon																											

		Surveys	A										B	C										D				E
Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1	Unknown	Site 14a	Site 5a	Site 1a	Site 17a	Site 14	Site 20a	Site 11	Site 11a	Site 8	Site 19	Site 14b	Site 1 13	Site 3 13	Site 2 13	Unknown	Jump Up
	Ctenophorus isolepis	Central Military Dragon											X												1	2			
	Ctenophorus maculatus	Spotted Dragon				2																							
	Ctenophorus nuchalis	Central Netted Dragon																											
	Ctenophorus pictus	Painted Dragon																											
	Ctenophorus reticulatus	Western Netted Dragon					1							1	13		2	2	4										1
	Ctenophorus salinarum	Saltpan Dragon				2		1							1					5	1	2							
	Ctenophorus scutulatus	Lozenge-marked Dragon											X																
	Ctenophorus vadnappa	Red-barred Dragon																	1										
	Diporiphora amphiboluroides	Mulga Dragon																											1
	Diporiphora valens	Southern Pilbara Tree Dragon											X																
	Gowidon longirostris	Long-nosed Dragon											X																
	Moloch horridus	Thorny Devil											X		1										1	1			
	Pogona minor	Western Bearded Dragon	1		2				2	1	1		X					1		2	1	2	2						
	Tympanocryptis cephalus	Pebble Dragon																			1								
Carphodactylidae	*Nephrurus laevissimus*	Smooth Knob-tail											X																
	Nephrurus levis	Three-lined Knob-tail											X																
	Nephrurus vertebralis	Midline Knob-tail					1		1											1		2							
	Underwoodisaurus milii	Barking Gecko													2		9												1
Diplodactylidae	*Diplodactylus conspicillatus*	Fat-tailed Gecko											X																
	Diplodactylus granariensis	Wheatbelt Stone Gecko																											
	Diplodactylus pulcher	Beautiful Gecko												4	3		3						1						

		Surveys	A										B	C											D				E
Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1	Unknown	Site 14a	Site 5a	Site 1a	Site 17a	Site 14	Site 20a	Site 11	Site 11a	Site 8	Site 19	Site 14b	Site 1 13	Site 3 13	Site 2 13	Unknown	Jump Up
	Lucasium damaeum	Beaded Gecko																											
	Lucasium squarrosum	Mottled Ground Gecko	2	1	5	2	1					2		1			3		2	1	3								
	Lucasium stenodactylum	Crowned Gecko											X																
	Rhynchoedura ornata	Beaked Gecko											X									2			1				1
	Strophurus ciliaris	Spiny-tailed Gecko												2	2		1		1										
	Strophurus ciliaris	Spiny-tailed Gecko											X																
	Strophurus elderi	Jewelled Gecko		1					1	2			X												1		1		
	Strophurus strophurus	Western Spiny-tailed Gecko																				7							
	Strophurus wellingtonae	Western Shield Spiny-tailed Gecko																											
Elapidae	*Brachyurophis fasciolatus*	Narrow-banded Burrowing Snake																	1										
	Brachyurophis fasciolatus	Narrow-banded Burrowing Snake											X																
	Brachyurophis fasciolatus	Narrow-banded Burrowing Snake																											
	Brachyurophis semifasciata	Half-girdled Snake																							1				1
	Demansia psammophis	Yellow-faced Whipsnake																							1				
	Demansia rufescens	Rufous Whipsnake											X																
	Furina ornata	Orange-naped Snake											X																
	Parasuta monachus	Hooded Snake												1			3												
	Pseudechis australis	Mulga Snake																											
	Pseudechis butleri	Spotted Mulga Snake																											
	Pseudonaja mengdeni	Western Brown Snake											X																
	Pseudonaja modesta	Ringed Brown Snake											X																

		Surveys	A										B	C											D				E
Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1	Unknown	Site 14a	Site 5a	Site 1a	Site 17a	Site 14	Site 20a	Site 11	Site 11a	Site 8	Site 19	Site 14b	Site 1 13	Site 3 13	Site 2 13	Unknown	Jump Up
	Simoselaps anomalus	Desert Banded Snake											X																
	Simoselaps bertholdi	Jan's Banded Snake	1										X										1		1				
	Suta fasciata	Rosen's Snake													2														
Gekkonidae	*Christinus marmoratus*	Marbled Gecko											X																
	Gehyra punctata	Spotted Dtella											X																
	Gehyra purpurascens	Purplish Dtella											X																
	Gehyra variegata	Variegated Gehyra											X		15	1	15		1			1	1						1
	Heteronotia binoei	Bynoe's Gecko	1				2				2	3	X		7		34												1
	Gehyra xenopus	Crocodile-faced Dtella		1			1			1	1																		
Pygopodidae	*Aprasia picturata*	Black-headed Worm-lizard																											
	Delma butleri	Unbanded Delma											X																
	Delma nasuta	Sharp-snouted Delma									1		X																
	Delma pax	Peace Delma											X																
	Lialis burtonis	Burton's Legless Lizard									1		X																
	Pygopus nigriceps	Western Hooded Scaly-foot									1						1		1										
	Pygopus nigriceps	Western Hooded Scaly-foot											X																
Pythonidae	*Antaresia perthensis*	Pygmy Python											X																
Scincidae	*Carlia triacantha*	Desert Rainbow-skink											X																
	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink											X	1															
	Cryptoblepharus plagiocephalus	Peron's Snake-eyed Skink																											
	Ctenotus ariadnae	Ariadna's Ctenotus											X																

		Surveys	A										B	C										D				E
Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1	Unknown	Site 14a	Site 5a	Site 1a	Site 17a	Site 14	Site 20a	Site 11	Site 11a	Site 8	Site 19	Site 14b	Site 1 13	Site 3 13	Site 2 13	Unknown	Jump Up
	Ctenotus atlas	Southern Mallee Ctenotus											X															
	Ctenotus brooksi	Wedgsnout Ctenotus											X															
	Ctenotus calurus	Blue-tailed Finesnout Ctenotus											X										1		3			
	Ctenotus dux	Fine Side-lined Ctenotus											X															
	Ctenotus grandis	Grand Ctenotus											X															
	Ctenotus greeri	Spotted-necked Ctenotus																					12					
	Ctenotus helenae	Clay-soil Ctenotus		2					2	1			X										1		1	2	3		
	Ctenotus leae	Ornage-tailed Finesnout Ctenotus											X															
	Ctenotus leonhardii	Leonhardi's Ctenotus	6	3	3	6	7				2	4	X							5	4	2						
	Ctenotus nasutus	Nasute Finsnout Ctenotus											X															
	Ctenotus pantherinus	Leopard Ctenotus																					4					
	Ctenotus pantherinus	Leopard Ctenotus											X												2	1		
	Ctenotus pantherinus	Leopard Ctenotus																										
	Ctenotus piankai	Coarse Sands Ctenotus											X															
	Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus											X										11				1	
	Ctenotus schomburgkii	Barred Wedgesnout Ctenotus											X						2	3		15	11		2		1	
	Ctenotus severus	Stern Ctenotus														1	6											
	Ctenotus uber	Spotted Ctenotus												3			2		6									
	Ctenotus uber	Spotted Ctenotus																										
	Cyclodomorphus melanops	Spinifex Slender Blue-tongue																										
	Egernia depressa	Southern Pygmy Spiny-tailed Skink											X						4									1

		Surveys	A										B	C											D				E
Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1	Unknown	Site 14a	Site 5a	Site 1a	Site 17a	Site 14	Site 20a	Site 11	Site 11a	Site 8	Site 19	Site 14b	Site 1 13	Site 3 13	Site 2 13	Unknown	Jump Up
	Egernia formosa	Goldfields Crevice Skink													3														1
	Eremiascincus fasciolatus	Narrow-banded Sand Swimmer											X																
	Eremiascincus richardsonii	Broad-banded Sand-swimmer											X	1			1												
	Lerista amicorum	Fortescue Slider											X																
	Lerista bipes	North-western Sandslider											X												25		3		
	Lerista desertorum	Central Desert Robust Slider	4	1	1				1	2	1						6		2				6		1				
	Lerista distinguenda	South-western Orange-tailed Slider																											
	Lerista ips	Robust Duneslider											X																
	Lerista kingi	King's Slider					1																						
	Lerista macropisthopus	Unpatterned Robust Slider													2														
	Lerista macropisthopus	Unpatterned Robust Slider											X																
	Lerista neander	Pilbara Robust Slider											X																
	Lerista picturata	Southern Robust Slider													2														
	Lerista timida	Timid Slider																									1		
	Lerista vermicularis	Slender Duneslider											X																
	Liopholis striata	Nocturnal Desert Skink											X						2										
	Menetia greyii	Common Dwarf Skink				1	1						X		4										1				
	Morethia butleri	Woodland Morethia Skink													4		6	2							1		1		
	Morethia ruficauda	Lined Fire-tailed Skink											X																
	Proablepharus reginae	Western Soil-crevice Skink																											
	Tiliqua multifasciata	Central Blue-tongue											X																

		Surveys	A										B	C										D				E
Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1	Unknown	Site 14a	Site 5a	Site 1a	Site 17a	Site 14	Site 20a	Site 11	Site 11a	Site 8	Site 19	Site 14b	Site 1 13	Site 3 13	Site 2 13	Unknown	Jump Up
	Tiliqua occipitalis	Western Blue-tongued Lizard																						1				
	Tiliqua rugosa	Bobtail																											
Typhlopidae	*Anilios australis*	Austral Blind Snake																											
	Anilios bicolor	Dark-spined Blind Snake																											
	Anilios grypus	Long-beaked Blind Snake											X																
	Anilios hamatus	Pale-headed Blind Snake					1				1			1								1							
	Anilios waitii	Waite's Blind Snake												2								1							
Varanidae	*Varanus acanthurus*	Spiny-tailed Monitor											X																
	Varanus brevicauda	Short-tailed Pygmy Monitor											X																
	Varanus caudolineatus	Stripe-tailed Monitor			1								X	1	2				6										
	Varanus eremius	Pygmy Desert Monitor											X																
	Varanus giganteus	Perentie											X		1														
	Varanus gilleni	Pygmy Mulga Monitor											X																
	Varanus gouldii	Gould's Goanna					1		1				X		1		1									2			
	Varanus panoptes	Yellow-spotted Monitor											X	2					1	1									1
	Varanus tristis	Black-headed Monitor											X	1															
Chelidae	*Chelodina steindachneri*	Flat-shelled Turtle											X																
Birds																													
Casuariidae	*Dromaius novaehollandiae*	Emu											X	1	2						2		2	5					1
Anatidae	*Cygnus atratus*	Black Swan											X																
	Tadorna tadornoides	Australian Shelduck											X																

		Surveys	A										B	C											D				E
Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1	Unknown	Site 14a	Site 5a	Site 1a	Site 17a	Site 14	Site 20a	Site 11	Site 11a	Site 8	Site 19	Site 14b	Site 1 13	Site 3 13	Site 2 13	Unknown	Jump Up
	Chenonetta jubata	Australian Wood Duck											X																
	Anas superciliosa	Pacific Black Duck											X																
	Anas gracilis	Grey Teal											X																
	Malacorhynchus membranaceus	Pink-eared Duck											X																
	Aythya australis	Hardhead																											
	Biziura lobata	Musk Duck																											
Megapodiidae	*Leipoa ocellata*	Malleefowl																										X	1
Phasianidae	*Coturnix pectoralis*	Stubble Quail																						1					
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe											X																
	Poliocephalus poliocephalus	Hoary-headed Grebe																											
Columbidae	*Phaps chalcoptera*	Common Bronzewing											X									1							1
	Ocyphaps lophotes	Crested Pigeon											X	5	6		11	1	7			9		2					1
	Geophaps plumifera	Spinifex Pigeon											X																
	Geopelia cuneata	Diamond Dove											X																
Cuculidae	*Chrysococcyx basalis*	Horsfield's Bronze-Cuckoo											X								3	1	3						1
	Chrysococcyx osculans	Black-eared Cuckoo																	2				1						1
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar											X	3				3				1		2					1
Podargidae	*Podargus strigoides*	Tawny Frogmouth											X						1										
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar											X		2	2													1
	Apus pacificus	Pacific Swift																											1
Rallidae	*Tribonyx ventralis*	Black-tailed Nativehen																											

		Surveys	A										B	C											D				E
Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1	Unknown	Site 14a	Site 5a	Site 1a	Site 17a	Site 14	Site 20a	Site 11	Site 11a	Site 8	Site 19	Site 14b	Site 1 13	Site 3 13	Site 2 13	Unknown	Jump Up
	Fulica atra	Eurasian Coot											X																
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt											X																
	Himantopus leucocephalus	Pied Stilt																											
	Cladorhynchus leucocephalus	Banded Stilt																											
	Recurvirostra novaehollandiae	Red-necked Avocet																											
Charadriidae	*Vanellus tricolor*	Banded Lapwing											X		1		4			9				4					
	Charadrius ruficapillus	Red-capped Plover											X																
	Erythrogonys cinctus	Red-kneed Dotterel											X																
	Elseyornis melanops	Black-fronted Dotterel											X																
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper											X																
Turnicidae	*Turnix velox*	Little Buttonquail											X						2					5					1
Laridae	*Chlidonias hybrida*	Whiskered Tern											X																
Otididae	*Ardeotis australis*	Australian Bustard											X	4							1							X	1
Ardeidae	*Ardea pacifica*	White-necked Heron											X																
	Egretta novaehollandiae	White-faced Heron											X																
Accipitridae	*Haliaeetus albicilla*																												
Anhingidae	*Anhinga melanogaster*	Australasian Darter											X																
Accipitridae	*Hamirostra melanosternon*	Black-breasted Buzzard											X																
	Hieraaetus morphnoides	Little Eagle											X						1				3						
	Aquila audax	Wedge-tailed Eagle											X	2			2	6				3							
	Circus assimilis	Spotted Harrier											X											1					

		Surveys	A										B	C										D				E
Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1	Unknown	Site 14a	Site 5a	Site 1a	Site 17a	Site 14	Site 20a	Site 11	Site 11a	Site 8	Site 19	Site 14b	Site 1 13	Site 3 13	Site 2 13	Unknown	Jump Up
	Accipiter fasciatus	Brown Goshawk											X										3						
	Accipiter cirrocephalus	Collared Sparrowhawk											X																1
	Milvus migrans	Black Kite											X																
	Haliastur sphenurus	Whistling Kite											X																
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo											X					2	1			1	1						
Strigidae	*Ninox boobook*	Southern Boobook											X																
Alcedinidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher															6		1					1					
Meropidae	*Merops ornatus*	Rainbow Bee-eater																	3				3						1
Falconidae	*Falco cenchroides*	Nankeen Kestrel											X	5	4		2					2	3						
	Falco longipennis	Australian Hobby											X									1							1
	Falco berigora	Brown Falcon											X	3			2		3			3	5	1					1
	Falco peregrinus	Peregrine Falcon																											
Megaluridae	*Poodytes carteri*	Spinifexbird											X																
Cacatuidae	*Eolophus roseicapilla*	Galah											X	908	7		2	44	7		1	4	5	8					1
	Cacatua sanguinea	Little Corella											X																
	Nymphicus hollandicus	Cockatiel											X	2							6	35	3	4					1
Psittaculidae	*Neopsephotus bourkii*	Bourke's Parrot																	4										1
	Barnardius zonarius	Australian Ringneck											X	31	1			25	3			9	16	36					1
	Psephotus varius	Mulga Parrot											X						14				2	11					1
	Melopsittacus undulatus	Budgerigar											X	9			2	11	17		20	170	29	15					1
Ptilonorhynchidae	*Chlamydera guttata*	Western Bowerbird																											1

		Surveys	A										B	C											D				E
Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1	Unknown	Site 14a	Site 5a	Site 1a	Site 17a	Site 14	Site 20a	Site 11	Site 11a	Site 8	Site 19	Site 14b	Site 1 13	Site 3 13	Site 2 13	Unknown	Jump Up
Climacteridae	*Climacteris affinis*	White-browed Treecreeper																	4										1
Maluridae	*Amytornis striatus*	Striated Grasswren											X															X	
	Stipiturus ruficeps	Rufous-crowned Emuwren											X																
	Malurus assimilis	Purple-backed Fairywren											X																
	Malurus lamberti	Variegated Fairywren																											
	Malurus splendens	Splendid Fairywren																											1
	Malurus splendens	Splendid Fairywren																											
	Malurus leucopterus	White-winged Fairywren												1						3	76	40		2					1
	Malurus leucopterus	White-winged Fairywren											X																
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater											X					2			2								
	Purnella albifrons	White-fronted Honeyeater											X					3			1	2	4	1					1
	Manorina flavigula	Yellow-throated Miner												15			1	10	41			21	13	98					1
	Manorina flavigula	Yellow-throated Miner																											
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater											X	2	2		5	11	10			9	8	2					1
	Anthochaera carunculata	Red Wattlebird																	3				2						1
	Anthochaera carunculata	Red Wattlebird																											
	Gavicalis virescens	Singing Honeyeater													1		2	11	3		3	8	2	3					1
	Gavicalis virescens	Singing Honeyeater											X																
	Gavicalis virescens	Singing Honeyeater																											
	Ptilotula penicillata	White-plumed Honeyeater (Western)											X																
	Ptilotula keartlandi	Grey-headed Honeyeater											X																

		Surveys	A										B	C										D				E
Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1	Unknown	Site 14a	Site 5a	Site 1a	Site 17a	Site 14	Site 20a	Site 11	Site 11a	Site 8	Site 19	Site 14b	Site 1 13	Site 3 13	Site 2 13	Unknown	Jump Up
	Ptilotula plumula	Grey-fronted Honeyeater																56	2				3						
	Conopophila whitei	Grey Honeyeater																						18					
	Epthianura tricolor	Crimson Chat											X	24			6	154	29		18	75							1
	Epthianura aurifrons	Orange Chat											X								5								
	Sugomel nigrum	Black Honeyeater											X																
	Lichmera indistincta	Brown Honeyeater											X																1
	Nesoptilotis flavicollis	Yellow-throated Honeyeater											X																
Pardalotidae	*Pardalotus striatus*	Striated Pardalote																					2	1					1
	Pardalotus striatus	Striated Pardalote											X																
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat																				2		2					1
	Acanthiza iredalei	Slender-billed Thornbill (Western)																											
	Acanthiza apicalis	Inland Thornbill																	2				3						1
	Acanthiza apicalis	Inland Thornbill											X																
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill											X						8			9	4						1
	Acanthiza uropygialis	Chestnut-rumped Thornbill											X	3	3				126			53	88	5					1
	Acanthiza robustirostris	Slaty-backed Thornbill											X						6				3						
	Smicrornis brevirostris	Weebill											X						7				98						1
	Gerygone fusca	Western Gerygone											X																
	Aphelocephala leucopsis	Southern Whiteface											X						52			4	5	8					1
Acanthizidae	*Aphelocephala nigricincta*	Banded Whiteface											X																
Pomatostomidae	*Pomatostomus temporalis*	Grey-crowned Babbler											X																

		Surveys	A										B	C										D				E
Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1	Unknown	Site 14a	Site 5a	Site 1a	Site 17a	Site 14	Site 20a	Site 11	Site 11a	Site 8	Site 19	Site 14b	Site 1 13	Site 3 13	Site 2 13	Unknown	Jump Up
	Pomatostomus superciliosus	White-browed Babbler											X		2									3					1
Cinclosoma	*castaneothorax*	Chestnut-breasted Quail-thrush																	3		2								1
	cinnamomeum	Cinnamon Quail-thrush											X																
Campephagidae	*Coracina maxima*	Ground Cuckooshrike											X	31			3				4			2					
	Coracina novaehollandiae	Black-faced Cuckooshrike											X	5			1	4	10			7	9	6					1
	Lalage tricolor	White-winged Triller											X	3					34			39		9					1
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella											X										6	2					
Oreoicidae	*Oreoica gutturalis*	Crested Bellbird											X	5		2		14	10		3	6	15	1					1
Pachycephalidae	*Colluricincla harmonica*	Grey Shrikethrush											X										5						1
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler											X										8						1
Artamidae	*Artamus personatus*	Masked Woodswallow											X					2	72		2		2	31					1
	Artamus superciliosus	White-browed Woodswallow																	3										
	Artamus cinereus	Black-faced Woodswallow											X	25			11	55	1		7	12		6					
	Artamus cyanopterus	Dusky Woodswallow																											
	Artamus minor	Little Woodswallow											X																
	Cracticus torquatus	Grey Butcherbird											X	4				2	8			4	8	7					
	Cracticus nigrogularis	Pied Butcherbird											X	23	4	1		6				13	4	1					1
	Gymnorhina tibicen	Australian Magpie											X	3			9		1										1
	Strepera versicolor	Grey Currawong												2									2	3					1
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail											X	2			1					12		2					1
Monarchidae	*Grallina cyanoleuca*	Magpie-lark											X	12			2					3		7					

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Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1	Unknown	Site 14a	Site 5a	Site 1a	Site 17a	Site 14	Site 20a	Site 11	Site 11a	Site 8	Site 19	Site 14b	Site 1 13	Site 3 13	Site 2 13	Unknown	Jump Up
Corvidae	*Corvus orru*	Torresian Crow											X								2			2					
	Corvus bennetti	Little Crow											X	50	7		12	29	6		11	36	24	21					1
Petroicidae	*Microeca fascinans*	Jacky Winter											X	1					1				22						
	Petroica goodenovii	Red-capped Robin											X	5	3	3	1	1	47			3	29	3					1
	Melanodryas cucullata	Hooded Robin											X	1				2	1		1	2							
Alaudidae	*Mirafra javanica*	Australasian Bushlark											X																
Locustellidae	*Cincloramphus cruralis*	Brown Songlark											X	7			8	3	1	7	7								
	Cincloramphus mathewsi	Rufous Songlark											X											3					
Hirundinidae	*Hirundo rustica*	Barn Swallow																											
	Hirundo neoxena	Welcome Swallow																											
	Petrochelidon nigricans	Tree Martin											X																
	Cheramoeca leucosterna	White-backed Swallow											X				2												
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird																				5		4					1
	Emblema pictum	Painted Finch											X																
	Taeniopygia guttata	Zebra Finch											X					12			9	36	5	4					1
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit												16			36			7	18			1					1
Mammals																													
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna											X																1
Bovidae	*Bos taurus*	Cow											X																1
	Capra hircus	Goat												1	1			1					1						1
	Ovis aries	Sheep												1					1				1						

		Surveys	A										B	C										D				E
Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1	Unknown	Site 14a	Site 5a	Site 1a	Site 17a	Site 14	Site 20a	Site 11	Site 11a	Site 8	Site 19	Site 14b	Site 1 13	Site 3 13	Site 2 13	Unknown	Jump Up
Camelidae	*Camelus dromedarius*	Dromedary											X							1									
Canidae	*Canis lupus*	Dingo											X							1									
	Vulpes vulpes	Red Fox													1				1				1						1
Felidae	*Felis catus*	Cat											X							1									1
Molossidae	*Austronomus australis*	White-striped Freetail Bat													1														
	Mormopterus planiceps	Southern Free-tail Bat													1														
	Mormopterus sp. 4	South-western Free-tail Bat																											1
Vespertilionidae	*Nyctophilus sp.*	Long-eared Bat Sp.																											1
	Chalinolobus gouldii	Gould's Wattled Bat												1	3														1
	Chalinolobus morio	Chocolate Wattled Bat																											1
	Nyctophilus geoffroyi	Lesser Long-eared Bat												4	3		9												
	Scotorepens balstoni	Inland Broad-nosed Bat												6	1														1
Dasyuridae	*Ningaui sp.*	Ningaui sp.																									1		
	Planigale sp.	Planigale sp.											X																
	Antechinomys laniger	Kultarr																											
	Dasycercus blythi	Brush-tailed Mulgara											X													2		2	
	Dasykaluta rosamondae	Kaluta											X																
	Ningaui ridei	Wongai Ningaui							1				X										5						
	Ningaui yvonneae	Mallee Ningaui																											
	Pseudantechinus woolleyae	Woolley's False Antechinus											X																
	Sminthopsis crassicaudata	Fat-tailed Dunnart													1				7	5									

		Surveys	A										B	C											D				E
Family	Species	Common Name	TM1	JS2	WM2	WS2	WM1	WS1	JS3	JS1	JS4	HB1	Unknown	Site 14a	Site 5a	Site 1a	Site 17a	Site 14	Site 20a	Site 11	Site 11a	Site 8	Site 19	Site 14b	Site 1 13	Site 3 13	Site 2 13	Unknown	Jump Up
	Sminthopsis dolichura	Little Long-tailed Dunnart												2	1				1	1		2	1						
	Sminthopsis hirtipes	Hairy-footed Dunnart											X																
	Sminthopsis longicaudata	Long-tailed Dunnart											X																
	Sminthopsis macroura	Stripe-faced Dunnart											X																
	Sminthopsis murina	Slender-tailed Dunnart																											
	Sminthopsis ooldea	Ooldea Dunnart																											
	Sminthopsis youngsoni	Lesser Hairy-footed Dunnart											X																
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo													1							1							
	Osphranter robustus	Euro											X		1		1		1			1	1						1
	Osphranter rufus	Red Kangaroo											X	1	1		1	1	1	1	1	1							1
Leporidae	*Oryctolagus cuniculus*	Rabbit											X		2		1			1		1							1
Equidae	*Equus asinus*	Donkey											X																
	Equus caballus	Horse											X																
Muridae	*Leporillus apicalis*	Lesser Stick-nest Rat											X																
	Mus musculus	House Mouse											X		2		1			2			3						
	Notomys alexis	Spinifex Hopping Mouse							1				X									1							
	Pseudomys chapmani	Western Pebble-mound Mouse											X																
	Pseudomys hermannsburgensis	Sandy Inland Mouse											X	1					2	1		1	7						

A Dunlop, J.N. and Payne, W. (1999) *A vertebrate Fauna Survey of the North Lake Carey Region including Hillside Prospect, Wallaby Prospect and Just in Time / Just in Case and the Teatree Dam Area*, Unpublished report for Placer (Granny Smith) and Homestake, Perth,

B Van Leeuwen, S. (1997) *Biological Survey of the Southern Little Sandy Desert*, Department of Conservation and land Management, Perth.

C Kingfisher Environmental Consulting (2014) *Sunrise Dam - Tropicana Infrastructure Corridor Fauna Survey*, Unpublished report for Anglogold Ashanti Australia, Perth.

D Ecologia Environment (2007) *Jump Up Dam Fauna Assessment*, Unpublished report for Heron Resources Limited, Perth.

Appendix C.

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

Basic vertebrate fauna survey and risk assessment
Mt Celia Gold Project

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 wild. 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.