PHOENIX
ENVIRONMENTAL SCIENCES

Basic and targeted terrestrial fauna survey for the Black Flag Wind Farm

Prepared for Northern Star Resources Limited

March 2025

Final



Basic and targeted terrestrial fauna survey for the Black Flag Pastoral Lease

Prepared for Northern Star Resources Limited

Version history

Author	Reviewers	Version	Version number	Date submitted	Submitted to
K. Fox	C. Nagle, A. Jacks	Draft for client comments	0.1	15-Feb-24	Y. Hynes
P. Williams; E. Broom	A. Jacks	Draft for client comments	0.2	02-Aug-24	B. McGillivray
P. Williams; E. Broom	A. Jacks	Final, client comments addressed	1.0	11-Sep-24	B. McGillivray
A. Jacks		Draft for client comments	1.1	29-Nov-24	B. McGillivray
A. Jacks		Final, client comments addressed	2.0	05-Mar-25	B. McGillivray Y. Hynes C. Bennison

© Phoenix Environmental Sciences Pty Ltd 2024

The use of this report is solely for the client for the purpose in which it was prepared. Phoenix Environmental Sciences accepts no responsibility for use beyond this purpose.

All rights are reserved and no part of this report may be reproduced or copied in any form without the written permission of Phoenix Environmental Sciences or the client.

Phoenix Environmental Sciences Pty Ltd

2/3 King Edward Road OSBORNE PARK WA 6017

P: 08 6323 5410

E: admin@phoenixenv.com.au

Project code: 1649-KO-NSR-FAU

EXECUTIVE SUMMARY

Phoenix Environmental Sciences (Phoenix) was commissioned by Northern Star Resources Limited (Northern Star) to undertake a desktop review, basic vertebrate and short-range endemic (SRE) invertebrate fauna survey, and additional targeted searches for conservation significant vertebrates and invertebrates within part of the Black Flag Pastoral Lease (the study area) over 2022, 2023 and 2024. The purpose of the work was to identify further survey requirements for potential future developments, and to support the submission of necessary regulatory approvals.

A search of relevant databases combined with information from reports of other surveys in the vicinity of the study area was used to determine the significant fauna potentially occurring in the study area. The identified fauna assemblage included 318 vertebrate species; 30 of which are listed as conservation significant. Of these, 3 had previously been recorded within the study area (Malleefowl *Leipoa ocellata*, VU; Chuditch *Dasyurus geoffroii* (tentative ID), VU; Southern Whiteface *Aphelocephala leucopsis,* VU).

Field surveys were undertaken from 12 – 16 September 2022, 21 – 27 November 2023 and 11 – 14 June 2024. Field methods for the fauna survey included habitat assessment and mapping, active searches, bat echolocation recordings, camera trapping for Chuditch, Malleefowl habitat assessment, targeted Malleefowl surveys, SRE invertebrate sampling and avifauna surveys conducted in line with Wind Farms and Birds: Interim Standards for Risk Assessment (Brett Lane and Associates 2005). A total of 56 sites were assessed for terrestrial fauna within the study area.

'Open woodland' and 'Shrubland' were identified as the dominant habitat types, constituting 69.9% of the area. The study recorded 77 vertebrate species, including Malleefowl, which was recorded from mounds, as well as calling and tracks.

Chuditch was not recorded during the surveys. While evidence may suggest sporadic presence, suitable refuge for a resident population is limited. Fork-tailed Swifts (*Apus pacificus*; Mig.), Peregrine Falcons (*Falco peregrinus*; OS), Central Long-eared Bat (*Nyctophilus major* subsp. *tor*, P3) and Western Rosellas (inland ssp.; *Platycercus icterotis* subsp. *xanthogenys*; P4) are likely to occur, with the latter dependent on vegetation condition and suitable tree hollows.

Introduced mammals, such as cats, foxes, rabbits, and dingoes, were present at low density, expected due to the proximity to Kalgoorlie-Boulder.

The invertebrate fauna desktop review identified 3 Confirmed and 12 Potential SRE taxa that had previously been recorded within the study area. The field surveys recorded 22 SRE taxa of which none were Confirmed, 11 were Potential, 7 were Uncertain and 4 were Widespread. Notably, new SRE taxa were discovered, however, it is unlikely these species are restricted to the study area. All SRE taxa recorded during the survey occur in habitat that is either extensive within the study are and region, or habitats that are limited within the study area but are connected to similar habitat outside the study area.

CONTENTS

Executive summary ii
Contents iii
1 Introduction 6
1.1 Background 6
1.2 Scope of work 6
1.3 Study area 7
2 Legislative context 9
2.1 Commonwealth 9
2.1.1 Matters of National Environmental Significance 9
2.1.2 Significant Impact Guidelines, Conservation Advice and Recovery Plans 10
2.2 State 11
2.2.1 Threatened and Priority species 11
2.2.2 Critical habitat 11
2.2.3 Other significant fauna 11
2.2.4 Short-range endemic invertebrates 12
3 Existing environment 13
3.1 Interim Biogeographic Regionalisation of Australia 13
3.2 Land systems and surface geology 13
3.3 Climate and weather 19
3.4 Land use 21
3.5 Conservation reserves and ESAs 21
4 Methods 22
4.1 Desktop review 22
4.2 Field survey 24
4.2.1 Survey timing 24
4.2.2 Habitat assessment and mapping 24
4.2.3 Active searches 27
4.2.4 Avifauna surveys 27
4.2.5 Ultrasonic bat recordings 27
4.2.6 Camera trapping for Chuditch 27
4.2.7 Targeted Malleefowl survey and habitat assessment 28
4.2.8 SRE invertebrate sampling 28
4.2.9 SRE potential habitat rating 29
4.2.10 SRE status rating 29
4.2.11 SRE taxonomy 29
4.2.12 Likelihood of occurrence assessment 30
4.3 Survey personnel 31
5 Results 33
5.1 Desktop review 33
5.1.1 Vertebrate fauna 33
5.1.2 SRE and significant invertebrate fauna 39
5.2 Field survey 47
5.2.1 Vertebrate fauna 47
5.2.2 SRE and significant invertebrate fauna 58
5.3 Survey limitations 66
6 Discussion 67
6.1 Vertebrate fauna 67
6.1.1 Vertebrate fauna habitats 67
6.1.2 Vertebrate fauna assemblage 68

6.2 SRE and significant invertebrate fauna 69
6.2.1 Invertebrate habitats 69
6.2.2 Invertebrate assemblage 69
6.3 Conclusion 71
References 73

LIST OF FIGURES

Figure 1-1 Project location and study area 8
Figure 3-1 Study area in relation to IBRA bioregions and subregions 16
Figure 3-2 Land systems in the study area 17
Figure 3-3 Surface geology in the study area 18
Figure 3-4 Annual climate and weather data for Kalgoorlie-Boulder Airport (no. 012038) and mean monthly data for the 12 months preceding the 2022 survey (BoM 2022) 20
Figure 3-5 Annual climate and weather data for Kalgoorlie-Boulder Airport (no. 012038) and mean monthly data for the 12 months preceding the 2023 survey (BoM 2024) 20
Figure 3-6 Annual climate and weather data for Kalgoorlie-Boulder Airport (no. 012038) and mean monthly data for the 12 months preceding the 2024 survey (BoM 2024) 21
Figure 4-1 Terrestrial fauna survey sites 32
Figure 5-1 Desktop records of significant vertebrate fauna 38
Figure 5-2 Desktop records of SRE invertebrates 46
Figure 5-3 Fauna habitats and significant fauna records from the field survey 52
Figure 5-4 SRE habitats and recorded SRE taxa from the field survey 65

LIST OF TABLES

Table 3-1 Land systems and extent in study area 14
Table 3-2 Surface geology of the study area, extent by deposit type 15
Table 4-1 Database searches conducted for the desktop review 22
Table 4-2 Survey reports included in the desktop review 23
Table 4-3 Terrestrial fauna survey effort 25
Table 4-4 SRE categories 29
Table 4-5 Specialist taxonomists 30
Table 4-6 Survey personnel 31
Table 5-1 Summary of terrestrial fauna desktop results 33
Table 5-2 Significant vertebrate fauna identified in the desktop review 34
Table 5-3 SRE and Threatened and Priority taxa identified in the desktop review. 40
Table 5-4 Extent and description of each fauna habitat in the study area 48
Table 5-5 Number of vertebrate species recorded during the surveys in comparison to desktop results, by group 53
Table 5-6 Likelihood of occurrence for significant vertebrate fauna identified in the desktop review 54
Table 5-7 Extent and description of each SRE habitat in the study area 58
Table 5-8 Specimens from SRE group recorded in the field survey - rows highlighted grey represent previously unknown taxa 61
Table 5-9 Potential survey limitations 66

LIST OF APPENDICES

Appendix 1 Survey site locations
Appendix 2 Terrestrial fauna survey site descriptions
Appendix 3 Vertebrate fauna desktop and field survey results
Appendix 4 SRE invertebrate desktop results
Appendix 5 Fauna species by site matrix

Table of Abbreviations

ABAB	Arid Bronze Azure Butterfly
BoM	Bureau of Meteorology
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
EPA	Environmental Protection Agency
EPBC	Environmental Protection and Biodiversity Conservation Act
EIA	Environmental impact assessments
IBRA	Interim Biogeographic Regionalisation of Australia
IHB	Inland Hairstreak Butterfly
IUCN	International Union for Conservation of Nature
MNES	Matters of National Environmental Significance
OS	Of special
SRE	Short-range endemic
WAM	West Australian Museum

1 INTRODUCTION

In July 2022, Phoenix Environmental Sciences Pty Ltd (Phoenix) was commissioned by Northern Star Resources Limited (Northern Star) to undertake a Basic and Targeted Terrestrial Fauna Survey for a portion of the Black Flag Pastoral Lease. In August 2023 and February 2024, Phoenix was commissioned to survey additional areas of the Black Flag Pastoral Lease (Figure 1-1).

The survey areas lie on the border of the Eastern Goldfields subregion of the Coolgardie bioregion and the Eastern Murchison subregion of the Murchison bioregion, and is located in both the Eremaean and South-West Interzone Climatic Regions, as defined by the EPA (2020).

This survey was part of several regional assessments across defined areas of Northern Star's Black Flag Pastoral Lease. The purpose of the survey was to to support the submission of regulatory approvals.

1.1 BACKGROUND

The study area is located within the known range of several conservation significant species, including the following:

- Malleefowl (*Leipoa ocellata*, VU)
    - Malleefowl have previously been recorded within the study area and throughout the surrounding landscape (Phoenix 2024a). Aerial imagery and land system descriptions indicate that the study area includes suitable Malleefowl habitat.
- Chuditch (*Dasyurus geoffroii,* VU)
    - An tentative record of Chuditch is known from the study area (Phoenix 2024a), with the next closest record known from Kambalda, approximately 50 km south. The study area covers woodland that likely represents suitable habitat for Chuditch.
- Arid Bronze Azure Butterfly (ABAB*; Ogyris petrina*, CR) and Inland Hairstreak Butterfly (IHB, *Jalmenus aridus*, P1), both of which are reported on separately by Phoenix (2022c).

The study area may also include suitable habitat for conservation significant birds such as the Peregrine Falcon (*Falco peregrinus;* OS) and Western Rosella (inland species) (*Platycercus icterotis* subsp. *xanthogenys*; P4), which are known from the area.

Additionally, a number of short-range endemic invertebrate (SRE) taxa are known from the study area and surrounds. This includes *Missulena harewoodi*, a Confirmed SRE taxa, which was recorded in the study area in 2021 (Phoenix 2024a).

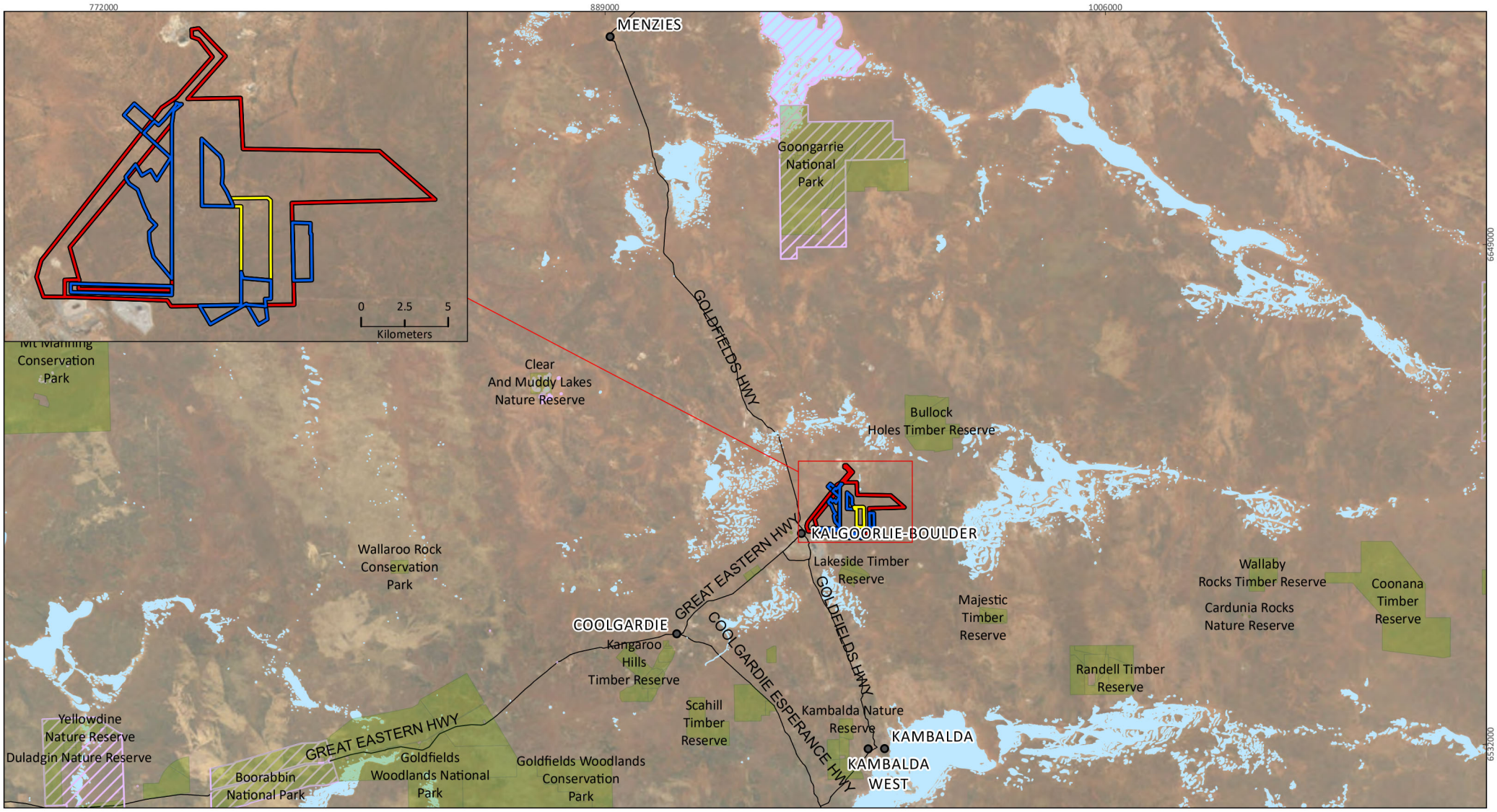
1.2 SCOPE OF WORK

The scope of work for the survey was as follows:

- desktop study (vertebrates and SREs) – to gather contextual information on the study area
- basic vertebrate and invertebrate fauna survey (including avifauna) – to collect broad fauna and habitat information on the study area, including
    - habitat assessment and mapping
    - opportunistic and low intensity fauna sampling
    - determine requirement for further surveys
- targeted significant vertebrate fauna survey – to collect detailed information on Malleefowl and Chuditch, comprising:
    - targeted Malleefowl survey (reported on separately by Phoenix (2025))
    - motion sensitive camera trapping for Chuditch.

1.3 STUDY AREA

The 2022 study area is 11,413 ha and comprises linear corridors along existing roadways, a large project area, and a corridor which links the Kanowna Belle Gold Mine to Kalgoorlie. The 2023 study area is 2,759 ha comprised of additional areas infilling gaps between the 2022 study area and extending particular areas north-west, south and south-east. The 2024 study area is 814 hectares. Due to overlap between the 2022,2023 and 2024 study areas, the combined study areas cover a total of 13,185 ha (Figure 1-1).





Northern Star Resources Limited
Black Flag - Kalgoorlie Operations

Project No	1649
Date	8/07/2024
Drawn by	BK
Map author	BT

0 25 50
Kilometers

1:1,199,130 (at A4) GDA 1994 MGA Zone 51

All information within this map is current as of 8/07/2024. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.

P:\Data\Projects\Kalgoorlie Operations\1649-KO-NSR-FAU\GIS\Mapping\MapDocuments\1625_maps.aprx

- 2022 study area
- 2023 study area
- 2024 study area
- DBCA managed land
- Lakes
- Environmentally Sensitive Areas
- Roads

Figure 1-1

Project location and study area

PHOENIX ENVIRONMENTAL SCIENCES

2 LEGISLATIVE CONTEXT

The protection of fauna in WA is principally governed by 3 acts:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- State *Biodiversity Conservation Act 2016* (BC Act)
- State *Environmental Protection Act 1986* (EP Act).

The BC Act came into full effect on 1 January 2019 and replaced the functions of the *Wildlife Conservation Act 1950* (WC Act).

2.1 COMMONWEALTH

2.1.1 Matters of National Environmental Significance

The EPBC Act is administered by the Federal Department of Climate Change, Energy, the Environment and Water (DCCEEW). The EPBC Act provides for the listing of Threatened fauna as Matters of National Environmental Significance (MNES). Under the EPBC Act, actions that have, or are likely to have, a significant impact on a MNES, require approval from the Australian Government Minister for the Environment through a formal referral process.

Conservation categories applicable to Threatened fauna species under the EPBC Act are as follows:

- Extinct (EX)[1] – there is no reasonable doubt that the last individual has died
- Extinct in the Wild (EW) – taxa known to survive only in captivity
- Critically Endangered (CR) – taxa facing an extremely high risk of extinction in the wild in the immediate future
- Endangered (EN) – taxa facing a very high risk of extinction in the wild in the near future
- Vulnerable (VU) – taxa facing a high risk of extinction in the wild in the medium-term
- Conservation Dependent (CD) – taxa whose survival depends upon ongoing conservation measures; without these measures, a conservation dependent taxon would be classified as VU, EN or CR.

The MNES significant impact guidelines state that an action is likely to have a significant impact if there is a real chance or possibility that it will adversely affect 'habitat critical to the survival of a species', which refers to areas that are necessary (DoE 2013):

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

Key threats and habitat critical to the survival of EPBC Act Threatened species are usually defined in the conservation advice and/or recovery plan for the species (see section 2.1.2). Habitat critical to the survival of a species may also be listed on the Register of Critical Habitat maintained by the minister under the EPBC Act.

[1] Species listed as Extinct and Conservation Dependent are not matters of NES and therefore do not trigger the EPBC Act.

The EPBC Act is also the enabling legislation for the protection of Migratory species as MNES under several international agreements:

- Japan-Australia Migratory Bird Agreement
- China-Australia Migratory Bird Agreement
- Convention on the Conservation of Migratory Species of Wild Animals
- Republic of Korea-Australia Migratory Bird Agreement.

2.1.2 Significant Impact Guidelines, Conservation Advice and Recovery Plans

Conservation advice and recovery plans for MNES identify overall conservation objectives, critical habitat, important populations, key threats and priority management actions and are relevant to defining habitat values within the study area. Guidance and policy documents relevant to MNES and this Project include:

- Chuditch (*Dasyurus geoffroii*) National Recovery Plan (DEC 2012)
- Conservation Advice. *Falco hypoleucos,* Grey Falcon (TSSC 2020)
- Draft Referral guideline for 14 birds listed as Migratory species under the EPBC Act (DoE 2015)
- Guideline for the Survey of ABAB in WA (DBCA 2020)
- Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed Migratory shorebird species (DoEE 2017)
- MNES: Significant impact guidelines 1.1 (DoE 2013)
- National Malleefowl Monitoring Manual (NMRT 2022)
- National Recovery Plan for Malleefowl *Leipoa ocellata* (Benshemesh 2007)
- Survey guidelines for Australia's threatened bats (DEWHA 2010)
- Survey guidelines for Australia's threatened mammals (DSEWPaC 2011)
- The action plan for Australian bats (Duncan *et al.* 1999)
- The action plan for Australian birds (Garnett & Baker 2020)
- The action plan for Australian mammals (Woinarski *et al.* 2014)
- The action plan for Australian reptiles (Cogger *et al.* 1993)
- Wildlife conservation plan for Migratory shorebirds (Department of the Environment 2015).

2.2 STATE

2.2.1 Threatened and Priority species

In WA, the BC Act provides for the listing of Threatened fauna species (Government of Western Australia 2018a, b)[2] in the following categories:

- Critically Endangered (CR) – species facing an extremely high risk of extinction in the wild in the immediate future[3]
- Endangered (EN) – species facing a very high risk of extinction in the wild in the near future[3]
- Vulnerable (VU) – species facing a high risk of extinction in the wild in the medium-term future[3].

Species may also be listed as specially protected under the BC Act in one or more of the following categories:

- species of special conservation interest (conservation dependent fauna, CD) – species with a naturally low population, restricted natural range, of special interest to science, or subject to or recovering from a significant population decline or reduction in natural range
- Migratory species (Mig.), including birds subject to international agreement
- species otherwise in need of special protection (OS).

The Department of Biodiversity, Conservation and Attractions (DBCA) administers the BC Act and also maintains a non-statutory list of Priority fauna. Priority species are still considered to be of conservation significance – that is they may be Threatened – but cannot be considered for listing under the BC Act until there is adequate understanding of threat levels imposed on them. Species on the Priority fauna lists are assigned to one of 4 Priority (P) categories, P1 (highest) – P4 (lowest), based on level of knowledge/concern.

2.2.2 Critical habitat

Under the BC Act, habitat is eligible for listing as critical habitat if it is critical to the survival of a Threatened species or a TEC and its listing is otherwise in accordance with the ministerial guidelines.

2.2.3 Other significant fauna

Under the EPA's environmental factor guidelines, fauna may be considered significant for a range of reasons other than listing as a Threatened or Priority species.

In addition to listing as Threatened or Priority, EPA (2016a) identifies the following attributes that constitute significant fauna:

- species with restricted distribution (see also section 2.2.4)
- species subject to a degree of historical impact from threatening processes
- providing an important function required to maintain the ecological integrity of a significant ecosystem.

[2] 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 BC Act.

[3] As determined in accordance with criteria set out in the ministerial guidelines.

2.2.4 Short-range endemic invertebrates

SRE fauna are defined as animals that display restricted geographic distributions, nominally less than 10,000 km^2, that may also be disjunct and highly localised (Harvey 2002). EPA (2016a) identifies species with restricted distributions as being significant fauna in the context of environmental impact assessments (EIA). SRE fauna need to be considered in EIA as localised, small populations of species that are generally at greater risk of changes in conservation status due to environmental change than other, more widely distributed taxa.

Short-range endemism in terrestrial invertebrates is believed to have evolved through 2 primary processes (Harvey 2002):

- Relictual – where the drying climate reduced the area of suitable habitat available to a species, forcing a range contraction. Such habitats typically maintain historic mesic conditions (e.g. south-facing rock faces or slopes of mountains or gullies).
- Habitat speciality – where species settled in particular isolated habitat types (e.g. rocky outcrops) by means of dispersal and evolved in isolation into distinct species.

SRE invertebrates have however also been reported in more widespread habitats such as spinifex plains or woodlands, mainly in groups with low dispersal capabilities, for example mygalomorph spiders and millipedes (see for example Car & Harvey 2014; Rix *et al.* 2018).

There can be uncertainty in categorising a specimen as an SRE due to several factors including poor regional survey density, lack of taxonomic research and problems of identification, i.e. specimens that may represent SREs cannot be identified to species level based on the life stage. For example, in contrast to mature males, juvenile and female millipedes, mygalomorph spiders and scorpions cannot be identified to species level. Molecular techniques such as 'barcoding' (Hebert *et al.* 2003a; Hebert *et al.* 2003b) are routinely employed to overcome taxonomic or identification problems.

3 EXISTING ENVIRONMENT

3.1 INTERIM BIOGEOGRAPHIC REGIONALISATION OF AUSTRALIA

The Interim Biogeographic Regionalisation of Australia (IBRA) classifies Australia's landscapes into large 'bioregions' and 'subregions' based on climate, geology, landform, native vegetation and species information (DoEE 2016). The study area lies on the border of the East Murchison subregion (MUR1) of the Murchison bioregion, and the Eastern Goldfield subregion (COO3) of the Coolgardie bioregion (Figure 3-1).

The East Murchison subregion is characterised by (Cowan 2001b):

> "*The northern parts of the 'Southern Cross' and 'Eastern Goldfields' Terrains of the Yilgarn Craton. characterised by its internal drainage, and extensive areas of elevated red desert sandplains with minimal dune development. Salt lake systems associated with the occluded Paleodrainage system. Broad plains of red-brown soils and breakaway complexes as well as red sandplains. Vegetation is dominated by Mulga Woodlands often rich in ephemerals; hummock grasslands, saltbush shrublands and Halosarcia shrublands. Arid climate, with mainly winter rainfall (200 mm). The subregional area for MUR1 is 7, 847, 996 ha.*"

The Eastern Goldfields subregion is characterised by (Cowan 2001a):

> "*Coolgardie 3 lies on the Yilgarn Craton's 'Eastern Goldfields Terrains'. The relief is subdued and comprises of gently undulating plains interrupted in the west with low hills and ridges of Archaean greenstones and in the east by a horst of Proterozoic basic granulite. The underlying geology is of gneisses and granites eroded into a flat plane covered with tertiary soils and with scattered exposures of bedrock. Calcareous earths are the dominant soil group and cover much of the plains and greenstone areas. A series of large playa lakes in the western half are the remnants of an ancient major drainage line. The vegetation is of mallees, Acacia thickets and shrubheaths on sandplains. Diverse Eucalyptus woodlands occur around salt lakes, on ranges, and in valleys. Salt lake support dwarf shrublands of samphire. Woodlands and Dodonaea shrubland occur on basic graninulites of the Fraser Range. The area is rich in endemic Acacias. The climate is arid to semi-arid with 200-300 mm of rainfall, sometimes in summer but usually in winter. The subregional area is 5, 102, 428 ha.*"

3.2 LAND SYSTEMS AND SURFACE GEOLOGY

DPIRD undertakes land system mapping for WA using a nesting soil-landscape mapping hierarchy (Schoknecht & Payne 2011). While the primary purpose of the mapping is to inform pastoral and agricultural land capability, it is also useful for informing biological assessments. Under this hierarchy, land systems are defined as areas with recurring patterns of landforms, soils, vegetation and drainage (Payne & Leighton 2004).

The study area intersects 9 land systems (Table 3-1; Figure 3-2). The most extensive of these is the Gumland System, followed by the Mx43 system, which each represent approximately one third of the study area.

Table 3-1 Land systems and extent in study area

Land system	Description	Area (ha)	% of study area
Gumland System	Extensive pedeplains supporting eucalypt woodlands with halophytic and non-halophytic shrub understoreys.	4,460	33.8
Mx43	Gently undulating valley plains and pediments; some outcrop of basic rock.	4,213	32.0
Graves System	Basalt and greenstone rises and low hills supporting eucalypt woodlands with prominent saltbush and bluebush understoreys.	1,824	13.8
Zed System	Low hills, rises and gently undulating stony plains based on metasedimentary rocks supporting Acacia shrublands.	1,355	10.3
Moriarty System	Low greenstone rises and stony plains supporting chenopod shrublands with patchy eucalypt overstoreys.	763	5.8
Bunyip System	Gilgaied drainage tract, draining greenstone hills supporting mixed halophytic shrublands occasionally with a black oak overstorey.	242	1.8
Helag System	Hardpan plains and central drainage tracts with mulga shrublands and minor chenopod shrublands.	222	1.7
BB5	Rocky ranges and hills of greenstones-basic igneous rocks.	94	0.7
Kanowna System	Level to gently inclined pedeplains, gently undulating stony plains and prominent drainage foci supporting eucalypt woodlands with saltbush low shrubs.	12	0.1
	Total	**13,185**	**100**

According to the Surface Geology of Australia 1:1,000,000 scale, WA database (Stewart *et al.* 2008), the study area intersects 8 geological formations (Table 3-2; Figure 3-3). Colluvium 38491 and sedimentary rocks 74322 are the most extensive, each covering one third of the study area.

Table 3-2 Surface geology of the study area, extent by deposit type

Surface geology	Abbreviation	Description	Area (ha)	% of study area
sedimentary rocks 74322	Ase	Phyllitic schist, siltstone, sandstone, greywacke, pelite, conglomerate, quartzite, phyllite, shale, slate, claystone, chert, minor felsic volcanic and volcaniclastic rocks; arkose, para- and orthoamphibolites; rare banded iron formation.	4,418	34
colluvium 38491	Qrc	Colluvium, sheetwash, talus; gravel piedmonts and aprons over and around bedrock; clay-silt-sand with sheet and nodular kankar; alluvial and aeolian sand-silt-gravel in depressions and broad valleys in Canning Basin; local calcrete, reworked laterite.	4,209	32
alluvium 38485	Qa	Channel and flood plain alluvium; gravel, sand, silt, clay, locally calcreted.	1,988	15
ferruginous duricrust 38498	Czl	Pisolitic, nodular or vuggy ferruginous laterite; some lateritic soils; ferricrete; magnesite; ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan; residual ferruginous saprolite.	1,107	8
felsic volcanic and volcaniclastic rocks 74288	Afe	Quartz-feldspar (meta-) porphyry, porphyritic microgranite; rhyolite, dacite, rhyodacite, andesite; agglomerate, breccia tuff; felsic schist; felsic volcanic and volcaniclastic rocks; dacite and rhyodacite tuff; dacite porphyry.	525	4
mafic intrusive rocks 74263	Ade	Mafic intrusive rocks, medium to coarse-grained; layered mafic to ultramafic intrusions - dolerite, gabbro, olivine gabbro, peridotite, pyroxenite, leucogabbro, quartz dolerite, quartz gabbro, gabbronorite.	423	3
ultramafic and minor mafic rocks 74475	Aue	Tremolite-chlorite-talc amphibolite, metapyroxenite, pyroxenite, peridotite, serpentinite, ultramafic schists, komatiite, high-Mg basalt; also chalcedony, silica, jasper, silcrete, silica cap rock on ultramafic rocks.	382	3
undivided sedimentary and volcanic rocks 74481	Awe	Undivided sedimentary (non-volcanic) and felsic volcanic rocks.	133	1
		Total	**13,185**	**100**





Northern Star Resources Limited
Black Flag - Kalgoorlie Operations

Project No	1649
Date	8/07/2024
Drawn by	BK
Map author	BT

0 15 30
Kilometers

1:657,900 (at A4) GDA 1994 MGA Zone 51

All information within this map is current as of 8/07/2024. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.
P:\Data\Projects\Kalgoorlie Operations\1649-KO-NSR-FAU\GIS\Mapping\MapDocuments\1625_maps.aprx

2022 study area
2023 study area
2024 study area

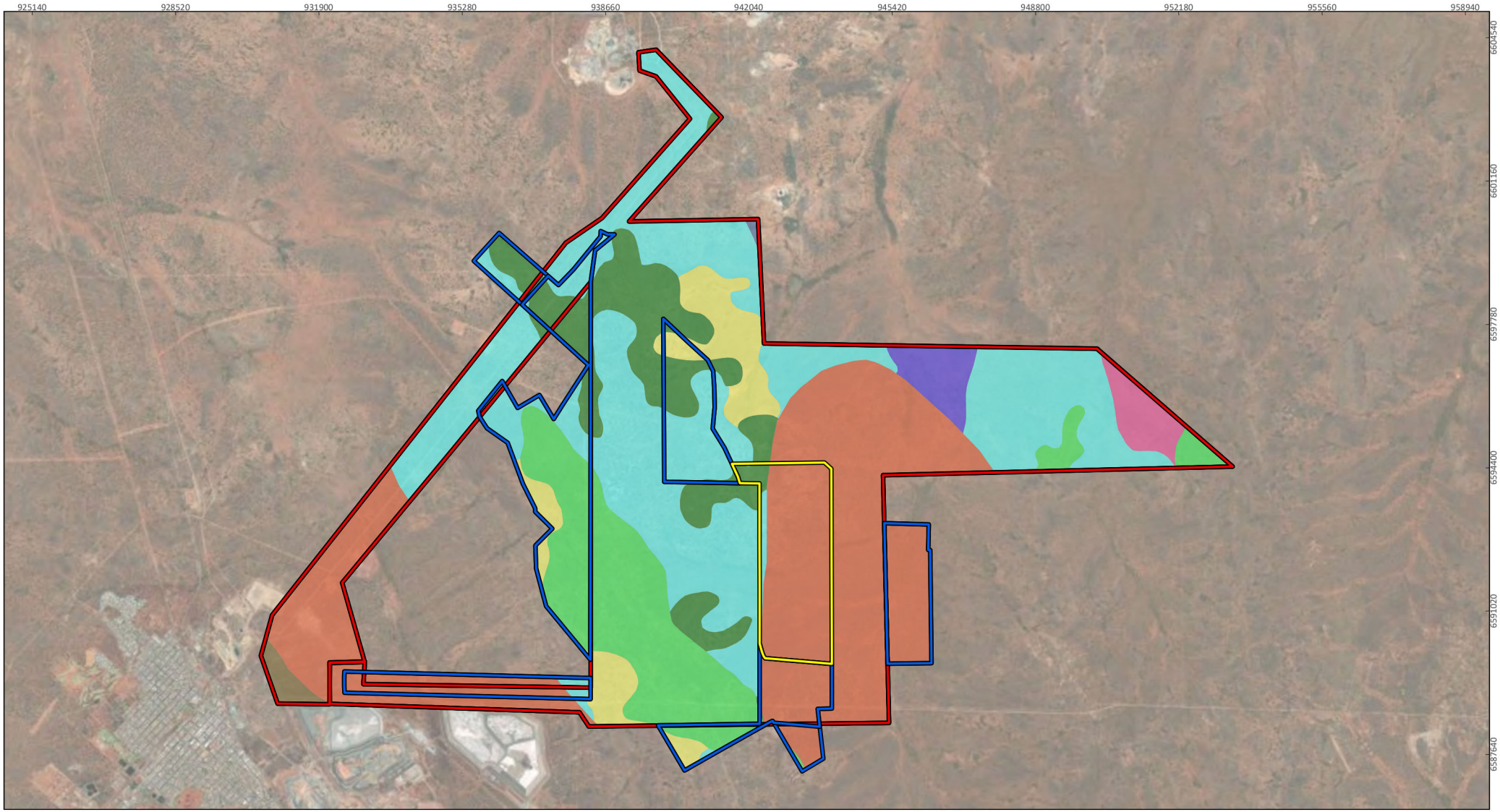
Region, subregion

Coolgardie, Eastern Goldfield
Coolgardie, Southern Cross
Murchison, Eastern Murchison

Figure 3-1

Study area in relation to IBRA bioregions and subregions

PHOENIX ENVIRONMENTAL SCIENCES





Northern Star Resources Limited
Black Flag - Kalgoorlie Operations

Project No	1649
Date	8/07/2024
Drawn by	BK
Map author	BT

0 2.5 5
Kilometers

1:121,200(at A4) GDA 1994 MGA Zone 51

All information within this map is current as of 8/07/2024. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.
P:\Data\Projects\Kalgoorlie Operations\1649-KO-NSR-FAU\GIS\Mapping\MapDocuments\1625_maps.aprx

2022 study area
2023 study area
2024 study area

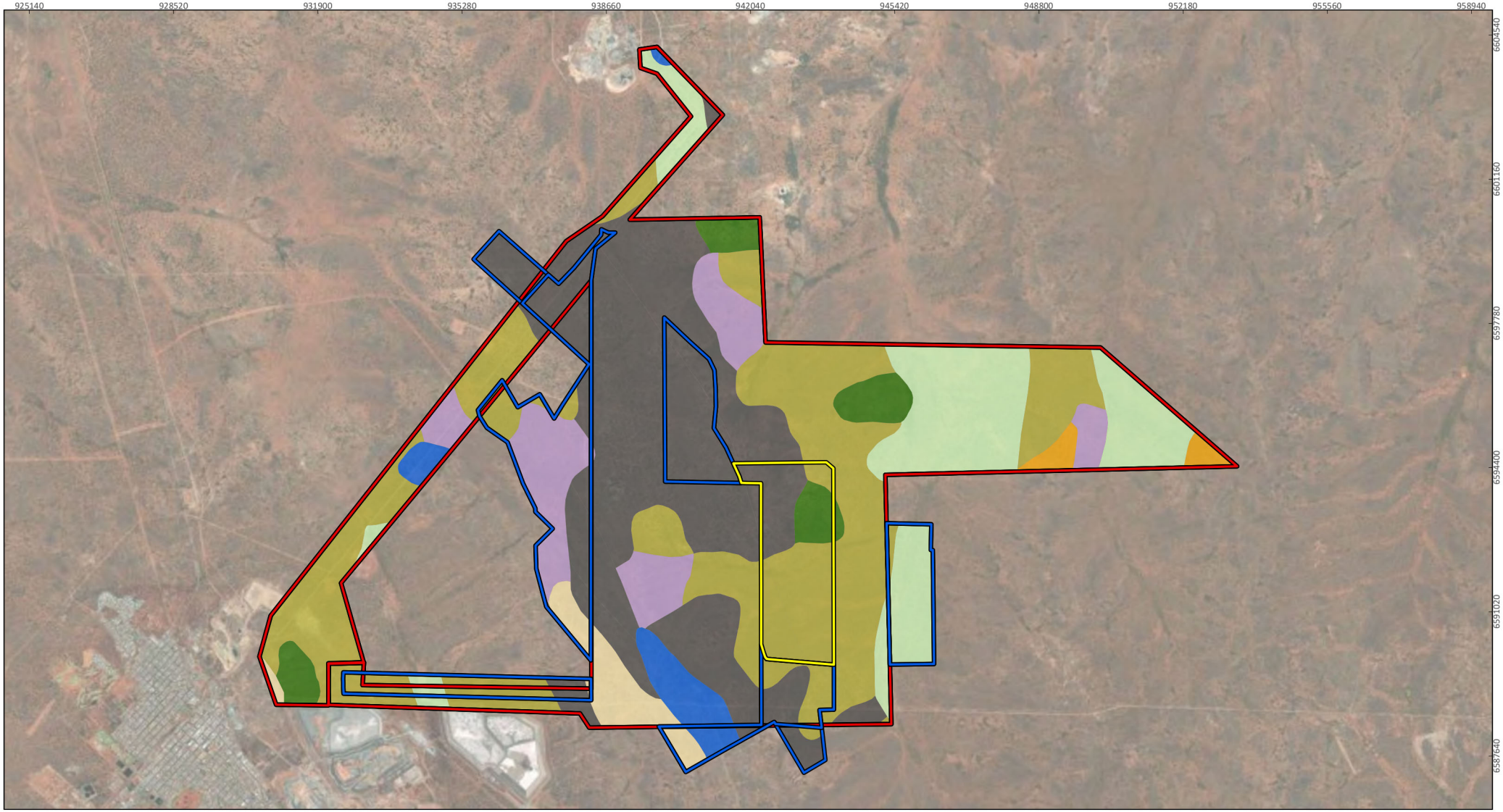
Land systems

BB5
Bunyip System
Graves System
Gumland System
Helag System
Kanowna System
Moriarty System
Mx43
Zed System

Figure 3-2

Land systems in the study area

PHOENIX ENVIRONMENTAL SCIENCES





Northern Star Resources Limited
Black Flag - Kalgoorlie Operations

Project No	1649
Date	8/07/2024
Drawn by	BK
Map author	BT

0 2.5 5
Kilometers

1:120,700(at A4) GDA 1994 MGA Zone 51

All information within this map is current as of 8/07/2024. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.
P:\Data\Projects\Kalgoorlie Operations\1649-KO-NSR-FAU\GIS\Mapping\MapDocuments\1625_maps.aprx

2022 study area
2023 study area
2024 study area

Surface geology

- alluvium 38485
- colluvium 38491
- felsic volcanic and volcaniclastic rocks 74288
- ferruginous duricrust 38498
- mafic intrusive rocks 74263
- sedimentary rocks 74322
- ultramafic and minor mafic rocks 74475
- undivided sedimentary and volcanic rocks 74481

Figure 3-3

Surface geology in the study area

PHOENIX ENVIRONMENTAL SCIENCES

3.3 CLIMATE AND WEATHER

The climate of the East Murchison subregion is described as arid with mostly winter rainfall (Cowan 2001b). The climate of the Eastern Goldfields subregion is characterised by arid to semi-arid with 200-300 mm of rainfall annually, sometimes falling in summer but usually winter (Cowan 2001a).

The nearest Bureau of Meteorology (BoM) weather station with comprehensive data collection and recent historic climate data is Kalgoorlie-Boulder Airport (no. 012038), Latitude: 30.78°S Longitude 121.45°E), located 6 km southwest of the study area.

Kalgoorlie-Boulder Airport records the highest mean maximum monthly temperature (34.9°C) in February (lowest in June, 15.9°C) and the lowest minimum mean monthly temperature (5.9°C) in June (highest in February, 18.9°C) (BoM 2022, 2024). Mean annual rainfall is 245.4 mm with July and June recording the highest monthly median (20.0, 18.8 mm respectively; Figure 3-6).

Preceding the 2022 survey, daily mean temperatures at Kalgoorlie-Boulder Airport were relatively consistent with the long-term average, with no month diverging over 2°C (Figure 3-4) (BoM 2022).

Preceding the 2023 survey, daily mean temperatures at Kalgoorlie-Boulder Airport were consistently higher than the long-term average from July to November (Figure 3-5).

Preceding the 2024 survey, daily mean temperatures at Kalgoorlie-Boulder Airport were consistently higher than the long-term averages from July to March. Daily maximum temperatures in March and April were 2.6°C and 1.6°C lower than average, while May was 3.2°C higher than the long term averages (Figure 3-6).

Records from Kalgoorlie-Boulder Airport show that rainfall in the months preceding each survey was highly variable compared to long term averages. Rainfall in the 6 months preceding the 2022 survey was significantly higher than average in April, August and September and lower than average in May, June and July. (Figure 3-4). Rainfall in the 6 months preceding the 2023 was significantly higher in June and August, and significantly lower that average in May, July, September and October, but overall was significantly lower (Figure 3-5). In the 6 months preceding the June 2024 survey, March and June recorded significantly higher rainfall and January, February, April and May recorded lower rainfall (Figure 3-6).

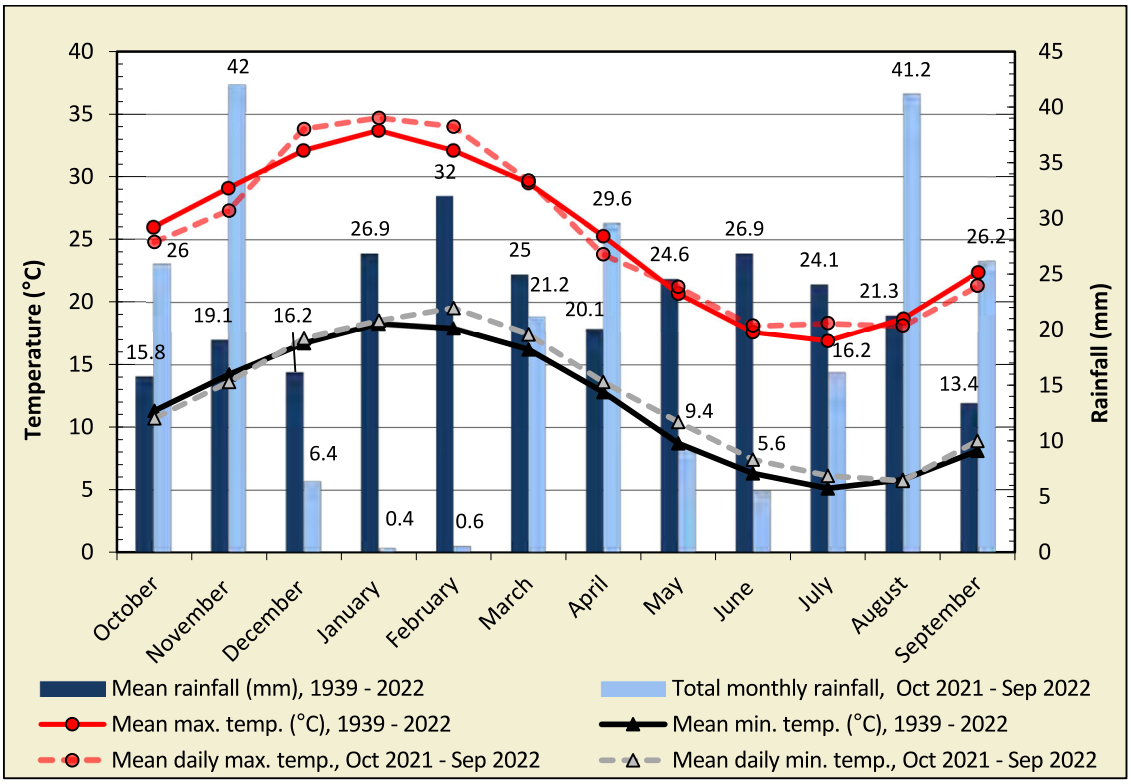


Figure 3-4 **Annual climate and weather data for Kalgoorlie-Boulder Airport (no. 012038) and mean monthly data for the 12 months preceding the 2022 survey (BoM 2022)**

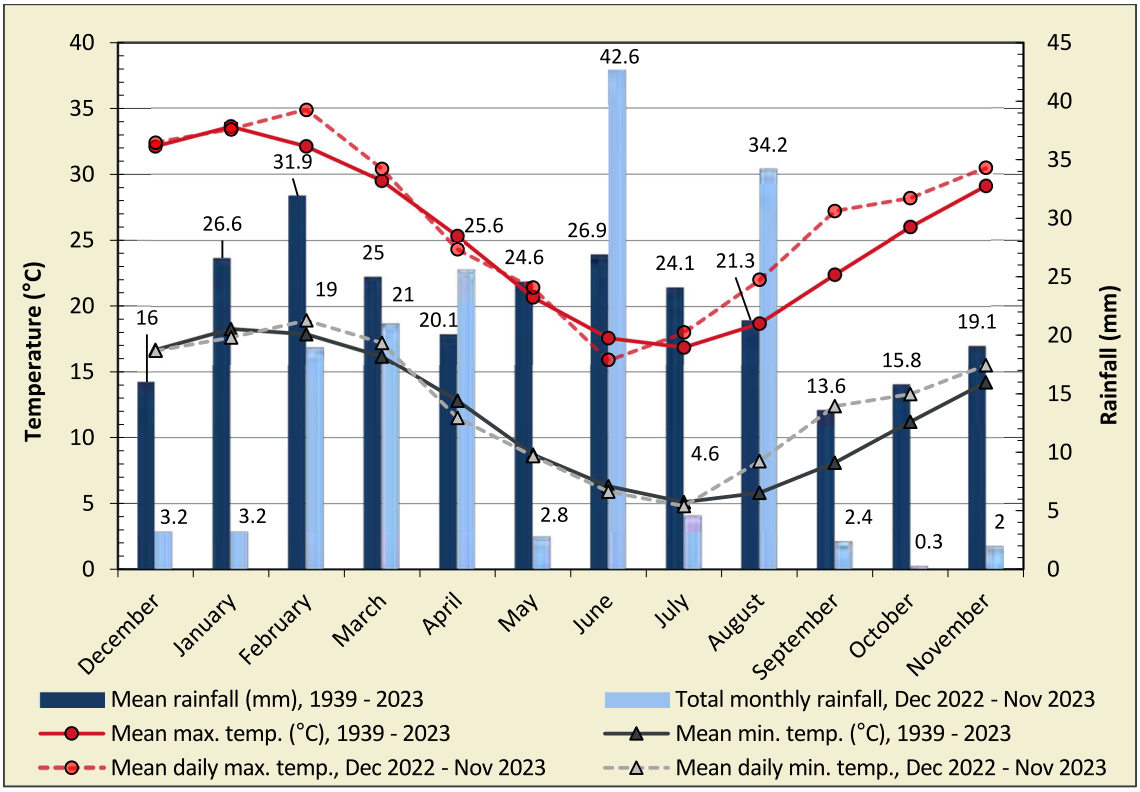


Figure 3-5 **Annual climate and weather data for Kalgoorlie-Boulder Airport (no. 012038) and mean monthly data for the 12 months preceding the 2023 survey (BoM 2024)**

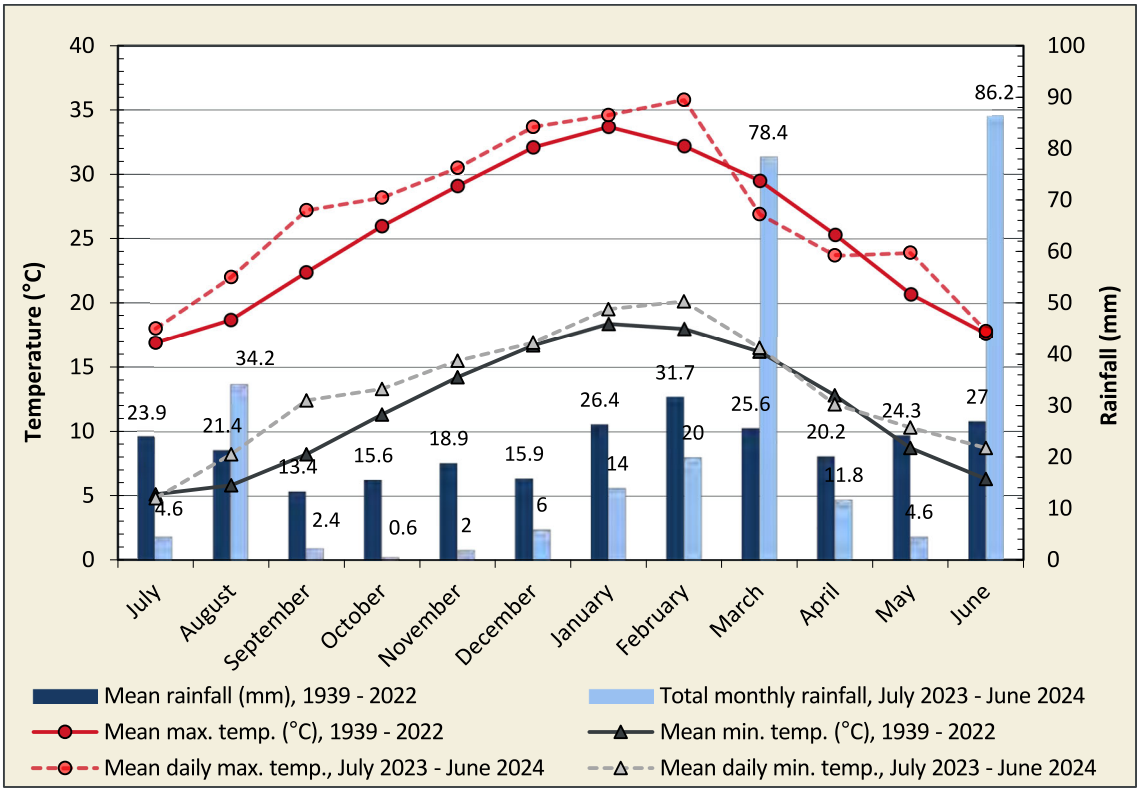


Figure 3-6 **Annual climate and weather data for Kalgoorlie-Boulder Airport (no. 012038) and mean monthly data for the 12 months preceding the 2024 survey (BoM 2024)**

3.4 LAND USE

The dominant land use within the Eastern Goldfields subregion is Unallocated Crown Land and Crown reserves. This accounts for the vast majority of the land use in the subregion with grazing on native pastures, freehold, conservation and mining making up the remainder (Cowan 2001a). The dominant land use within the Eastern Murchison subregion is grazing on native pastures, with Unallocated Crown Land, Crown reserves, mining and conservation making up the remainder (Cowan 2001b).

The dominant land use of the study area is grazing on native pastures. The study area encompasses pastoral lease N049574 and N049574.

3.5 CONSERVATION RESERVES AND ESAS

The study area does not intersect any current or proposed conservation reserves; however, Kalgoorlie Arboretum is located 3.6 km west of the study area and Lakeside Timber Reserve is located 5.3 km south of the study area. The closest Environmentally Sensitive Area is located approximately 49.8 km north of the study area (Figure 1-1).

4 METHODS

The basic and targeted terrestrial fauna survey was conducted in accordance with relevant survey guidelines and guidance, including:

- EPA Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA 2020)
- EPA Technical Guidance: Sampling of short-range endemic invertebrate fauna (EPA 2016b)
- National Malleefowl Monitoring Manual (NMRT 2022)
- Wind Farms and Birds: Interim Standards for Risk Assessment (Brett Lane and Associates 2005)
- National Wind Farm Development Guidelines (Draft) (Environment Protection and Heritage Council 2010)
- Onshore Wind Farms – interim guidance on bird and bat management (DAWE 2021a).

4.1 DESKTOP REVIEW

Searches of several biological databases were undertaken to identify and prepare lists of significant fauna that may occur within the study area (Table 4-1). In addition, biological data from previous surveys conducted within the current study area was collated to generate lists of previous vertebrate fauna and SRE records for the study area (Table 4-2).

Significant species records from technical reports and database searches were collated with previous records for the study area to develop a list of potential significant values. A literature search was conducted for accessible reports for biological surveys conducted within 40 km of the study area to build on the lists developed from the database searches (Table 4-2).

Table 4-1 Database searches conducted for the desktop review

Database	Target group/s	Search coordinates and extent
Protected Matters Search Tool (DCCEEW 2022)	EPBC Act Threatened flora, fauna and ecological communities	Approximate centre point of study area (-30.70°S, 121.60°E) with 40 km buffer
Phoenix Biological Database (Phoenix 2022d)	Fauna records and SREs	Fauna - Study area plus a 40 km buffer SREs - Study area plus a 100 km buffer
DBCA Threatened and Priority Fauna Database (DBCA 2022b)	Threatened and Priority fauna	Study area plus a 40 km buffer
DBCA NatureMap Database (DBCA 2022a)	Flora and fauna records	Study area plus a 40 km buffer
Atlas of Living Australia (ALA 2022)	Significant vertebrate fauna records	Approximate centre point of study area (-30.70°S, 121.60°E) with 40 km buffer
IBSA database, where available (IBSA 2022)	Fauna records	Approximate centre point of study area (-30.70°S, 121.60°E) with 40 km buffer
WA Museum Arachnid and Myriapod Database, Mollusca Database	Arachnid, myriapod and mollusc SREs	100 km^2 search area encompassing the study area between -30.00°S, 120.81°E (northwest corner) and -31.34°S, 122.45°E (southeast corner)

Table 4-2 Survey reports included in the desktop review

Report author	Location relative to the study area	Survey description	Project
Phoenix (2014b)	~ 60 km S	Terrestrial invertebrate fauna monitoring - 2013	St Ives Gold Mine
GHD (2015)	~16 km SE	Level 1 Vegetation, Flora and Fauna Assessment	Bulong Area
Harewood (2015)	Overlap	Fauna survey (Level 2 - Phase 1 and 2)	Proposed Tails Storage Facility Expansion
McKenzie *et al.* (1992)	Overlap	The biological survey of the Eastern Goldfields of Western Australia Part 8	Kurnalpi - Kalgoorlie study area
Phoenix (2018b)	Overlap	Flora and vegetation, and terrestrial fauna survey for proposed infrastructure within the Development Envelope	Fimiston Gold Mine Operations
Phoenix (2018c)	~0.3 km S	Flora, vegetation and terrestrial fauna survey of Croesus	Fimiston Gold Mine Operations
Phoenix (2018d)	~9.9 km NW	Flora, vegetation and terrestrial fauna survey	Crossroads tenements (M24/462, L24/197)
Phoenix (2018e)	~4 km S	Flora, vegetation and terrestrial fauna survey of the Southern Cutback	Fimiston Gold Mine Operations
Phoenix (2018f)	~52.6 km S	Terrestrial fauna survey for the St Ives Gold Mine	Beyond 2018 Project
Phoenix (2019a)	~25 km W	Fauna survey	Mungari Gold Operations Cutters Ridge Project
Phoenix (2019b)	~25.4 km S	Regional flora and fauna survey	St Ives Gold Mine
Phoenix (2019d)	Overlap	Targeted flora and SRE invertebrate survey	FIM IIE Project
Phoenix (2020)	~35.6 km S	Regional flora and fauna survey	St Ives Gold Mine
Phoenix (2019c)	~11.2 km NW	Regional flora, vegetation and terrestrial fauna survey	Gidji Operations
Phoenix (2024a)	Overlap	Basic fauna and SRE survey and targeted SRE survey	Fimiston Gold Mine Operations
Phoenix (2022e)	~0.3 km W	Terrestrial fauna survey of proposed Regional Courtyard	Kalgoorlie Operations
Phoenix (2023a)	Overlap	Basic and Targeted Terrestrial Fauna Survey for the Kalgoorlie Operations	Kalgoorlie Operations
Phoenix (2023b)	Overlap	Birding Memo for Kalgoorlie Operations	Kalgoorlie Operations
Phoenix (2022c)	Overlap	*Camponotus* Memo for Kalgoorlie Operations	Kalgoorlie Operations

4.2 FIELD SURVEY

Field methods for the fauna survey of the Project included:

- habitat assessment and mapping (4.2.2)
- active searches (4.2.3)
- avifauna surveys (4.2.4)
- bat echolocation recordings (4.2.5)
- camera trapping for Chuditch (4.2.6)
- targeted Malleefowl survey and habitat assessment (Phoenix 2025)
- SRE invertebrate sampling (4.2.8).

A total of 32 sites were sampled in 2022 (KO sites), 18 sites were sampled in 2023 (BF sites), and 9 sites were assessed for habitat features in 2023 (Figure 4-1; Appendix 1).

4.2.1 Survey timing

Field surveys were conducted on the following dates:

- 12 – 16 September 2022
- 21 – 27 November 2023
- 11 – 13 June 2024.

4.2.2 Habitat assessment and mapping

Initial habitat characterisation was undertaken using various remote geographical tools, including aerial photography (Google Earth®), land system maps and topographic maps. Habitats with the potential to support significant terrestrial fauna species were identified based on known habitats of such species within the Coolgardie bioregion. Tentative sites were selected for the terrestrial fauna survey to represent all habitat types. Final survey site selection was conducted after ground-truthing of site characteristics.

At the broadest scale, site selection considered aspect, topography and land systems. At the finer scale, consideration was given to proximity to water bodies (drainage lines and creek), vegetation complexes and condition and soil type. Sites were primarily chosen to represent the best example of distinct habitats within the broader habitat associations of the study area with a focus on species of conservation significance identified in the desktop review. Habitat descriptions and characteristics were recorded at all basic survey sites (Figure 4-1; Table 4-3; Appendix 2).

Mapping of broad fauna habitats was undertaken based on mapped vegetation types, site-based habitat assessments and additional habitat data points collected during the field survey. Mapping of habitat for significant fauna and SRE invertebrates was derived for broad fauna habitat classifications.

Table 4-3 Terrestrial fauna survey effort

Site	Habitat assess-ment	Avifauna surveys (hrs)	Camera trap (nights)	Active searches (hrs)	Litter sieve (#)	Opportunistic sighting (#)	SRE foraging (hrs)	Ultrasonic recording (nights)
KO-001	1	0.7	12	1.1	3	2	1.1	2
KO-002	1	0.7	16	2	3		2	
KO-003	1	0.7	16	2	3		2	4
KO-004	1	1.3	12			1		2
KO-005	1	0.7		2.9	3		2.9	
KO-007	1	0.7		1.3	3		1.3	
KO-008	1	0.7		1.1	3		1.1	
KO-009	1	0.7						
KO-011	1	0.7		1.7	3		1.7	
KO-012	1	0.7						
KO-013	1	0.7						
KO-016	1	0.7						
KO-017	1	0.7						
KO-018	1	0.7						
KO-019	1			0.9	3		0.9	
KO-020	1	0.7						
KO-021	1	0.7						
KO-022	1	0.7						
KO-023	1	0.7		0.9	3		0.9	
KO-028	1					1		
KO-MF1	1	0.7		2	3		2	
KO-MF2	1					1		
KO-Opp01						1		
KO-Opp02						1		
KO-Opp03						1		
KO-Opp04						1		
BF001	1	0.7		0.7		1	0.7	
BF002	1	0.7		0.7	3	1	0.7	
BF003	1	0.7		0.7	3		0.7	
BF004	1	0.7	4	0.7			0.7	4
BF005	1	0.7		0.7	3	1	0.7	
BF007	1					1		
BF008	1					1		
BF010	1	0.7		0.7			0.7	
BF011	1	0.7	4	0.7	3		0.7	4
BF012	1	0.7		0.7	3		0.7	
BF013	1	0.7		0.7			0.7	
BF014	1					1		
BF015	1		4			1		4
BF016	1					1		

Site	Habitat assess-ment	Avifauna surveys (hrs)	Camera trap (nights)	Active searches (hrs)	Litter sieve (#)	Opportunistic sighting (#)	SRE foraging (hrs)	Ultrasonic recording (nights)
BF017	1					1		
BF018	1					1		
BFOP001						1		
BFOP002						1		
BFOP003						1		
BFOP004						1		
BFOP005						1		
BFOP006						1		
BF01	1							
BF02	1							
BF03	1							
BF04	1							
BF05	1							
BF07	1							
BF08	1							
BF_MF_ Mound	1							
Total		**20.2**	**68**	**22.2**	**45**	**25**	**22.2**	**20**

4.2.3 Active searches

Active searches were undertaken at 19 sites throughout the study area (Figure 4-1). Active searches primarily targeted diurnal herpetofauna and mammals from direct sightings and secondary evidence. Searches focused primarily on significant species identified in the desktop review as potentially occurring within the study area, including Chuditch and Malleefowl.

Searches were undertaken in any observable microhabitats considered likely to support mammals, reptiles and amphibians. Techniques included: raking leaf and bark litter, overturning logs, searching beneath the bark of trees, investigating dead trees and logs, investigating burrows, investigating infrastructure ruins or disused building materials such as tin piles and identifying any secondary evidence including tracks, diggings, scats, fur or sloughs (shed skins), predation or feeding sites, and fauna constructed structures such as nests. A minimum of 0.7 person hours were spent active searching at each site for a total of 22.2 hours over the duration of the field survey (Table 4-3).

4.2.4 Avifauna surveys

An avifauna survey was undertaken for a minimum of twenty-minutes at each basic site (Figure 4-1; Table 4-3). Avifauna surveys were confined to the habitat type represented by each site to collect assemblage data for each habitat. Fixed point counts were used, with a radius of approximately 100m for small birds and up to 800 m for large birds (e.g. birds of prey, waterbirds). Avifauna surveys were undertaken throughout the day with a focus on periods of higher activity around sunrise and sunset. Surveys consisted of bird recordings from visual sightings and call recognition. A total of 13.9 person hours of avifauna census was undertaken during the field survey at 28 sites within the study area (Table 4-3).

Avifauna surveys were conducted in line with Wind Farms and Birds: Interim Standards for Risk Assessment (Brett Lane and Associates 2005), National Wind Farm Development Guidelines (Draft) (Environment Protection and Heritage Council 2010) and Onshore Wind Farms – interim guidance on bird and bat management (DAWE 2021a). As no previous avifauna surveys have been completed for the Project, a Level 1 investigation was conducted as per Brett Lane and Associates (2005). The results of the windfarm assessment are presented in a separate report Bird and Bat risk assessment for the Black Flag Wind Farm Project (Phoenix, in prep).

4.2.5 Ultrasonic bat recordings

Song Meter SM2 ultrasonic recording devices were used to record bat echolocation calls at 6 sites during the field survey (Table 4-3; Figure 4-1). Recording devices were deployed at each site for a minimum of 2 nights of recording for between eight and 12 continuous hours per night (Table 4-3). Devices were aimed at a 45° angle to the ground. The Song Meters were positioned in areas of habitat likely to have increased insect activity and to attract bats (i.e. likely foraging areas or movement corridors) and/or potential roosting sites. At the most prospective sites for bats within the study area, and when time allowed, recorders was deployed for 4 nights, as per guidelines EPA (2020) guidelines.

4.2.6 Camera trapping for Chuditch

Motion-activated camera were deployed for 3 to 4 nights at 4 sites (Table 4-3; Figure 4-1) where evidence of Chuditch had previously been detected or areas considered potential habitat (e.g. rocky breakaways and high value foraging habitat). No other highly suitable locations for camera trapping were identified.

4.2.7 Targeted Malleefowl survey and habitat assessment

Refer to Phoenix (2025) for Malleefowl survey methods

4.2.8 SRE invertebrate sampling

Sampling for SRE invertebrates was conducted at 19 sites (Figure 4-1), in areas identified as suitable habitat for SREs. Sampling comprised the following methods:

- active foraging
- litter/soil sieving.

Active foraging for SRE invertebrate groups comprised inspection of logs, larger plant debris, the underside of bark of larger trees and the underside of rocks. Methodical searches were conducted amongst the leaf litter of shade-bearing tall shrubs and trees, including raking of litter, and spinifex bases were inspected thoroughly. Rocks and rock crevices were inspected, particularly for pseudoscorpions.

Site was sampled for a minimum 0.7-person hour (concurrently with active searches for vertebrate fauna), a total search effort of approximately 22.2 hours (Table 4-3). Trapdoor spider burrows identified during the searches were excavated if they were considered inhabited. Excavation involved removing soil from around the burrow to carefully expose the burrow chamber and remove the spider.

Combined litter/soil sifts were undertaken at 15 sites, with 3 sifts conducted at each site dependent on abundance of leaf litter. In total, 45 sifts were undertaken (Table 4-3). The collection of leaf litter samples was standardised volumetrically by the diameter and height (310 mm x 50 mm = 1.55 L) of the sieves which were completely filled with compressed litter and the upper layers of underlying soil. Samples were sieved through 3 stages of decreasing mesh size over a round tray and invertebrates were picked from the sieves and tray with forceps. These samples particularly targeted pseudoscorpions, buthid scorpions, millipedes, centipedes, molluscs and isopods.

4.2.9 SRE potential habitat rating

Fauna habitat mapping was assessed for its potential to support endemic SRE species and communities. Potential SRE habitat was rated as follows:

- High – defined/known areas of habitat that contain elements that often give rise to specialisation or dependency in invertebrate fauna, such as aspect (e.g. south-facing slopes, geological features (e.g. granite), soil types that retain water (e.g. clay, loam)). These habitats may also include habitat isolates which have the capacity to restrict dispersal.
- Low – areas of largely in-tact native vegetation that occur broadly across the landscape, are less incised and typically link more restricted habitats. This may include land that was cleared but has since been rehabilitated or is in the process of being rehabilitated.
- None – land that has been previously cleared for other uses that no longer contains native vegetation.

4.2.10 SRE status rating

Currently, there is no accepted system to determine the likelihood that a species is an SRE. The WA Museum applies 3 categories: Confirmed, Potential, and Widespread. Confirmed SREs are taxa for which the distribution is known to be less than 10,000 km^2, the taxonomy is well known, and the group is well represented in collections and/ or via comprehensive sampling (WAM 2013). Potential SREs include those taxa for which there is incomplete knowledge of the geographic distribution of the group and its taxonomy, and the group is not well represented in collections. Phoenix applies 4 categories based on the WA Museum criteria (Table 4-4).

Table 4-4 SRE categories

SRE category	Criteria
Confirmed	Distribution <10,000 km^2. Taxonomy of the group is well known (but not necessarily published); group is well represented in collections, in particular from the region in question; high levels of endemism exist in documented species; inference is often possible from immature specimens.
Potential	Distribution <10,000 km^2. Taxonomically poorly resolved group; patchy distribution, often common in certain microhabitats, but no other regional records; congeners (= species in the same genus) both Widespread and restricted in distribution.
Not SRE/Widespread	Distribution >10,000 km^2.
Uncertain	Taxonomy cannot be resolved to species level (i.e. indeterminate species designations due to sex, life stage or damage) and therefore species distribution remains uncertain).

4.2.11 SRE taxonomy

Initial higher-level (class, order, family) identifications of specimens are undertaken by Phoenix staff in Phoenix' invertebrate laboratory. Final specials designations are allocated using specialist morphological and/or molecular sequencing (Table 4-5).

Where possible identifications are compared with reference material from the WA Museum and/or taxonomist reference collections.

Table 4-5 Specialist taxonomists

Person	Title	Taxa
Anna Jacks	Principal invertebrate zoologist, Phoenix	Chilopoda, Gastropoda
Lachlan Petersen	Zoologist, Phoenix	Diplopoda
Caitlin Nagle	Senior zoologist, Phoenix	Molecular analysis
Dr Erich S. Volschenk	Taxonomic consultant, Alacran	Scorpiones, Pseudoscorpiones
Dr Simon Judd	Taxonomic consultant	Isopoda
Dr Rodney Eastwood	Taxonomic consultant	Lepidoptera (Butterflies) and ants and leafhoppers relating to the ABAB

Genomic analysis was undertaken for all specimens for which morphological identification was not achievable. All mygalomorph spider, centipede, snail and millipede specimens were sent for molecular analyses. Tissue from each specimen was obtained in Phoenix's laboratory and sequenced by Genotyping Australia Pty Ltd.

Sequences were edited and analysed using Geneious 2024 (Dotmatics 2022). Sequences for comparison were sourced from GenBank (Benson *et al.* 2012) and Phoenix's DNA database using the megablast search function in Geneious. For each sequence, the most similar 4 - 10 matches were retrieved. In cases where the retrieved sequences represented a species more than twice, then the 2 longest sequences were retained, and the shorter conspecific sequences discarded. Where megablast results yielded families differing from the morphological assessment, then additional sequences were obtained from GenBank, representing the morphological taxonomic assessment. If all of the resulting blast sequences represented organisms from a different taxonomic class, sequences were discarded as likely to have been contaminated.

Pseudoscorpion, scorpion and isopod specimens were identified morphologically by taxonomic consultants where possible (Table 4-5).

Representative SRE specimens collected during the survey were lodged with the WA Museum.

4.2.12 Likelihood of occurrence assessment

Following the field survey, the likelihood of occurrence for each significant fauna species identified in the desktop review was assessed and assigned to one of 4 ratings:

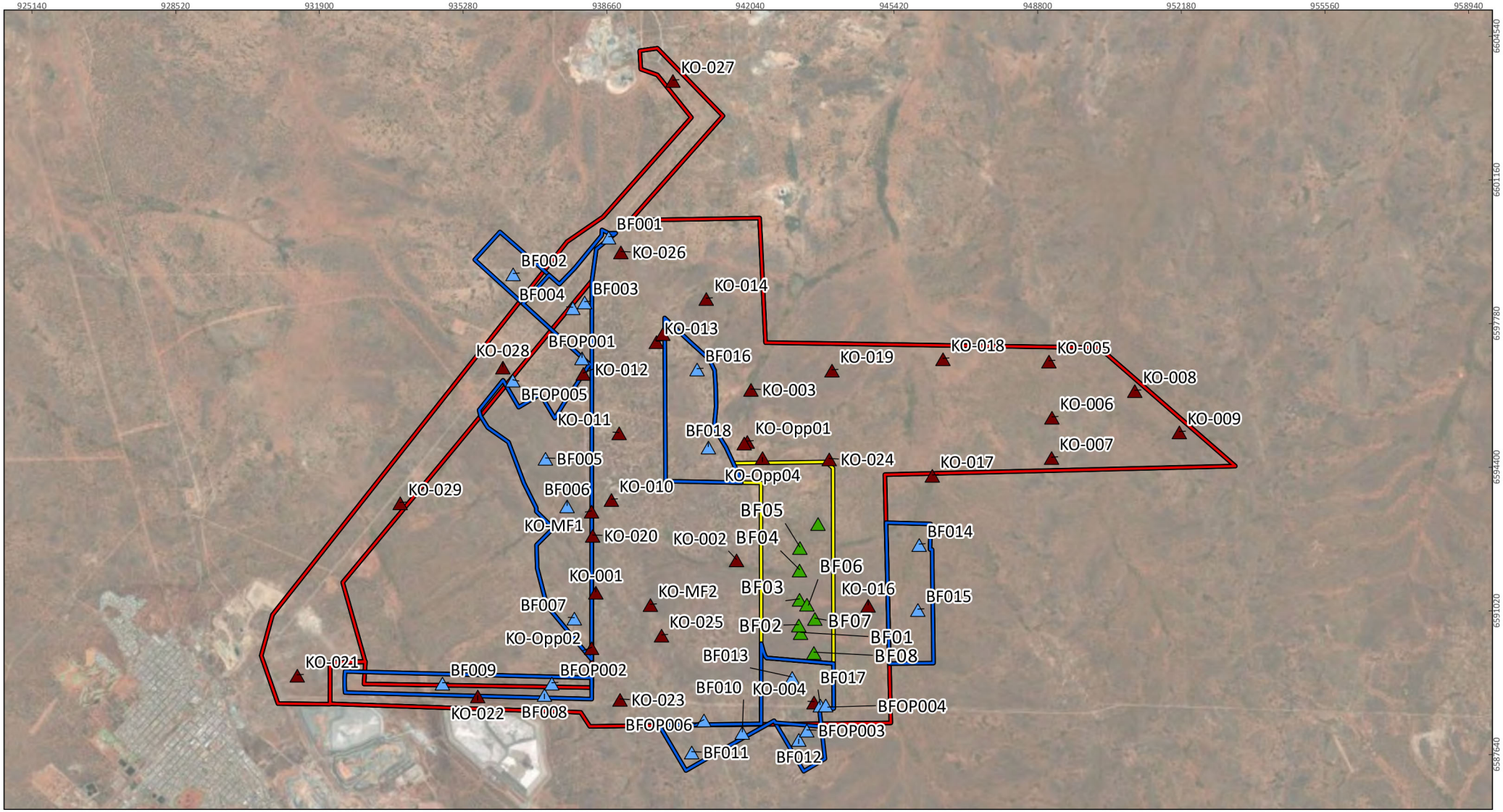
- recorded – species recorded within the study area by previous or current survey
- likely – study area within current known range of species, suitable habitat within the study area and home range of species intersects study area based on known records
- possible – study area within current known range of species, suitable habitat within the study area and home range of species does not intersect study area based on known records
- unlikely – study area outside current known range of species or no suitable habitat present in study area.

4.3 SURVEY PERSONNEL

The personnel involved in the surveys are listed in Table 4-6. All survey work was carried out under relevant licences issued by DBCA under the BC Act (Table 4-6).

Table 4-6 Survey personnel

Name	Permit	Qualifications	Role/s
Caitlin Nagle	Fauna taking (biological assessment) licence no. BA27000705 TFA no. 2223-0071	BSc (Zoology & Cons. Biology) MSc (Cons. Biology)	Project manager, field survey, genetics, reporting
Brooke Quick		BSc (Environmental Science)	Field survey, reporting, lab work & taxonomy
Kerryn Fox	Fauna taking (biological assessment) licence no. BA27000930 TFA no. 2223-0071	BSc (Cons., Wildlife & Marine Biology) MSc (Wildlife Health and Cons.)	Field survey, reporting
Rod Eastwood		Ph.D. (Environmental Science)	Field survey
Paula Strickland	Fauna taking (biological assessment) licence no. BA27001065	BSc (Cons. Bio & Zool.) MSc (Trop. Bio. & Cons.)	Field survey, report review
Anna Jacks	NA	BSc (Hons) (Environmental Science)	Lab work & taxonomy, genetics, reporting, invertebrate taxonomy
Brigitte Kovar	NA	BSc, MSc (Geospatial Intelligence)	Mapping





Northern Star Resources Limited
Black Flag - Kalgoorlie Operations

Project No	1649
Date	8/07/2024
Drawn by	BK
Map author	BT

0 2.5 5
Kilometers

1:121,154 (at A4) GDA 1994 MGA Zone 51

All information within this map is current as of 8/07/2024. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.

P:\Data\Projects\Kalgoorlie Operations\1649-KO-NSR-FAU\GIS\Mapping\MapDocuments\1625_maps.aprx

- 2022 study area
- 2023 study area
- 2024 study area
- 2022 sites
- 2023 sites
- 2024 sites

Figure 4-1

Terrestrial fauna survey sites

PHOENIX ENVIRONMENTAL SCIENCES

5 RESULTS

5.1 DESKTOP REVIEW

5.1.1 Vertebrate fauna

The desktop review identified records of 318 vertebrate taxa within the desktop search extent. The list comprised 6 frogs, 85 reptiles (including 1 introduced), 187 birds (including 3 introduced) and 40 mammals (including 6 introduced) (Table 5-1; Appendix 3).

A previous detailed survey overlapping the south-western end of the study area recorded 120 vertebrate species comprising one fish, 3 amphibians, 64 birds, 24 mammals and 28 reptiles (Harewood 2015). Although the study area for Harewood (2015) extended outside the study area for this survey, trap sites were placed in fauna habitats that occur within the study area (type 1, 2, 3; Table 5-4). One previously significant species was recorded (Rainbow Bee-eater; *Merops ornatus*), which is no longer listed. No current significant species were recorded by Harewood (2015).

Thirty conservation significant vertebrate species were identified in the desktop review, comprising 13 species listed as Threatened, Conservation Dependent or Specially Protected under the EPBC Act and/or BC Act (Table 5-2). Fourteen avifauna species are listed as Migratory under the EPBC Act and BC Act (Table 5-2). A further 6 species are listed as Priority by DBCA (Table 5-2). The presence of 5 of the conservation significant species is predicted based on habitat models (DAWE 2022) rather than observational records ('*' in Table 5-2).

Two significant vertebrate species have previously been recorded within the study area (Figure 5-1):

- Malleefowl *Leipoa ocellata* (VU), record by Phoenix (2024a) and one desktop record (DBCA TFA).
- Southern Whiteface *Aphelocephala leucopsis* (VU), three desktop records in the Atlas of Living Australia database

An unconfirmed record of Chuditch *Dasyurus geoffroii* (VU) was recorded in the study area by Phoenix (2024a).

The record of *Egernia stokesii* subsp. *badia* (EN/VU), returned as part of the DBCA TFA search is likely a transported individual.

Table 5-1 Summary of terrestrial fauna desktop results

Class	Native	Introduced	Total
Amphibians	6	0	6
Reptiles	84	1	85
Birds	184	3	187
Mammals	34	6	40
Total	**309**	**10**	**318**

Table 5-2 Significant vertebrate fauna identified in the desktop review

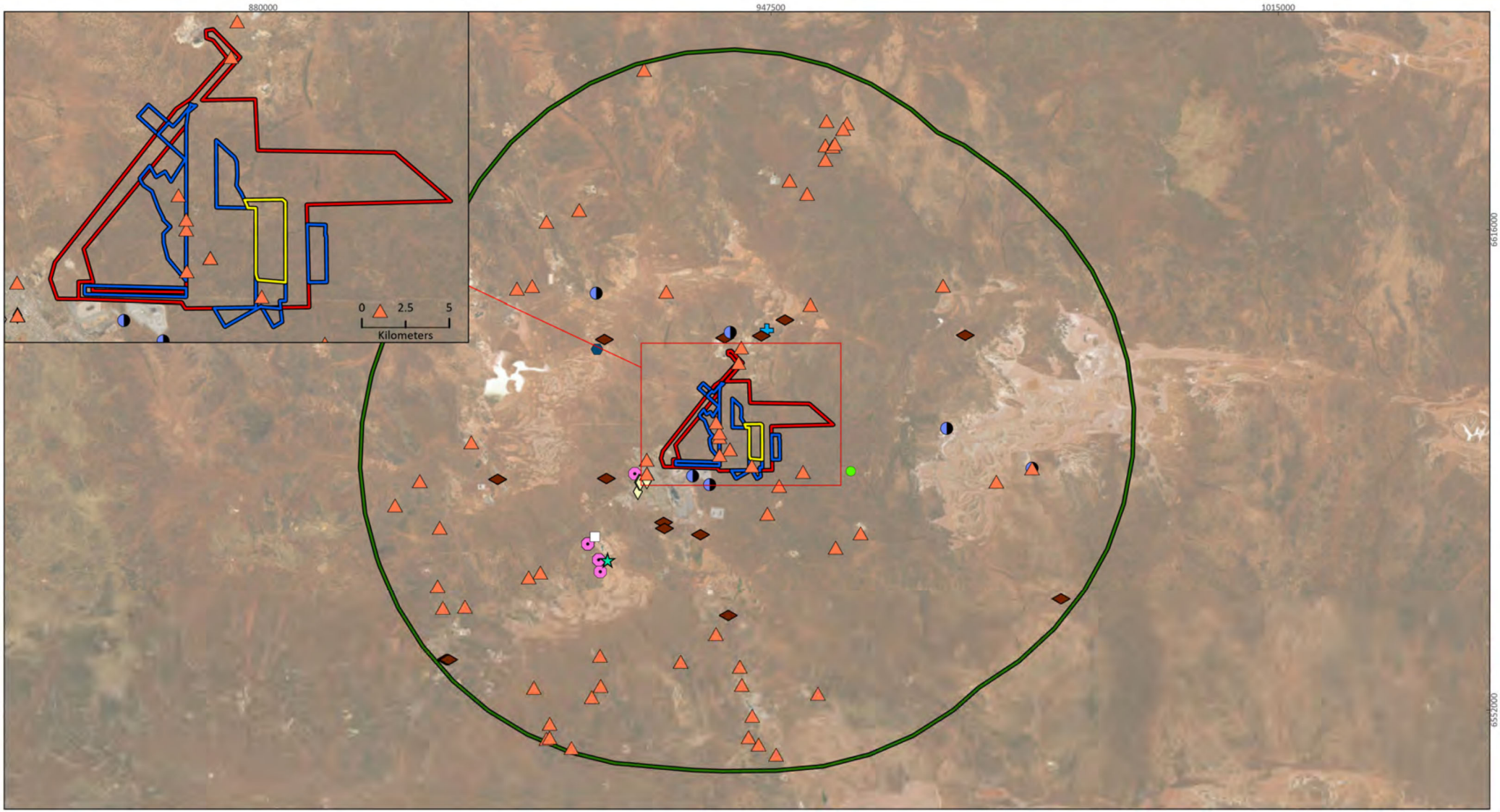
Species	Status	Proximity to study area	Habitat
Birds (25)			
Aphelocephala leucopsis Southern Whiteface	VU (EPBC Act)	Within study Area	Live in a wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. These areas are usually in habitats dominated by acacias or eucalypts on ranges, foothills and lowlands, and plains (DCCEEW 2023b).
Apus pacificus Fork-tailed Swift	Mig. (EPBC & BC Act)	*	Widespread Migratory species that does not breed in Australia, typically present from October to April. It occurs in a wide range of dry or open habitats across most of WA (DoEE 2020).
Thinornis cucullatus Hooded Plover	P4 (DBCA list)	2.4 km N	The Hooded Plover population extends from coastal New South Wales to the west coast of WA. Most of the West Australian population is found on the coast from Jurien to the east of Esperance, and a part of the population nests inland (Prószyński 2017). Nesting pairs of Hooded Plovers can be found on the shore of inland salt lakes, freshwater marshes, inlets and coastal sandy beaches.
Falco hypoleucos Grey Falcon	VU (BC Act)	*	The Grey Falcon is a widespread but rare species inhabiting much of the hot, semi-arid and arid interior of Australia. Occurs in a wide variety of arid habitats including open woodlands and open *Acacia* shrubland, hummock and tussock grasslands and low shrublands, particularly where crossed by tree-lined water courses (Schoenjahn *et al.* 2019; TSSC 2020). Range has contracted northwards in WA, now rarely occurs south of 26°S (Johnstone & Storr 1998).
Falco peregrinus Peregrine Falcon	OS (BC Act)	6.4 km S	Preferred habitat includes cliffs and wooded watercourses. Nesting occurs mainly on cliff ledges, granite outcrops, quarries and in trees with old raven or Wedge-tailed Eagle nests (Johnstone & Storr 1998).
Amytornis textilis subsp. *textilis* Western Grasswren	P4 (DBCA list)	10.85 km E	Occurs in semi-arid shrublands on coastal dunes, plains and drainage lines (DCCEEW 2023b).
Leipoa ocellata Malleefowl	VU (EPBC & BC Acts)	Within study area	Malleefowl occur mainly in scrubs and thickets of mallee (*Eucalyptus* spp.), boree (*Melaleuca lanceolata*) and bowgada (*Acacia linophylla*), and other dense litter forming shrublands including mulga shrublands (Johnstone and Storr, 2004). Nest mounds require sandy soil as well as abundant litter (Benshemesh 2007).
Motacilla cinerea Grey Wagtail	Mig. (EPBC & BC Acts)	*	A vagrant visitor to Australia that inhabits fast flowing streams and rivers (IUCN 2019).
Oxyura australis Blue-billed Duck	P4 (DBCA list)	6.4 km S	Endemic to Australia's temperate regions, inhabiting terrestrial wetlands (fresh or saline) with extensive bordering vegetation, including artificial wetland, such as sewage ponds (Birdlife International 2015); (del Hoyo *et al.* 2014).

Species	Status	Proximity to study area	Habitat
Platycercus icterotis xanthogenys Western Rosella (inland ssp.)	P4 (DBCA)	1.1 km S	The Western Rosella (inland form) is primarily found in eucalypt and casuarina woodlands, preferring Salmon Gum, Wandoo and tall mallees (Johnstone & Storr 1998). They feed on a range of fruits, seeds and marri flowers both on the ground and in trees. Salmon Gum, Gimlet, Wandoo, Marri, Flooded Gum and York Gum are preferentially used for nesting (KLA 2011).
Polytelis alexandrae Princess Parrot	P4 (DBCA list)	39.9 km SW	Typically found in sandy environments including both dunes and flats in the arid habitats in Western and central Australia. They can be found in shrublands and savanna woodlands containing dispersed Eucalypts, Acacias, Eromophilla, Grevillea, Casuarinas and Allocasuarinas (DCCEEW 2024).
Zanda latirostris Carnaby's Black Cockatoo	EN (EPBC & BC Acts)	3.4 km WSW	Occurs in uncleared or remnant native eucalypt woodlands, and in shrublands or kwongan heathlands dominated by hakea, dryandra, banksia and grevillea species (DoEE 2020; Garnett & Crowley 2000; Weerheim 2008).
Pezoporus occidentalis Night Parrot	EN/CR (EPBC Act; BC Act)	*	Night Parrot appears to favour areas of dense vegetation comprising old-growth (often > 50 years unburnt) spinifex (*Triodia* spp.) especially hummocks that are ring-forming for roosting and nesting. Such areas may also be associated with dense chenopod shrubs. It is thought that spinifex hummocks that are <40-50 cm in height are not likely to provide adequate shelter for roosting and nesting (DPaW 2017a). Foraging appears to take place in habitats containing various native grasses and herbs in addition to spinifex, and these areas may or may not contain shrubs or low trees. Favoured sites may vary with the season and local conditions, and may not necessarily occur within or adjacent to roosting areas, as they have been observed to fly up to 40 km in a night (DPaW 2017b). *Triodia* species are thought to provide a food resource while flowering and seeding. The succulent genus *Sclerolaena* has also been shown to be a source of food and moisture and other succulent chenopods species are also considered likely to be important. Foraging habitat is likely to be more important if it is adjacent to or within about 10 km of patches of *Triodia* deemed suitable as roosting habitat. Home ranges are up to 3,000 ha (Murphy *et al.* 2017).
Actitis hypoleucos Common Sandpiper	Mig. (EPBC & BC Acts)	6.4 km S	Breeds in Eurasia, a small population winters in Australia. Found across all Australian states, they never occur in large flocks, mostly singly. In WA the species is mostly coastal with some inland records (Geering *et al.* 2007). They are found across a wide range of wetlands: small ponds, large inlets and mudflats where they forage on the shore usually close to the vegetation.

Species	Status	Proximity to study area	Habitat
Calidris acuminata Sharp-tailed Sandpiper	Mig. (EPBC & BC Acts)	5.3 km NE	One of the most common Australian shorebirds. They breed in Arctic north-east Siberia and a large population winters in Australia. The distribution of the species in Australia depends on water quantity conditions; some large wetlands may be available inland after important rainfall, but only occasionally. The distribution on the coast is more regular, the conditions being more consistent. The species is semi-gregarious and occurs in scattered flocks, mainly on non-tidal flats, often inland.
Calidris alba Sanderling	Mig. (EPBC & BC Acts)	6.4 km S	Found mostly on open sandy beaches exposed to open sea-swell, and also on exposed sandbars and spits, shingle banks and beaches that may contain wave-washed rocky outcrops (DCCEEW 2023b).
Calidris ferruginea Curlew Sandpiper	CR/Mig./CR (EPBC Act; BC Act)	1.3 km NE	Mainly occur on intertidal mudflats in sheltered coastal areas, also around non-tidal swamps, lakes, and lagoons near the coast. Less often inland around ephemeral and permanent lakes and waterholes, usually with bare edges of mud or sand (DCCEEW 2023b).
Calidris melanotos Pectoral Sandpiper	Mig. (EPBC & BC Acts)	*	Found in wetlands, inland as well as on the coast. Occurs on shallow fresh to saline wetlands, usually coastal or near-coastal but occasionally further inland. Prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation (DCCEEW 2023b).
Calidris ruficollis Red-necked Stint	Mig. (EPBC & BC Acts)	9.1 km NE	Mostly found in coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and, sometimes, on protected sandy or coralline shores (DCCEEW 2023b).
Limosa limosa Black-tailed Godwit	EN/Mig./Mig. (EPBC Act; BC Act)	14.0 km NW	Typically found in coastal environments with sheltered bays, estuaries and lagoons. Habitat use is dictated by the tides. They are also found in shallow and sparsely vegetated near-coastal wetlands (DCCEEW 2024).
Tringa brevipes Grey-tailed Tattler	Mig. EPBC and BC Acts; P4 DBCA list	14.8 km SW	Occurs on sheltered coasts with reefs and rock platforms or mudflats, and can also be found on reefs or platforms that are exposed at low tide (DCCEEW 2023b).
Tringa glareola Wood Sandpiper	Mig. (EPBC & BC Acts)	6.4 km S	Prefers the shallows of wooded lakes or swamps with trees. It also inhabits freshwater swamps, lakes, flooded pastures and occasionally, mangroves (Morcombe 2004).
Tringa nebularia Common Greenshank	Mig. (EPBC & BC Acts)	1.3 km NE	The species is present in summer across all Australian states, mostly on the coast but sometimes inland. The species is not gregarious. Small groups can sometimes be seen when roosting at high tide (Geering *et al.* 2007). They prefer coastal open mudflats.
Tringa stagnatilis Marsh Sandpiper	Mig. (EPBC & BC Acts)	6.4 km S	Inhabits coastal and inland wetlands, estuarine and mangrove mudflats, beaches, swamps, lakes and several other types of wetlands (Morcombe 2004).

Species	Status	Proximity to study area	Habitat
Plegadis falcinellus Glossy Ibis	Mig. (EPBC & BC Acts)	6.4 km S	This bird has a nearly global distribution, and in Australia mostly occurs in eastern and northeastern areas, but also patchily in most of WA. It usually occurs in freshwater marshes, floodplains and artificial wetlands, but also uses coastal wetlands including saltmarsh and estuary habitats (DAWE 2021b).
Mammals (4)			
Dasyurus geoffroii Chuditch	VU (EPBC & BC Acts)	Within study area (unconfirmed)	The Chuditch is now confined to south-WA, occurring in only 5% of its former range. Prior to European settlement the species occupied approximately 70% of continental Australia (Smith *et al.* 2004; Van Dyck & Strahan 2008). They are now mostly found in woodland, heath and mallee habitats.
Myrmecobius fasciatus Numbat	EN (EPBC & BC Acts)	2.4 km W	The species is now restricted to 2 isolate wild populations in south-west Australia and nests in hollow logs, trees or in burrows (DCCEEW 2023b).
Macrotis lagotis Bilby	VU (EPBC & BC Acts)	1.3 km NE	Bilby prefers hummock grassland in plains and alluvial areas, open tussock grassland on uplands and hills, and mulga woodland/shrubland on ridges and rises (DCCEEW 2023b), but areas where it is now regionally extinct include many other (mostly open / exposed) habitat types.
Nyctophilus major subsp. *tor* Central Long-eared Bat	P3 (DBCA list)	17 km N (Harewood 2015)	*Nyctophilus major tor* is poorly known but assumed similar to congeners in foraging ecology, as echolocation calls across Nyctophilus spp. in WA are relatively uniform (Bullen & McKenzie 2002). It has been recorded across the south of WA, within the Goldfields, Wheatbelt and south coast. It inhabits a range of habitats including eucalypt and she-oak woodlands and forests. It roosts in tree hollows, crevices and under loose bark.
Reptiles (1)			
Egernia stokesii subsp. *badia* Western Spiny-tailed Skink	EN/VU (EPBC Act; BC Act) Extralimital, likely transported individual	6.6 km S	Known to occur in semi-arid areas of south-west WA between Shark Bay and Minnivale, east of Cue (DCCEEW 2023b). The species have been recorded in York Gum, Gimlet and Salmon Gum woodlands with numerous fallen logs.

* – Modelled distribution





Northern Star Resources Limited
Black Flag - Kalgoorlie Operations

Project No	1625
Date	10/07/2024
Drawn by	JL
Map author	KF

0 15 30
Kilometers

1:683,600(at A4) GDA 1994 MGA Zone 51

All information within this map is current as of 10/07/2024. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.

- 2022 study area
- 2023 study area
- 2024 study area
- 40 km buffer

Status

- CR (EPBC & BC Acts)
- CR/Mig./CR (EPBC Act; BC Act)
- EN (EPBC & BC Acts)
- EN/VU (EPBC Act; BC Act)
- Mig. (EPBC & BC Acts)
- Mig. (EPBC and BC Acts); P4 (DBCA list)
- P1 (DBCA list)
- P3 (DBCA list)
- P4 (DBCA list)
- VU (EPBC & BC Acts)

Figure 5-1

Desktop records of significant vertebrate fauna

PHOENIX ENVIRONMENTAL SCIENCES

5.1.2 SRE and significant invertebrate fauna

The desktop review identified records of 7 Confirmed SRE taxa and 93 Potential SRE taxa from within the SRE desktop search area (Table 5-3; Figure 5-2). A further 47 taxa of Uncertain SRE status were identified.

Of the 100 taxa Confirmed or Potential SRE taxa, 3 are named species (*Buddelundia frontosa, Missulena harewoodi* and *Aurecocrypta lugubris*). The remaining 97 comprise taxa named only to morphospecies codes as applied by the WA Museum or are not identified to Confirmed species level (i.e. "sp." or "cf."). The majority of taxa records of Uncertain SRE status are unidentifiable ("sp. indet.", i.e. female or juvenile specimens) or could not be identified to species or morphospecies and may represent new species or other species listed in the same genus where records exist (Table 5-3).

The desktop records indicate 14 SRE species have previously been recorded within the study area, including 3 of Confirmed SRE status (in bold) (Figure 5-2):

- ***Antichiropus* 'DIP176' – Confirmed**
- ***Antichiropus* 'DIP145, kalgoorlie' - Confirmed**
- *Beierolpium* '8/4-Fi02' – Potential
- *Buddelundia frontosa* – Potential
- *Idiosoma* 'kalgoorlie 1' – Potential
- *Idiosoma* 'MYG244' – Potential
- *Idiosoma* 'Phoenix0086' – Potential
- *Kwonkan* 'Phoenix0082' – Potential
- *Kwonkan* 'Phoenix0085'- Potential
- *Lychas* 'bituberculatus complex' – Potential
- ***Missulena harewoodi* – Confirmed**
- *Synothele* 'Phoenix0083' – Potential
- *Synothele* 'Phoenix0084' – Potential
- *Teyl* 'Phoenix0081' – Potential.

An additional 5 species have been recorded outside the study area but within the cut-out area surrounded by the study area (Figure 5-2).

- Cheliferidae 'sp. Fi01' - Potential
- *Conothele* 'MYG554' - Potential
- *Idiommata* 'kalgoorlie' - Potential
- *Lychas* 'annulatus complex' - Potential
- *Spherillo* 'sp. indet. B' (fimiston) – Potential

Two conservation significant species were returned in the desktop review:

- Arid Bronze Azure Butterfly (*Ogyris petrina*) (EPBC Act, BC Act – CR)
- Inland Hairstreak Butterfly (*Jalmenus aridus*) (DBCA – P1).

Table 5-3 SRE and Threatened and Priority taxa identified in the desktop review.

Taxa highlighted in dark grey have previously been recorded within the study area and species in light grey have been recorded within the cut-out area surrounded by the study area.

Higher taxon, family	Species	Proximity to study area	SRE category	Source[2]	Comment
Centipedes (3)					
Chilenophilidae	*Sepedonophilus* `sp. G1`	62 km NW	Potential	WAM	Recorded outside study area.
	Sepedonophilus `sp. G2`	73 km NW	Potential	WAM	Recorded outside study area.
Cryptopidae	*Cryptops* `sp. G1`	73 km NW	Potential	WAM	Recorded outside study area.
Isopods (16)					
Armadillidae	*Acanthodillo* '1'	28 km SW	Potential	PES	Recorded outside study area in open woodland habitat adjacent Lake Brown.
	Armadillidae 'gen4 sp2'	28 km SW	Potential	PES	Recorded outside study area in open woodland habitat adjacent Lake Brown.
	Buddelundia `sp. 72MS`	42.3 km NW	Potential	WAM	Recorded outside study area.
	Buddelundia cf. monticola	48.9 km S	Potential	Phoenix (2020)	Recorded in woodland habitat for St Ives Gold Mine.
	Buddelundia frontosa	Within study area	Potential	Phoenix (2024a)	Recorded inside and outside the study area. Also known from Lake Lefroy and Koolyanobbing.
	Buddelundia 'lefroy A'	44.8 km S	Potential	Phoenix (2020)	Recorded in drainage line woodland habitat for St Ives Gold Mine.
	Buddelundia 'lefroy B'	48 km S	Potential	Phoenix (2020)	Recorded in woodland habitat for St Ives Gold Mine.
	Buddelundia 'lefroy C'	58 km S	Potential	Phoenix (2020)	Recorded in drainage line woodland habitat for St Ives Gold Mine.
	Cubaris 'lefroy'	77.3 km S	Potential	Phoenix (2014b)	Recorded outside study area for St Ives Gold Mine.
	Spherillo 'sp. indet. A1' (fimiston)	1.4 km S	Potential	Phoenix (2024a)	Recorded outside study area for Fimiston Gold Mine Operations.
	Spherillo 'sp. indet. A2' (fimiston)	0.7 km S	Potential	Phoenix (2024a)	Recorded outside study area for Fimiston Gold Mine Operations.
	Spherillo 'sp. indet. B' (fimiston)	0.1 km W	Potential	Phoenix (2024a)	Recorded in cut-out area surrounded by study area for Fimiston Gold Mine Operations.

Higher taxon, family	Species	Proximity to study area	SRE category	Source[2]	Comment
Paraplatyarthridae	*Paraplayarthrus* `sp. G1`	60.8 km NW	Potential	WAM	Recorded outside study area.
	Paraplayarthrus `sp. G2`	60.8 km NW	Potential	WAM	Recorded outside study area.
Philosciidae	Philosciidae `sp. G1`	57.5 km NW	Potential	WAM	Recorded outside study area.
	Philosciidae 'lefroy'	83.1 km S	Potential	Phoenix (2018f)	Recorded outside study area adjacent Lake Lefroy. Possibly a riparian species around lake.
Millipedes (7)					
Paradoxosomatidae	*Antichiropus* `DIP065, binduli 2`	13.6 km SW	Confirmed	WAM	Recorded outside study area.
	Antichiropus `DIP067, Broad Arrow`	2.1 km S	Confirmed	PES (Harewood 2015)	Recorded outside study area in mixed *Eucalyptus* low woodland habitat by Harewood (2015).
	Antichiropus `DIP145, kalgoorlie`	Within study area	Confirmed	WAM	Recorded in open woodland habitat within study area.
	Antichiropus 'DIP176'	Within study area	Confirmed	Phoenix (2019d)	Recorded in open woodland habitat within study area.
	Antichiropus `DIP185, goongarrie`	40 km NW	Confirmed	WAM	Recorded outside study area in drainage line woodland habitat.
	Antichiropus `sp. G1`	40 km NW	Potential	WAM	Recorded outside study area in drainage line woodland habitat.
Siphonotidae	Siphonotidae `sp. G1`	69.6 km NW	Potential	WAM	Recorded outside study area.
Spiders (48)					
Actinopodidae	*Missulena harewoodi*	Within study area	Confirmed	(Harewood 2015); Phoenix (2024a)	Recorded inside and outside the study area in open woodland habitat. Reported as *Missulena* 'kalgoorlie' in Harewood (2015).
Anamidae	*Aname* `Mt Vetters sp. 03`	24.6 km N	Potential	WAM	Recorded at Mt. Vetters Station, Black Swan Nickel Mine.
	Aname `Mt Vetters sp. 04`	24.6 km N	Potential	WAM	Recorded at Mt. Vetters Station, Black Swan Nickel Mine.
	Aname `Mt Vetters sp. 05`	24.6 km N	Potential	WAM	Recorded at Mt. Vetters Station, Black Swan Nickel Mine.
	Aname `Mt Vetters sp. 06`	24.6 km N	Potential	WAM	Recorded at Mt. Vetters Station, Black Swan Nickel Mine.
	Aname `MYG347`	67.8 km N	Potential	WAM	Recorded at Gindalbie Station.
	Aname `MYG364`	72.1 km NW	Potential	WAM	Recorded outside the study area.
	Aname `MYG738`	25 km SW	Potential	WAM	Recorded outside the study area.
	Aname `sp. nov. curved embolus`	21 km NW	Potential	WAM	Recorded at Kanowna Homestead, Mt Vetters Station.

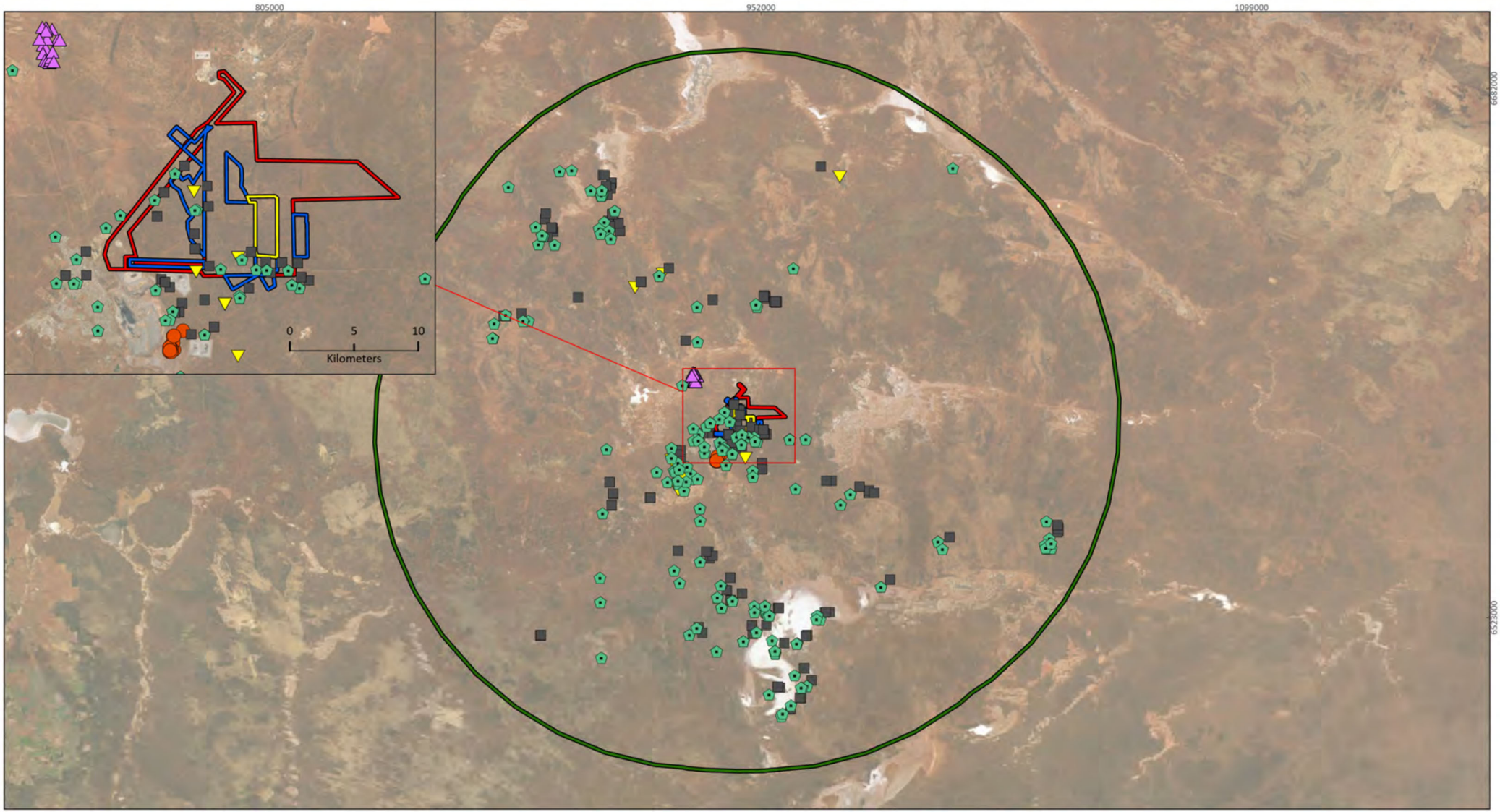
Higher taxon, family	Species	Proximity to study area	SRE category	Source[2]	Comment
	Aname 'MYG181'	87.9 km SE	Potential	PES	Recorded at Aldiss-Randalls Gold Project.
	Aname 'PES0053'	72.5 km S	Potential	PES	Recorded at St Ives Gold Mine.
	Aname 'SIGM121'	80 km S	Potential	PES	Recorded at St Ives Gold Mine.
	Kwonkan `Mt Vetters sp. 02`	24.6 km N	Potential	WAM	Recorded at Mt. Vetters Station, Black Swan Nickel Mine.
	Kwonkan `MYG213`	32.9 km SE	Potential	WAM	Not recorded inside study area.
	Kwonkan `Phoenix0082`	Within study area	Potential	Phoenix (2024a)	Recorded inside and outside the study area in open woodland habitat.
	Kwonkan `Phoenix0085`	Within study area	Potential	Phoenix (2024a)	Recorded inside and outside the study area in open woodland habitat.
	Kwonkan `SIGM104`	57.4 km S	Potential	PES	Recorded on bank of Lake Lefroy for St Ives Gold Mine.
	Kwonkan 'MYG263'	92.2 km ESE	Potential	PES	Recorded at Aldiss-Randalls Gold Project.
	Proshermacha `MYG435`	70.9 km NW	Potential	WAM	Recorded outside the study area.
	Proshermacha `MYG502`	44 km S	Potential	PES	Recorded in woodland drainage line habitat at St Ives Gold Mine.
	Proshermacha `MYG506`	33 km SE	Potential	WAM	Recorded outside the study area.
	Teyl `door-building Diplurid`	9.5 km S	Potential	WAM	Recorded outside the study area.
	Teyl `door-building`	9.5 km S	Potential	WAM	Recorded outside the study area.
	Teyl `double-door`	35 km SE	Potential	WAM	Recorded outside the study area.
	Teyl `Phoenix0081`	Within study area	Potential	Phoenix (2024a)	Collected in open woodland habitat inside and outside the study area.
	Teyl `sp. G1`	63 km NW	Potential	WAM	Recorded outside the study area.
Barychelidae	*Aurecocrypta lugubris*	69 km NE	Confirmed	WAM	Recorded at Gindalbie Station.
	Idiommata `kalgoorlie`	0.8 km SE	Potential	Phoenix (2018a) Harewood (2015)	Taxon currently only known from KCGM tenements, however, unlikely to be confined to KCGM Operations. Occurs in 2 vegetation types. Recorded by Harewood (2015). Recorded in cut-out area surrounded by study area.
	Synothele `Phoenix0083`	Within study area	Potential	Phoenix (2024a)	Recorded inside and outside the study area.

Higher taxon, family	Species	Proximity to study area	SRE category	Source[2]	Comment
	Synothele `Phoenix0084`	Within study area	Potential	Phoenix (2024a)	Only recorded within study area.
	Synothele `sp. G1`	68.5 km NW	Potential	WAM	Recorded outside the study area.
	Synothele 'MYG264'	92.3 km ESE	Potential	PES	Recorded at Aldiss-Randalls Gold Project.
Euagridae	*Cethegus* `fugax`	64 km SE	Potential	WAM	Recorded outside study area.
	Cethegus `sp. G1`	76.4 km NW	Potential	WAM	Recorded outside study area.
	Cethegus `sp. G2`	72.9 km NW	Potential	WAM	Recorded outside study area.
Halonoproctidae	*Conothele* `MYG549`	74.6 km WNW	Potential	WAM	Recorded outside study area at Rowles Lagoon Nature Reserve.
	Conothele `MYG554` ('kalgoorlie')	0.6 km S	Potential	Phoenix (2024a) Harewood (2015)	Recorded as *Conothele* 'kalgoorlie' outside study area by Harewood (2015). Recorded in cut-out area surrounded by study area.
Idiopidae	*Bungulla* `MYG677`	44.2 km S	Potential	Phoenix (2020)	Recorded in woodland drainage lines at St Ives Gold Mine.
	Bungulla `sp. G1`	73.4 km NW	Potential	WAM	Recorded outside study area.
	Idiosoma `goldfields sp. group`	1.9 km W	Potential	WAM	Recorded outside study area.
	Idiosoma `MYG159`	4 km W	Potential	WAM	Recorded outside study area.
	Idiosoma `MYG244`	Within study area	Potential	Phoenix (2024a)	Recorded inside and outside the study area at Rowles Lagoon Nature Reserve.
	Idiosoma `occidentalis sp. group`	1.9 km W	Potential	WAM	Recorded outside study area.
	Idiosoma `Phoenix0086`	Within study area	Potential	Phoenix (2024a)	Only recorded inside the study area.
	Idiosoma `sp. near MYG224`	37.8 km S	Potential	WAM	Recorded outside study area.
	Idiosoma `squama`	0.3 km S	Potential	WAM	Recorded outside study area in open woodland habitat.
	Idiosoma 'kalgoorlie 1'	Within study area	Potential	Phoenix (2024a) Harewood (2015)	Occurs inside and outside study area by Harewood (2015). Initially reported in the genus *Aganippe* (for genus level change see Rix *et al.* (2017)).
	Idiosoma 'SIGM120'	76.1 km S	Potential	PES	Recorded in drainage line adjacent to Lake Lefroy for St Ives Gold Mine.

Higher taxon, family	Species	Proximity to study area	SRE category	Source[2]	Comment
Pseudoscorpions (14)					
Cheliferidae	Cheliferidae `sp. Fi01`	0.1 km W	Potential	Phoenix (2024a)	Distribution unknown. Only recorded outside study area.
	Nesidiochernes `sp. Fi01`	1.4 km S	Potential	Phoenix (2024a)	Distribution unknown. Only recorded outside study area.
	Nesidiochernes `sp. Fi02`	1.4 km S	Potential	Phoenix (2024a)	Distribution unknown. Only recorded outside study area.
	Nesidiochernes `sp. G1`	57.9 km NW	Potential	WAM	Only recorded outside study area.
	Sundochernes `sp. G1`	42.2 km NW	Potential	WAM	Only recorded outside study area.
Garypidae	*Synsphyronus mimulus*	Within study area	Widespread	Phoenix (2024a)	Recorded in open woodland habitat inside the study area.
	Synsphyronus `cf. mimulus`	44.6 km S	Potential	Phoenix (2020)	Recorded outside study area in woodland, drainage line and undulating plain habitat at St Ives Gold Mine.
	Synsphyronus `PSE216`	80.1 km SW	Potential	WAM	Recorded outside study area at Victoria Rock Nature Reserve.
	Synsphyronus '7/2 goldfields (PSE117)'	45.3 km S	Potential	Phoenix (2020)	Recorded outside study area in woodland and drainage line habitat at St Ives Gold Mine.
Olpiidae	*Austrohorus* `salt lake species`	57.7 km SE	Potential	WAM	Recorded outside study area adjacent to Lake Lefroy.
	Austrohorus `sp. Fi01`	3.7 km S	Potential	Phoenix (2024a)	Recorded in shrubland along drainage line habitat at Fimiston Gold Mine Operations. Distribution unknown. Recorded in cut-out area surrounded by study area.
	Beierolpium `8/4-Fi02`	Within study area	Potential	Phoenix (2024a)	Potential SRE owing to taxonomic data deficiency. Distribution unknown. Previously recorded inside and outside the study area in open woodland habitat.
	Beierolpium `sp. 8/4 small`	44.1 km S	Potential	Phoenix (2020)	Data deficient. Recorded in woodland, drainage line and undulating plain habitat at St Ives Gold Mine.
	Indolpium `Fi03`	0.6 km S	Potential	Phoenix (2024a)	Distribution unknown. Recorded at Fimiston Gold Mine Operations.
Scorpions (9)					
Buthidae	*Lychas* `adonis`	62.8 km NW	Potential	PES	Recorded outside study area.
	Lychas `annulatus complex`	0.8 km E	Potential	WAM Harewood (2015)	Recorded outside study area by Harewood (2015). Recorded in cut-out area surrounded by study area.

Higher taxon, family	Species	Proximity to study area	SRE category	Source[2]	Comment
	Lychas `bituberculatus complex`	Within study area	Potential	Phoenix (2019d)	Recorded inside and outside the study area.
	Lychas 'SIGM132'	76 km S	Potential	WAM	Recorded outside study area adjacent to Lake Lefroy.
Urodacidae	*Urodacus* `magestic`	32.9 km SE	Potential	WAM	Recorded outside study area.
	Urodacus `sp. G1`	76.5 km NW	Potential	WAM	Recorded outside study area.
	Urodacus `sp. G2`	71.2 km NW	Potential	WAM	Recorded outside study area.
	Urodacus 'lefroy'	81.6 km S	Potential	Phoenix (2014b)	Recorded outside study area adjacent to Lake Lefroy at St Ives Gold Mine.
	Urodacus 'SIGM131'	83.9 km S	Potential	Phoenix (2014b)	Recorded outside study area adjacent to Lake Lefroy at St Ives Gold Mine.
Snails (3)					
Camaenidae	*Sinumelon* cf. *jimberlanensis*	36.2 km S	Potential	WAM	Recorded outside study area in drainage lines and shrubland on rocky hill and open woodland habitat.
	Sinumelon cf. *kalgum*	69.3 km WNW	Potential	WAM	Recorded outside study area in shrubland on plain habitat.
	Sinumelon cf. *vagente*	59.3 km S	Potential	WAM	Recorded outside study area.
Punctidae	*Westralaoma* cf. *expicta*	61.1 km S	Potential	WAM	Recorded outside study area near creek bed.
Insects (2)					
Lycaenidae	*Jalmenus aridus*	4.7 km S	DBCA – P1	Phoenix (2022b)	Originally described from Lake Douglas.
	Ogyris petrina	12.5 km W	EPBC/ BC Act – CR	Phoenix (2022a)	Currently only known form Barbalin Nature Reserve in the northern Avon Wheatbelt and a site near Kalgoorlie.

[2] - PES = Phoenix Environmental Science database, WAM = Western Australia Museum





Northern Star Resources Limited
Black Flag - Kalgoorlie Operations

Project No	1625
Date	10/07/2024
Drawn by	JL
Map author	KF

0 35 70
Kilometers

1:1,538,600(at A4) GDA 1994 MGA Zone 51

All information within this map is current as of 10/07/2024. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.

- 2022 study area
- 2023 study area
- 2024 study area
- 100 km buffer

SRE Status

- Confirmed
- P1 (DBCA list)
- CR (EPBC/BC Act)
- Potential
- Uncertain

Figure 5-2

Desktop records of SRE invertebrates

PHOENIX ENVIRONMENTAL SCIENCES

5.2 FIELD SURVEY

5.2.1 Vertebrate fauna

5.2.1.1 Habitats

Nine broad fauna habitat types were identified in the study area (Table 5-4; Figure 5-3). These habitats comprised of the following:

- open woodland (40.5%)
- shrubland (30.5%)
- groved woodland (15.6%)
- floodplain (2.9%)
- drainage line (4.7%)
- farm dam with permanent pools (0.01%)
- minor breakaway supporting open woodland (0.06%)
- grassland (3.8%)
- cleared – infrastructure (1.9%).

Seven habitat types refer to natural vegetation on clay loam and stony soils along low hilltops to plains and ephemeral drainage channels (Table 5-4), one of these also featuring patches of sandy substrate. Areas previously cleared or modified include water sources used by vertebrate fauna.

The most significant fauna habitat includes 'shrublands' with closed canopy and sandy substrate, representing suitable foraging and breeding habitat for Malleefowl. The 'open woodland', 'shrubland' and 'drainage line' represent potential foraging habitat for Chuditch. These fauna habitat types do not occur exclusively within the study area but are continuous throughout the East Murchison and Eastern Goldfields subregions (Cowan 2001a, b).

Narrow areas of disturbances such as unsealed access tracks or small mine excavations are not distinguished from adjacent natural vegetation due to the coarse scale of mapping and the fact that they may be used by fauna for dispersal and foraging.

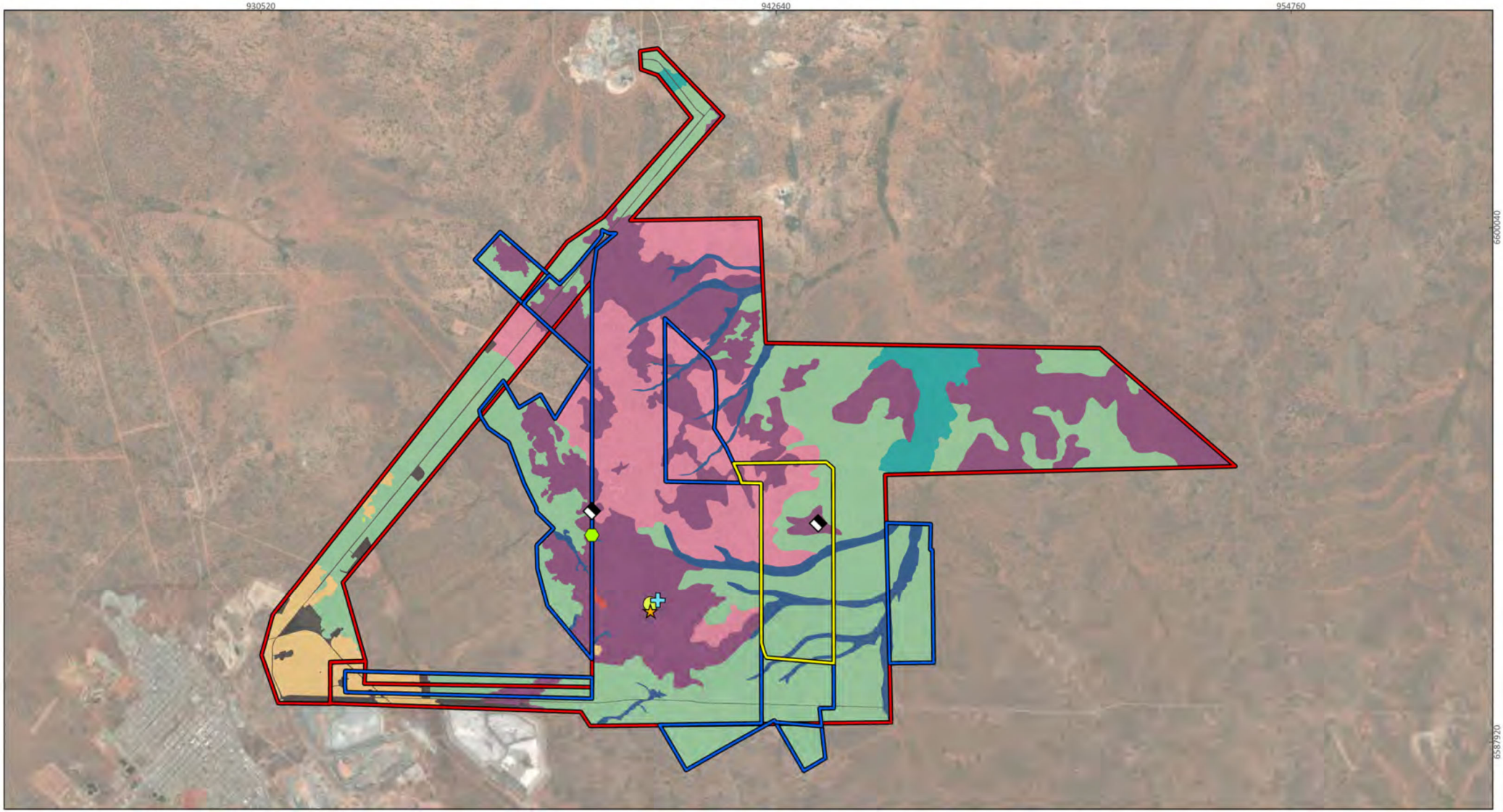
Table 5-4 Extent and description of each fauna habitat in the study area

Habitat type	Site/s	Description	Extent and % of study area	Representative photograph
Open woodland	KO-004, KO-005, KO-008, KO-019, KO-022, KO-023 KO-029, BF001, BF002, BF003, BF004, BF005, BF006, BF008, BF009, BF010, BF011, BF012, BF013, BF014, BF015, BF017, BFOP003, BFOP004, BFOP006, BF01, BF02, BF05, BF06, BF07, BF08,	Open woodland over low mixed shrubs on clay loam plain. High abundance of large fallen logs, large trees with hollows and leaf litter. MF: low to medium suitability depending on density	5,334 ha 40.53%	
Shrubland	KO-007, KO-009, KO-012, KO-014, KO-020, KO-025, KO-026, KO-MF1, KO-MF2, KO-Opp02, KO-Opp04, BF001, BF004, BFOP001, BFOP002, BF_MFmound	Shrubland with scattered mallee, *Eucalyptus* and *Allocasurina* on clay loam with gravel or sparse sand. Dense shrubby understory provides cover from predators. High abundance of flowering/seeding shrubs. MF: low to high suitability depending on density	4,017 ha 30.5%	

Habitat type	Site/s	Description	Extent and % of study area	Representative photograph
Groved woodland	KO-010, KO-011, KO-013, KO-015, KO-Opp01, KO-Opp03, KO-Opp01, BF016, BF018	Grover *Eucalyptus* woodland over mixed shrubs on plains and low hills. Areas of dense vegetation interspersed with open patches. MF: low to medium suitability	2051 ha 15.6%	
Floodplain	KO-018, KO-027	Floodplain with scattered trees, shrubs and grasses on clay loam. Likely to be seasonally inundated. MF: low suitability	387 ha 2.9%	

Habitat type	Site/s	Description	Extent and % of study area	Representative photograph
Drainage line	KO-002, KO-003, KO-016, BF03, BF04, BF007	Drainage line with *Eucalyptus* over mixed shrubs on clay loam soils. Thick patches of leaf litter. MF: low to high suitability depending on density and potential for surface water flow	621 ha 4.7%	
Farm dam with permanent pools	KO-017	Farm dams with permanent pools with scattered low-mid shrubs and grasses on dam walls. MF: low suitability	2 ha 0.01%	

Habitat type	Site/s	Description	Extent and % of study area	Representative photograph
Minor breakaway supporting open woodland	KO-001	Open *Eucalyptus* woodland over scattered shrubs on stony hill slopes with minor breakaway. MF: low suitability	8 ha 0.06%	
Grassland	KO-021	Grassland cleared of nearly all upper story vegetation. Sparse *Eucalyptus* and mulga shrubs. MF: low suitability	516 ha 4%	
Cleared – infrastructure	NA	Cleared infrastructure areas Unsuitable for MF	250 ha 2%	





Northern Star Resources Limited
Black Flag - Kalgoorlie Operations

Project No	1649
Date	2/12/2024
Drawn by	BK
Map author	BT

0 2.5 5
Kilometers

1:121,200(at A4) GDA 1994 MGA Zone 51

All information within this map is current as of 2/12/2024. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.

- 2022 study area
- 2023 study area
- 2024 study area

Habitat

- Cleared - infrastructure
- Drainage line
- Farm dam with permanent pools
- Floodplain
- Grassland
- Groved woodland
- Minor breakaway supporting open woodland
- Open woodland
- Shrubland

Malleefowl, VU (EPBC & BC Acts)

- Calling
- Foraging
- Mound active
- Mound inactive
- Tracks

Figure 5-3

Fauna habitats and significant fauna records from the field survey

PHOENIX ENVIRONMENTAL SCIENCES

5.2.1.2 Assemblage

A total of 77 terrestrial vertebrate species representing 36 families and 69 genera were recorded in the study area during the field surveys (Appendix 3). The assemblage included 73 native species and 4 introduced species. The recorded assemblage represents 25.8% of the species identified in the desktop review (Table 5-5). All species recorded during the survey were identified in the desktop review.

Table 5-5 Number of vertebrate species recorded during the surveys in comparison to desktop results, by group

Group	No. species identified in desktop review	No. species recorded in survey
Amphibians	6	0
Reptiles	85	6
Birds	165	53
Mammals	42	18 (incl. 4 introduced)
Total	**298**	**77**

5.2.1.3 Significant vertebrate fauna

One Threatened vertebrate fauna species, Malleefowl (VU), was recorded during the surveys (Figure 5-3). Phoenix (2025) presents the results of the targeted Malleefowl survey and habitat suitability throughout the study area in more detail.

The likelihood of occurrence assessment (section 4.2.11) for the remaining significant species identified in the desktop review (section 4.1) determined 5 were likely to occur in the study area, 14 may possibly occur and 10 are unlikely to occur (Table 5-6). The 5 significant species likely to occur are:

- Southern Whiteface (*Aphelocephala leucopsis*; VU)
- Fork-tailed swift (*Apus pacificus*; Mig.)
- Peregrine Falcon (*Falco peregrinus*; OS)
- Western Rosella (inland ssp.) (*Platycercus icterotis* subsp. *xanthogenys*; P4)
- Central Long-eared Bat (*Nyctophilus major* subsp. *tor*; P3*).*

Table 5-6 Likelihood of occurrence for significant vertebrate fauna identified in the desktop review

Species	Status	Likelihood of occurrence	Comment	Habitats								
				Open Woodland	Shrubland	Groved woodland	Floodplain	Drainage	Farm Dam	Minor breakaway	Grassland	Cleared
Birds (25)												
Aphelocephala leucopsis Southern Whiteface	VU (EPBC Act)	**Likely**	Suitable habitat present within the study area. Desktop records from within the study area.	✓	✓	✓					✓	
Apus pacificus Fork-tailed Swift	Mig. (EPBC & BC Act)	**Likely**	Not limited by habitat. The species can occur within a wide range of habitats, including those found in the study area where is likely to forage, although it is unlikely it will land or nest within the study area.	✓	✓	✓	✓	✓	✓	✓	✓	
Thinornis cucullatus Hooded Plover	P4 (DBCA list)	Unlikely	Suitable habitat absent. Possible visitor to salt lakes 6 – 20 km from study area.									
Falco hypoleucos Grey Falcon	VU (BC Act)	Unlikely	Rarely recorded in southern WA, may be a rare visitor. Suitable woodland, grassland and shrubland habitat present within the study area.	✓	✓	✓	✓	✓	✓	✓	✓	
Falco peregrinus Peregrine Falcon	OS (BC Act)	**Likely**	Previously recorded nearby at Kanowna Belle mine site (Harewood 2015). Suitable habitat in study area. The species is likely to forage within and in the vicinity of the study area and may also nest in open woodland habitat where suitable large trees are present.	✓		✓	✓	✓		✓		
Amytornis textilis subsp. *textilis* Western Grasswren	P4 (DBCA list)	Unlikely	Study area outside of current known range.									
Leipoa ocellata Malleefowl	VU (EPBC & BC Acts)	**Recorded**	Evidence presented in Phoenix (2025). Suitable nesting and foraging habitat in open woodland, woodland and shrubland habitat.	✓	✓			✓				

Species	Status	Likelihood of occurrence	Comment	Habitats								
				Open Woodland	Shrubland	Groved woodland	Floodplain	Drainage	Farm Dam	Minor breakaway	Grassland	Cleared
Motacilla cinerea Grey Wagtail	Mig. (EPBC & BC Acts)	Unlikely	Suitable stream and river habitat absent.									
Oxyura australis Blue-billed Duck	P4 (DBCA list)	**Possible**	Possible rare visitor to permanent water features within the study area. Additionally, may traverse study area to salt lakes 7-20 km outside study area.					✓	✓			
Platycercus icterotis subsp. *xanthogenys* Western Rosella (inland ssp.)	P4 (DBCA)	**Likely**	Suitable woodland habitat present. Recorded by Phoenix twice, both records within 2.3 km of the study area (Phoenix 2013, 2014a).	✓		✓		✓		✓		
Zanda latirostris Carnaby's Black Cockatoo	EN (EPBC & BC Acts)	Unlikely	Study area outside of current known range.	✓		✓		✓		✓		
Pezoporus occidentalis Night Parrot	EN/CR (EPBC Act; BC Act)	Unlikely	Suitable spinifex habitat absent.									
Polytelis alexandrae Princess Parrot	P4 (DBCA list)	Unlikely	Study area outside of core range. Possibly a very rare visitor following periods of high rainfall.	✓	✓	✓		✓				
Actitis hypoleucos Common Sandpiper	Mig. (EPBC & BC Acts)	**Possible**	Possible rare visitor to permanent water features within the study area. Additionally, may traverse study area to salt lakes 7-20 km outside study area.						✓			
Calidris acuminata Sharp-tailed Sandpiper	Mig. (EPBC & BC Acts)	**Possible**	Possible rare visitor to permanent water features within the study area. Additionally, may traverse study area to salt lakes 7-20 km outside study area.						✓			
Calidris alba Sanderling	Mig. (EPBC & BC Acts)	**Possible**	Possible rare visitor to permanent water features within the study area. Additionally, may traverse study area to salt lakes 7-20 km outside study area.						✓			

Species	Status	Likelihood of occurrence	Comment	Habitats								
				Open Woodland	Shrubland	Groved woodland	Floodplain	Drainage	Farm Dam	Minor breakaway	Grassland	Cleared
Calidris ferruginea Curlew Sandpiper	CR/Mig./CR (EPBC Act; BC Act)	**Possible**	Possible rare visitor to permanent water features within the study area. Additionally, may traverse study area to salt lakes 7-20 km outside study area.						✓			
Calidris melanotos Pectoral Sandpiper	Mig. (EPBC & BC Acts)	**Possible**	Possible rare visitor to permanent water features within the study area. Additionally, may traverse study area to salt lakes 7-20 km outside study area.						✓			
Calidris ruficollis Red-necked Stint	Mig. (EPBC & BC Acts)	**Possible**	Possible rare visitor to permanent water features within the study area. Additionally, may traverse study area to salt lakes 7-20 km outside study area.						✓			
Limosa limosa Black-tailed Godwit	EN/Mig./Mig. (EPBC Act; BC Act)	**Possible**	Possible rare visitor to permanent water features within the study area. Additionally, may traverse study area to salt lakes 7-20 km outside study area.						✓			
Tringa brevipes Grey-tailed Tattler	Mig. EPBC and BC Acts; P4 DBCA list	**Possible**	Possible rare visitor to permanent water features within the study area. Additionally, may traverse study area to salt lakes 7-20 km outside study area.						✓			
Tringa glareola Wood Sandpiper	Mig. (EPBC & BC Acts)	**Possible**	Possible rare visitor to permanent water features within the study area. Additionally, may traverse study area to salt lakes 7-20 km outside study area.						✓			
Tringa nebularia Common Greenshank	Mig. (EPBC & BC Acts)	**Possible**	Possible rare visitor to permanent water features within the study area. Additionally, may traverse study area to salt lakes 7-20 km outside study area.						✓			
Tringa stagnatilis Marsh Sandpiper	Mig. (EPBC & BC Acts)	**Possible**	Possible rare visitor to permanent water features within the study area. Additionally, may traverse study area to salt lakes 7-20 km outside study area.						✓			

Species	Status	Likelihood of occurrence	Comment	Habitats								
				Open Woodland	Shrubland	Groved woodland	Floodplain	Drainage	Farm Dam	Minor breakaway	Grassland	Cleared
Plegadis falcinellus Glossy Ibis	Mig. (EPBC & BC Acts)	**Possible**	Possible visitor to permanent water features within the study area. Additionally, may traverse study area to salt lakes 7-20 km outside study area.						✓			
Mammals (4)												
Dasyurus geoffroii Chuditch	VU (EPBC & BC Acts)	**Possible**	Chuditch (unconfirmed) has previously been recorded within the study area (scat) (Phoenix 2024a). Woodland habitat supports foraging/dispersal. Suitable refuge (rocky breakaways or hollow logs) is scarce in the study area and not extensive enough to support a resident population.	✓		✓		✓		✓		
Myrmecobius fasciatus Numbat	EN (EPBC & BC Acts)	Unlikely	Study area outside of current known range.									
Macrotis lagotis Bilby	VU (EPBC & BC Acts)	Unlikely	Study area outside of current known range.									
Nyctophilus major subsp. *tor* Central Long-eared Bat	P3 (DBCA list)	**Likely**	While not recorded during the survey, it was previously observed in 2011 during bat survey at the Kanowna Belle mine site (Harewood 2015). Suitable *Eucalyptus* woodland habitat occurs within the study area.	✓		✓		✓		✓		
Reptiles (1)												
Egernia stokesii subsp. *badia* Western Spiny-tailed Skink	EN/VU (EPBC Act; BC Act)	Unlikely	Study area outside of current known range.									

5.2.2 SRE and significant invertebrate fauna

5.2.2.1 Habitats

Eight habitats with the potential to support SRE invertebrate fauna were identified within the study area (Table 5-7; Figure 5-4). These habitats cover approximately 98.1% of the study area, which includes 4.8% of High Potential habitat and 93.3% of Low Potential habitat. The remaining area is represented by farm dam with permanent pools and cleared areas (2%), which are regarded as being unsuitable to support SREs.

Habitat with High Potential to support SREs was represented by drainage lines and minor breakaway supporting open woodland (Table 5-7; Figure 5-4). Drainage lines provide high habitat complexity and availability of moisture. The minor breakaways represent a unique substrate in the area and are restricted in distribution both locally and regionally.

The remaining habitats 6 SRE habitats are regarded as having Low Potential to support SREs due to low habitat complexity and/or their extensive and continuous occurrence in the study area and surrounding region.

Five habitats feature smooth bark eucalypts, making them potentially suitable for the ABAB host ant, *C.* sp. nr. *terebrans.*

Table 5-7 Extent and description of each SRE habitat in the study area

Habitat type	Site/s	Description	Extent and % of study area	SRE Potential
Open woodland	KO-004, KO-005, KO-008, KO-019, KO-029, BF001, BF002, BF003, BF004, BF005, BF006, BF008, BF009, BF010, BF011, BF012, BF013, BF014, BF015, BF017, BFOP003, BFOP004, BFOP006, BF01, BF07	Open woodland over low mixed shrubs on clay loam plain. Extensive and relatively continuous. Moderate habitat complexity and availability of refugia. Low incidence of water. Abundant leaf litter.	5,334 ha 40.53%	Low
Shrubland	KO-007, KO-009, KO-012, KO-014, KO-020, KO-025, KO-026, KO-MF1, KO-MF2, KO-Opp02, KO-Opp04, BF001, BF004, BFOP001, BFOP002, BF02, BF03, BF04, BF05, BF06, BF08	Shrubland with scattered mallee, *Eucalyptus* and *Allocasurina* on clay loam with gravel or sparse sand. Moderate habitat complexity and protection. Is relatively extensive with no barriers to dispersal. High incidence of leaf litter.	4,017 ha 30.5%	Low
Groved woodland	KO-010, KO-011, KO-013, KO-015, KO-Opp01, KO-Opp03, KO-Opp01, BF016, BF018	Very open/ groved *Eucalyptus* woodland over mixed shrubs on stony hill. Moderate levels habitat complexity and protection. Is relatively extensive with no barriers to dispersal. High incidence of leaf litter.	2051 ha 15.6%	Low
Floodplain	KO-018, KO-027	Floodplain with scattered trees, shrubs and grasses on clay loam.	387 ha 2.9%	Low

		High incidence of water but relatively low habitat complexity and limited refugia. Low availability of leaf litter.		
Drainage line	KO-002, KO-003, KO-016, BF007	Drainage line with *Eucalyptus* over mixed shrubs on clay loam soils. High incidence of leaf litter and water. Relatively high habitat complexity and availability of microhabitats.	621 ha 4.7%	High
Farm dam with permanent pools	KO-017	Farm dams with permanent pools with scattered low-mid shrubs and grasses on dam walls. Highly degraded and exposed.	2 ha 0.01%	None
Minor breakaway supporting open woodland	KO-001	Open *Eucalyptus* woodland over scattered shrubs on stony hill slopes with minor breakaway. Low habitat complexity but crevices and small rock piles provide protection. Low incidence of leaf litter and water. Limited extent on both a local and regional scale.	8 ha 0.06%	High
Grassland	KO-021	Grassland cleared of nearly all upper story vegetation. Sparse *Eucalyptus* and mulga shrubs. Degraded and highly exposed. Low habitat complexity and availability of refugia.	516 ha 4%	Low
Cleared – infrastructure	NA	Mine pits, waste rock, urban developments, infrastructure, and former infrastructure sites.	250 ha 2%	None

5.2.2.2 SRE records

A total of 58 specimens from 22 SRE taxa were collected (Figure 5-4; Table 5-8), including 7 mygalomorph spider taxa, 6 isopod taxa, 6 pseudoscorpion taxa, 2 centipede taxa and one scorpion taxon. Of these, 11 are Potential SREs and 4 are Widespread. The remaining 7 are of Uncertain SRE status due to unresolved taxonomy. No Confirmed SRE taxa were recorded.

Of the 22 SRE taxa, 15 species were identified to the level of species or morphospecies code as applied by the WA Museum. Of these, 7 had significant genetic divergence from their closest matches on GenBank and/or were not a genetic/morphological match to reference specimens held by specialist taxonomists (Table 4-5). As such, they are conservatively considered new species. However, as many of these groups are poorly represented in publicly available reference collections and genetic databases, some of these taxa may represent known but not-sequenced species or morphospecies. All recognised taxa were identified in the desktop review.

The 7 Uncertain SRE taxa were unidentifiable (“sp. indet.”, i.e. female or juvenile specimens) or could not be identified to species or morphospecies and may represent undescribed taxa, known species or other species listed in the same genus where records exist.

Four clusters of SREs were evident across 4 habitat types in shrubland, groved woodland, drainage lines and open woodland (Figure 5-3 and Figure 5-4). The shrubland/ groved woodland cluster toward the centre of the study area recorded 3 Potential SREs: *Buddelundia* sp. indet, Philosclidae *'*KWD' and *Idiosoma '*MYG224'. Two records of unresolved taxonomy resulting in Uncertain SRE status, *Buddelundia* sp. indet. and *Lychas* sp. indet. These habitat types are abundant collectively 46.1% of the study area.

Two clusters of SRE taxa were evident in and around drainage habitat (Figure 5-3 and Figure 5-4). The northern drainage cluster recorded 2 individuals of unresolved taxonomy resulting in uncertain SRE status: Chernetidae sp. indet. and *Cryptops* sp. indet. *Idiosoma '*MYG244' and *Paraplatyarthrus '*KWB1' were also found in this habitat type and are regarded as Potential SREs. The southern drainage cluster recorded 2 Uncertain SRE specimens due to unresolved taxonomy, *Beierolpium* sp. indet. and Chernetidae sp. indet. *Idiosoma* 'MYG244' was also found in this cluster and is a Potential SRE. Drainage lines are considered highly suitable SRE habitats due to their ability to maintain adequate moisture to support SRE taxa. This habitat type was relatively restricted consisting of only 4.7% of the study area.

An SRE cluster was also evident in open woodland /shrubland habitats in the north-east corner of the study area (Figure 5-3 and Figure 5-4). This cluster was spread over a relatively large extent (Figure 5-4). Three records returned Uncertain SRE status due to unresolved taxonomy and include; Philosciidae sp. indet., *Synsphyronus* sp. indet. and Chilenophilidae sp. indet. Three records returned a Potential SRE status including; *Buddelundia* cf. *frontosa*, *Synothele '*Phoenix0103*'* and *Synothele '*Phoenix0083'. Finally, the field survey recorded *Gauis austini* from the same cluster which is a Widespread species. Open woodland and shrubland habitats are abundant, consisting of 71% of the total study area.

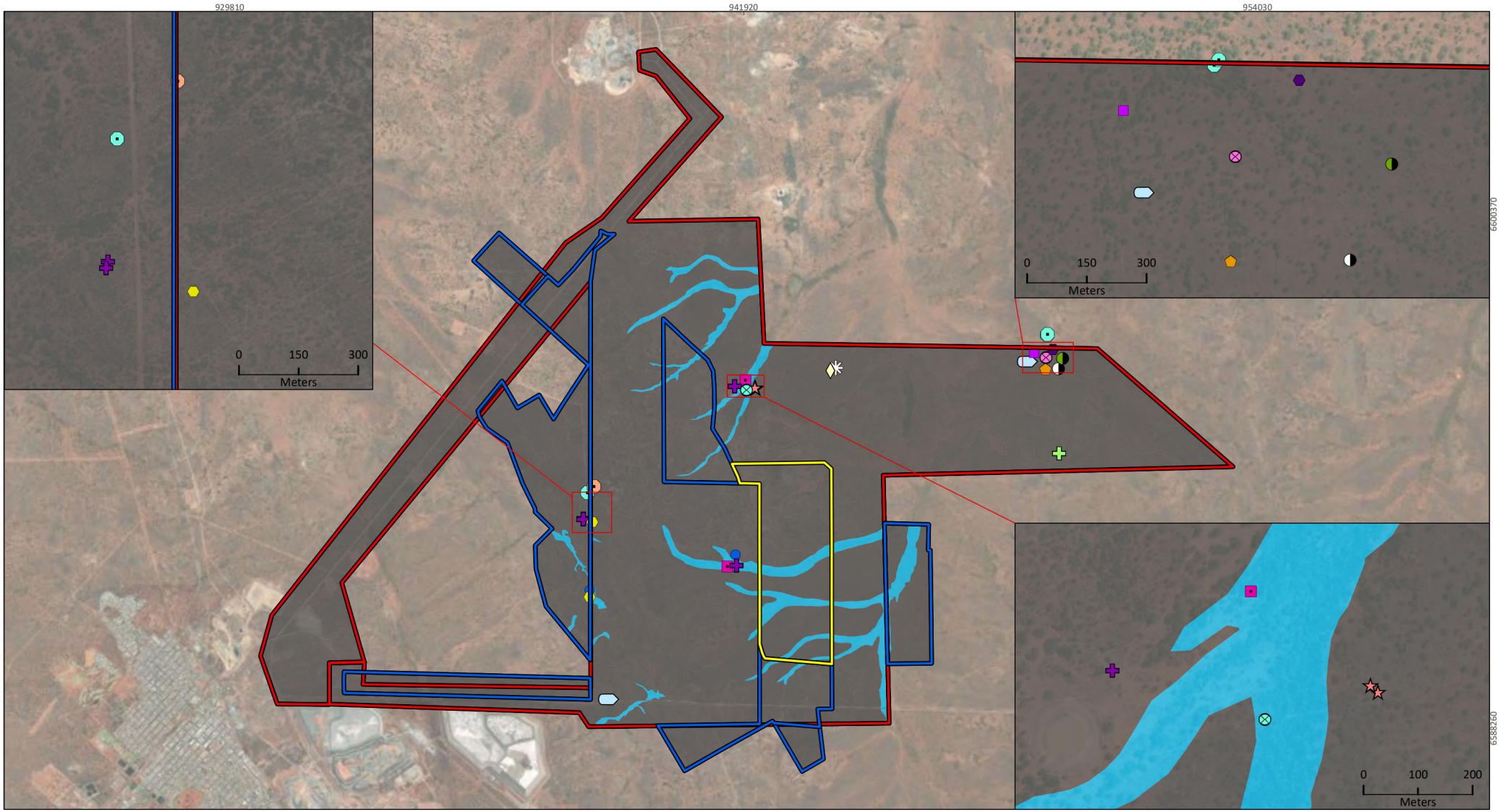
Table 5-8 Specimens from SRE group recorded in the field survey - rows highlighted grey represent previously unknown taxa

Higher order/ Family	Taxa	Sites	Habitats	No. specimens	SRE Status/ significance	Comments
Class Arachnida, infraorder Mygalomorphae (trapdoor spiders; 7)						
Anamidae	*Kwonkan* 'Phoenix0085'	KO-008	Open woodland	1	Potential	This specimen is **0.5%** divergent from PES34711 (Kwonkan 'Phoenix0085' from Phoenix (2024a)) and is therefore considered conspecific. Species first recorded by Phoenix (2024a).
Barychelidae	*Synothele* 'Phoenix0083'	KO-005	Open woodland	1	Potential	This specimen is **7.5%** divergent from PES34806 (Synothele 'Phoenix0083' from Phoenix (2024a)) and is therefore considered as a conservative conspecific. Species first recorded by Phoenix (2024a).
Barychelidae	*Synothele* 'Phoenix0103'	KO-005	Open woodland	1	Potential	This specimen is **13.9%** divergent from PES31454 (Synothele 'Phoenix0016' from Phoenix (2024a)) and is therefore considered a new species. Only recorded in the study area.
Euagridae	*Cethegus* 'MYG050'	KO-019	Open woodland	1	Widespread	This specimen is **2.2%** divergent from PES34650 (*Cethegus* 'MYG050') and is therefore considered conspecific. Previously recorded inside the study area by Phoenix (2024a).
Idiopidae	*Gaius austini* (previously *G.* 'kalgoorlie')	KO-005, KO-023	Open woodland	2	Widespread	These specimens are **0.0-1.7%** divergent from PES34704 (*Gaius austini* from Phoenix (2024a)) and are therefore considered conspecific. Previously recorded inside the study area by Phoenix (2024a).
Idiopidae	*Idiosoma* 'MYG244'	KO-002, KO-003, KO-MF1	Drainage, shrubland	4	Potential	These specimens are **0.1-0.8%** divergent from PES34699 (*Idiosoma* 'MYG244') and are therefore considered conspecific. Previously recorded inside the study area by Phoenix (2024a).

Higher order/ Family	Taxa	Sites	Habitats	No. specimens	SRE Status/ significance	Comments
Idiopidae	*Idiosoma* 'MYG256'	KO-007	Shrubland	1	Widespread	This specimen is **1.6%** divergent from PES34690 (*Idiosoma* sp. MYG256) and are therefore considered conspecific. Previously recorded inside the study area by Harewood (2015), but has a range greater than 10,000 km^2
Class Malacostraca, order Isopoda (isopods; 6)						
Armadillidae	*Buddelundia* cf *frontosa*	KO-005, KO-MF1	Open woodland, Shrubland	3	Potential	Specimens have an intraspecific divergence of **8.17%** and are therefore considered conservatively conspecific. These specimens are **15.39%** divergent from other species analysed. They are a morphologically identified as *Buddelundia* cf *frontosa.*
Armadillidae	*Buddelundia* sp. indet.	KO-MF1	Shrubland	1	Uncertain	Juvenile specimen that is morphologically distinct from other specimens collected. Genetic analysis failed so remains taxonomically unresolved. SRE status Uncertain owing to taxonomic data deficiency. Distribution unknown.
Paraplatyarthidae	*Paraplatyarthrus* KWB1	KO-003	Drainage	1	Potential	The sequence of *Paraplatyarthrus* KWB1 was sister to *Paraplatyarthrus* 'G2' which was collected at Goongarrie (north of this study), but still clearly different at **12.42%** sequence divergence. Since no matching sequences were obtained, it is considered likely to be an SRE species.
Paraplatyarthidae	*Paraplatyarthrus* KWB2	KO-005	Open woodland	1	Potential	This specimen is **13.0%** divergent with other species analysed and is therefore considered a new species. It is considered likely to be an SRE species.
Philosciidae	Philosciidae KWB	KO-MF1, KO-001	Open woodland, Minor Breakaway supporting open woodland	3	Potential	Specimens have **19.07%** divergence from other species analysed and are therefore considered a new species. There was insufficient resolution in the phylogeny to unambiguously place this taxon in a genus group. Philosciidae of this type have high potential to be SREs and this taxon is therefore considered a likely SRE.

Higher order/ Family	Taxa	Sites	Habitats	No. specimens	SRE Status/ significance	Comments
Philosciidae	Philosciidae sp. indet.	KO-005	Open woodland	2	Uncertain	SRE status Uncertain owing to taxonomic data deficiency. Distribution unknown.
Class Arachnida, order Pseudoscorpions (pseudoscorpions; 6)						
Chernetidae	Chernetidae sp. indet.	KO-002, KO-003	Drainage	2	Uncertain	SRE status Uncertain owing to taxonomic data deficiency. Distribution unknown.
Chernetidae	Chernetidae 'Phoenix0185'	BF005, BF017, BF003, BF013	Open woodland	15	Potential	Specimens **19.9%** divergent from closest available match. There was insufficient resolution in the phylogeny to unambiguously place this taxon into a genus group. Species taxonomy not resolved. May represent a new species or a known but not-sequenced species. Potential SRE owing to taxonomic data deficiency.
Garypidae	*Synsphyronus* sp. indet.	KO-005, BF011	Open woodland	6	Uncertain	These specimens have an intraspecific divergence of 1.1% and are therefore considered conspecific. Specimens could not be matched to a known species or morphospecies due to poor representation of this group in available reference libraries. However, it is considered highly likely that these specimens represent *S. mimulus* or *S. dorothyae* (both Widespread). SRE status Uncertain owing to taxonomic data deficiency. Distribution unknown.
Olpiidae	*Beierolpium* sp. indet.	KO-MF1, KO01	Minor breakaway supporting open woodland, shrubland	2	Uncertain	SRE status Uncertain owing to taxonomic data deficiency. Distribution unknown.
Olpiidae	*Beierolpium* 'Phoenix0186'	BF002	Open woodland	1	Potential	This specimen is **19.4%** divergent from its closest available match and does not match other specimens collected as part of this survey. It is therefore conservatively considered a new species, however, could potentially represent a known but not-sequenced species. Distribution unknown. Potential SRE owing to taxonomic data deficiency.

Higher order/ Family	Taxa	Sites	Habitats	No. specimens	SRE Status/ significance	Comments
Olpiidae	*Beierolpium* 'Phoenix0187'	KO-002, BF011	Open woodland, drainage	6	Potential	Specimens were **17.8%** divergent from closest available match and do not match other specimens collected as part of this survey. They are therefore conservatively considered a new species, however, could potentially represent a known but not-sequenced species. Distribution unknown. Potential SRE owing to taxonomic data deficiency.
Class Chilopoda, order Centipedes (centipedes; 2)						
Chilenophilidae	Chilenophilidae sp. indet.	KO-005	Open woodland	1	Uncertain	SRE status Uncertain owing to taxonomic data deficiency. Distribution unknown.
Cryptopidae	*Cryptops* sp. indet.	KO-003	Drainage	2	Uncertain	DNA analysis failed. SRE status Uncertain owing to taxonomic data deficiency. Distribution unknown.
Class Arachnida, order Scorpions (scorpions; 1)						
Buthidae	*Lychas* 'splendens'	KO-MF1	Shrubland	1	Widespread	This morphospecies is regarded as Widespread.





Northern Star Resources Limited
Black Flag - Kalgoorlie Operations

Project No	1649
Date	8/07/2024
Drawn by	BK
Map author	BT

0 2.5 5
Kilometers

1:121,100(at A4) GDA 1994 MGA Zone 51

All information within this map is current as of 8/07/2024. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.

P:\Data\Projects\Kalgoorlie Operations\1649-KO-NSR-FAU\GIS\Mapping\MapDocuments\1625_maps.aprx

2022 study area
2023 study area
2024 study area

SRE habitat
High
Low

Name, SRE status
Beierolpium sp. indet., Uncertain
Buddelundia cf. *frontosa*, Potential
Buddelundia sp. indet., Uncertain
Cethegus 'MYG050', Not SRE
Chernetidae sp. indet., Uncertain
Chilenophilidae sp. indet., Uncertain
Chilopoda sp. indet., Uncertain
Cryptops sp. indet., Uncertain
Gaius austini, Not SRE
Idiosoma 'MYG244', Potential
Idiosoma 'MYG256', Not SRE
Paraplatyarthrus KWB1, Confirmed
Paraplatyarthrus KWB2, Potential
Philosciidae KWB, Potential
Philosciidae sp. indet., Uncertain
Synothele 'Phoenix0083', Potential
Synothele'Phoenix0103', Potential
Synsphyronus sp. indet., Uncertain

Figure 5-4

SRE habitats and recorded SRE taxa from the field survey

PHOENIX ENVIRONMENTAL SCIENCES

5.3 SURVEY LIMITATIONS

The limitations of the terrestrial fauna survey have been considered in accordance with EPA (2020) (Table 5-9).

Table 5-9 Potential survey limitations

Limitations	Limitation	Comments
Availability of contextual information at a regional and local scale	No	Numerous studies have previously been undertaken within or in the vicinity of the study area which provide adequate contextual information.
Competency/experience of the team carrying out the survey	No	The field team and report authors have extensive experience in terrestrial fauna surveys within the vicinity of the study area and across WA.
Scope and completeness	No	All target fauna groups, conservation significant species and habitats within the study area were surveyed adequately.
Proportion of fauna recorded and/or collected, any identification issues	No	The fauna survey is considered adequate for a basic survey considering the habitat types present in the study area. All vertebrate fauna was identified to the species level in the field. Invertebrate fauna specimens were submitted to taxonomic specialists on relevant groups for identification.
Access within the study area	No	The whole of the study area was accessible by vehicle or on foot.
Timing, rainfall, season	No	Temperatures preceding and during the survey was comparable to annual averages for previous years. Rainfall was higher than average during August and September (the month prior and during the survey) in 2022, and above average in September 2023. Some rainfall occurred during the 2024 survey. The survey timing was within optimal timing for reptiles, amphibians, birds, and mammals but was outside the optimal timing for SREs in the DBCA Goldfields region (south) (May-August). However, conditions leading up to the survey and during the survey were suitable in terms of adequate rainfall and temperatures for SRE activity.
Disturbance that may have affected the results of the survey	No	No disturbances occurred during the field survey which are considered to have impacted the results.

6 DISCUSSION

The study area lies on the border of the East Murchison and Eastern Goldfields subregion (Cowan 2001a, b) within the northern boundary of the Great Western Woodlands (DEC 2010). This location roughly coincides with the mulga-eucalypt line, within a transitional zone where mulga shrublands and eucalypt woodlands form a complex mosaic.

The vertebrate fauna assemblage of the East Murchison and Eastern Goldfields subregions, particularly in close proximity to Kalgoorlie, has been well surveyed and described. In contrast, the invertebrate fauna of the region is less well known, as is standard across the country. This is particularly true for those groups with limited dispersal abilities, resulting in the provisional Potential SRE status of many taxa. However, previous SRE surveys conducted around Kalgoorlie, including several that overlap the study area, provide good background knowledge and regional data.

6.1 VERTEBRATE FAUNA

6.1.1 Vertebrate fauna habitats

Of the 9 fauna habitat types identified in the study area, ‘open woodland’ and ‘shrubland’ are the most abundant, respectively occupying 40.5% and 30.5% of the study area (Table 5-4). The south-western portion of the study area is proximal to Kalgoorlie-Boulder; as such, obvious signs of disturbance are notable. A higher proportion of this area has been cleared for infrastructure purposes, and vegetation has been almost entirely cleared of upper story vegetation and is dominated by tussock grassland and invasive weeds.

Fauna habitats identified and mapped in the study area match broadly with those in the surrounding area and most are widespread in the region. Restricted habitats in the study area include ‘minor breakaway supporting open woodland’, ‘farm dam with permanent pools’, ‘grassland’ and 'floodplain’ (Table 5-4). However, these habitats also occur outside the study area and are unlikely to represent critical habitat for significant vertebrate fauna.

Habitats within the study area most likely to represent an important life history component for conservation significant species (i.e., used for breeding, dispersal, refuge and foraging) are those with high productivity or structural complexity. This includes open woodland, shrubland and minor breakaway supporting open woodland.

Open woodland is regionally extensive. The large trees with hollows, fallen logs and patches of deep leaf litter provide refugia to a variety of species. In particular, eucalypt woodland may be utilised for roosting by the Central Long-eared Bat and occasional denning, foraging and/or dispersal by Chuditch. Tall, mature trees may also provide suitable nesting habitat for Peregrine Falcon.

Shrubland occurs patchily throughout the study area, and more broadly in the region. The dense shrubby understory, extensive leaf litter and abundance of flowing/seeding shrubs provide cover from predators and productive foraging. Mulga shrubland is likely to be regularly utilised by Malleefowl for nesting, foraging and dispersal.

The minor breakaway supporting open woodland is restricted both regionally and within the study area. The small areas of caves and overhangs within the breakaway may occasionally be utilised by mammals, including Chuditch. However, the low complexity and limited extent of the breakaway system likely prevents permanent inhabitancy.

The grassland coincides with the areas of high disturbance in close proximity to Kalgoorlie. These areas have had much of their overstory removed through clearing.

The minor floodplain represents the merge point of several drainage lines and is likely to be seasonally inundated. This area may attract a variety of bird species during wet conditions.

The remaining habitats are widespread or are unlikely to represent important habitat to conservation significant species.

6.1.2 Vertebrate fauna assemblage

The desktop review identified 318 vertebrate fauna taxa potentially occurring in the vicinity of the study area, of which 30 are listed as conservation significant (Table 5-2). The 77 vertebrate species recorded during the surveys were all expected to occur based on the desktop review. One Threatened vertebrate species was recorded during the field survey (Malleefowl).

Malleefowl was recorded within the study area during the surveys. The records include mounds which confirm breeding habitat is present, which is consistent with their known distribution at a local and regional scale, and their tendency to nest and forage in shrublands dominated by mallee (NMRT 2019). The desktop review also indicates a strong presence of Malleefowl throughout the Goldfields region, with an abundance of records, including nests/breeding, occurring in all directions from the study area (ALA 2024; DBCA 2024; Phoenix 2024b). Malleefowl presence and habitat suitability within the study area is presented in more detail in Phoenix (2025).

No evidence of Chuditch was recorded during the surveys. Chuditch records in the area are sparce, and suitable refuge within the study area (rocky breakaways or hollow logs) is scarce, therefore very unlikely to support resident populations.

Southern Whiteface was recorded in the desktop review, and is likely to occur in a variety of habitat types, most notably open woodlands and shrublands. This species is abundant and widespread across the region and Australia, especially in arid and semi-arid areas.

Fork-tailed Swifts are summer migrants to Australia and may be found over any habitat type, where they forage in the airspace above. The species is considered likely to occur within the study area as infrequent visitors to forage; however, as they are almost exclusively aerial, they are unlikely to land or nest in the study area.

Western Rosella is likely to be a visitor or possibly a resident within the study area in woodland habitat. ALA (2024)shows multiple records of Western Rosella within the desktop review area, most of which are absent from the other databases consulted. Because only the inland subspecies is Priority listed, records not explicitly identified to subspecies would not be included in the Threatened and Priority Fauna Database (DBCA 2021). The nearest occurrence is 1.1 km to the south, so the species is likely to occur in the study area; whether regular foraging or breeding occurs would depend on the population density (typically low, and here just outside the inland limit of the species range), and on the condition of vegetation in the study area, especially presence of suitable tree hollows.

Peregrine Falcon has large foraging ranges and are considered likely to occasionally forage within and in the vicinity of the study area. It is possible the species may nest in tree hollows or in large, abandoned nests of other birds.

Central Long-eared Bat was considered likely to occur within the study area. While not recorded during the survey, the species has previously been recorded nearby at Kanowna Belle mine site (Harewood 2015). ALA (2024) shows one other record of the species recorded in 2017, occurring 40 km southwest of the study area (Appendix 3). The scarcity of records and patchy distribution indicates the species may occur as an occasional resident or foraging visitor to the study area.

Of the other significant bird species considered possible to occur in the study area, most are Migratory birds (Table 5-6; including those that migrate within Australia) and would be no more than occasional visitors to ‘farm dam with permanent pools’ habitat or fly across the study area to large salt lakes 7-20 km away.

Secondary signs of introduced mammals, such as cat, fox, rabbit, and dingo, were recorded scattered throughout the study area in low density. Given the proximity of Kalgoorlie-Boulder to the study area, the occurrence of introduced species was expected.

6.2 SRE AND SIGNIFICANT INVERTEBRATE FAUNA

6.2.1 Invertebrate habitats

Nine invertebrate fauna habitats were identified within the study area, primarily comprising open woodland and shrubland, which cover 40.5% and 30.5% of the study area respectively.

Two habitats are considered to have High Potential to support SRE invertebrate taxa due to their characteristics, relative isolation, or restricted distribution within the landscape (drainage lines and minor breakaway). These habitats collectively make up 5.3% of the study area.

The drainage lines in the study area offer higher habitat complexity and moisture retention that much of the surrounding landscape, providing highly suitable habitat for SREs. The drainage lines continue outside of the study area and any species they host are unlikely to be restricted to the study area.

The minor breakaway provides supporting open woodland offers limited vegetation cover or leaf litter, but the crevices and overhands offer suitable refugia for SRE groups. The unique substrate and limited regional extent of this habitat may influence the assemblage of invertebrate fauna that it hosts. The habitat does occur outside of the study area but is limited in extent.

The remaining habitats are Low Potential SRE habitats as they are unrestricted and have no barriers to dispersal. However, many still provide microhabitats suitable for supporting invertebrate fauna and may host SREs. In particular, the large expanses of open woodland offer deep leaf litter and many fallen logs, which likely influenced the diverse assemblage recorded in the habitat.

6.2.2 Invertebrate assemblage

The study area supports a relatively diverse assemblage of SRE fauna, which includes a mix of well-studied taxa and species new to science.

The desktop review identified records of 7 Confirmed SRE taxa and 93 Potential SRE taxa within the search extent (Table 5-3). Of these, 3 Confirmed and 11 Potential SRE taxa have previously been recorded within the study area.

The field surveys collected 27 taxa, of which 17 were Potential SREs (Table 5-8) and the remaining were Widespread taxa or taxa of Uncertain SRE status due to poorly resolved taxonomy. The 17 Potential SREs included a combination of recognised taxa, species new to science and taxonomically unresolved taxa.

The assemblage was primarily comprised of mygalomorph (trapdoor) spiders, isopods (woodlice/slaters) and pseudoscorpions. Representatives the from scorpion and centipede groups were also collected.

IHB (*Jalmenus aridus*; P1) is recorded in the study area and suitable habitat exists for this species, which is discussed in further detail in Phoenix (2024c). Future surveys during the flight season will determine if the species reside within the study area. Furthermore, *Camponotus* sp. nr. *terebrans* were not detected in the search area, therefore, ABAB is not likely to occur (Phoenix 2024c).

6.2.2.1 Confirmed SRE taxa

No Confirmed SREs were collected during the field surveys. However, the desktop review identified 3 Confirmed SRE taxa that have previously been recorded in the study area including 2 *Antichiropus* millipedes and a mygalomorph spider from the *Missulena* (mouse spider) genus.

Missulena harwoodi has been recorded from 2 sites in open woodland and groved woodland within the study area. It has also been recorded in woodland approximately 5 km south of the study area.

Antichiropus 'DIP145, Kalgoorlie' and *Antichiropus* 'DIP176, Kalgoorlie' were recorded from the same site, located in open woodland. *Antichiropus* millipedes in arid areas are more detectable humid

weather conditions, making them difficult to collect therefore distributions is difficult to ascertain. No records of these 2 species occur outside the study area, however given the open woodland habitat these 2 species occurs in does not contain high refugia characteristics or is restricted, it is likely these occur outside the study area.

6.2.2.2 Potential SRE taxa

The Potential SREs collected during the field survey comprised 11 taxa, comprising of mygalomorph spiders, isopods and pseudoscorpions.

Seven taxa collected during the field survey had significant genetic divergence from their closest matches on GenBank or the Phoenix Biological Database and are considered new species. These taxa are all regarded as Potential SREs due to data deficiency and/or the nature of their occurrence throughout the study area. These species comprise:

- Mygalomorph spiders
    - *Synothele* 'Phoenix0103'
      Recorded from a single site in open woodland. Habitat is of Low Potential for SREs and is both extensive and continuous outside the study area. Unlikely to be restricted to the study area.
- Isopods
    - *Paraplatyarthrus* KWB1
      Collected from one site in drainage, which is regarded as being of High Potential for SREs. Drainage has a relatively limited extent in the study area but extends well into the surrounding region. This taxon is unlikely to be restricted to the study area but is considered likely to be an SRE based on analysis by taxonomic experts.
    - *Paraplatyarthrus* KWB2
      Collected from one site in open woodland, which is considered to be of Low Potential for SREs and continuous in the study area and broader region. This taxon is unlikely to be restricted to the study area but is considered likely to be an SRE based on analysis by taxonomic experts.
    - Philosciidae KWB
      Collected from 2 sites in open woodland and minor breakaway supporting open woodland. Open woodland is considered to be of Low Potential for SREs and is continuous in the study area and broader region. Minor breakaway is regarded as being of High Potential for SREs, primarily because it is limited in extent both within the study area and regionally. This taxon is unlikely to be restricted to the study area but is considered likely to be an SRE.
- Pseudoscorpions
    - Chernetidae ‘Phoenix0185’
      Collected from 4 sites distributed across the study area and all located in open woodland. Given the widespread nature of the habitat, it is unlikely that this species is restricted to the study area. However, it is regarded as a Potential SRE due to data deficiency.
    - *Beierolpium* ‘Phoenix0186’
      Collected from one site in open woodland. Given the widespread nature of the habitat, it is unlikely that this species is restricted to the study area. Is regarded as a Potential SRE due to data deficiency.
    - *Beierolpium* ‘Phoenix0187’
      Collected from 2 sites in drainage and open woodland. Drainage has a relatively limited extent in the study area but extends well into the surrounding region, while open woodland is extensive and continuous in the study area and regionally. It is

unlikely that this taxon is restricted to the study area, however it is regarded as a Potential SRE due to data deficiency.

Given the limited taxonomic knowledge and reference material available for mygalomorph spiders, isopods and pseudoscorpions, it is possible any of the above species have been collected regionally and not classified in an open access database.

A total of 4 taxa regarded as Potential SREs were collected during the field survey, all of which were identified in the desktop review. They comprise:

- Mygalomorph spiders
  - *Kwonkan* 'Phoenix0085'
    Collected from one site in open woodland during the current survey and from one site within the study area during a previous survey Phoenix (2024a). Has also been recorded from multiple sites between 1 km and 4 km south of the study area. This species is not restricted to the study area but is regarded as a Potential SRE due to data deficiency. The habitats from which it has been recorded are widespread.
  - *Synothele* 'Phoenix0083'
    Collected from one site in open woodland during the current survey and from one site within the study area during a previous survey Phoenix (2024a). Has also been recorded from a site approximately 5 km south of the study area. This species is not restricted to the study area but is regarded as a Potential SRE due to data deficiency. The habitats from which it has been recorded are widespread.
  - *Idiosoma* 'MYG244'
    Collected from 4 sites in drainage and shrubland during the current survey and from 3 sites within the study area during a previous survey Phoenix (2024a). Also known from a site located approximately 1 km south-east of the study area. This species is not restricted to the study area but is regarded as a Potential SRE due to data deficiency. The habitats from which it has been recorded extend outside the study area, with shrubland being extensive and continuous in the region.
- Isopods
  - *Buddelundia* cf. *frontosa*
    Collected from 2 sites in open woodland and shrubland, which are regarded as being of Low Potential for SREs. This is a southern Goldfields species, but the specimens were borderline conspecific; possibly suggesting a species complex. The habitats in which it was recorded are both widespread and continuous in the region. It is unlikely that this species is restricted to the study area but is regarded as a Potential SRE.

6.3 CONCLUSION

The fauna habitats identified and mapped in the study area are broadly consistent with those known from the region and most are considered widespread. All habitats also occur outside the study area.

One conservation significant species, Malleefowl (VU), was recorded during the surveys including evidence of breeding. Suitable habitat exists throughout the study area, particularly in shrubland habitats (see Phoenix (2025) for habitat suitability).

Southern Whiteface (VU) has been recorded in the study area, and likely occurs in woodland and shrubland habitat within the study area. This species is widely distributed across mainland Australia, occurring in a variety of woodlands and shrubland habitats with suitable grass/shrub understory, however is threatened by habitat loss and fragmentation (DCCEEW 2023a).

Fork-tailed Swift, Peregrine Falcon, Central Long-eared Bat and Western Rosella (inland ssp.) are considered likely to occur within the study area. Some Migratory or significant wetland bird species may occasionally use the study area in ‘farm dam with permanent pool’ habitat, but it does not

represent important or restricted habitat values for such species. Any significant species with potential to occur would not be restricted to the study area.

Three Confirmed SRE taxa are known to occur within the study area, none of which were recorded during this survey. All occur in habitat that is extensive within the region, or habitats that are limited within the study area but are connected to similar and extensive habitat outside the study area. The majority of the study area (95.2%) consists of widespread Low potential SRE or Negligible (cleared) habitat, with the High Potential SRE habitats (minor drainage and rocky breakaway), representing only 4.8%.

REFERENCES

ALA. 2022. *Atlas of Living Australia*. Available at: http://www.ala.org.au/

ALA. 2024. *Atlas of Living Australia*.

Benshemesh, J. 2007. *National Recovery Plan for Malleefowl Leipoa ocellata*. South Australian Department of Environment and Heritage, South Australia.

Benson, D. A., Cavanaugh, M., Clark, K., Karsch-Mizrachi, I., Lipman, D., Ostell, J. & Sayers, E. W. 2012. GenBank. *Nucleic Acids Research* **41**: D36–D42.

Birdlife International. 2015. *Species fact sheet: Blue-billed Duck (Oxyura australis)*. Birdlife International. Available at: http://www.birdlife.org/datazone/speciesfactsheet.php?id=362

BoM. 2022. *Climate statistics for Australian locations*. Commonwealth of Australia, Bureau of Meteorology. Available at: http://www.bom.gov.au/climate/data/

BoM. 2024. *Climate statistics for Australian locations*. Commonwealth of Australia, Bureau of Meteorology. Available at: http://www.bom.gov.au/climate/data

Brett Lane and Associates. 2005. *Wind Farms and Birds: Interim Standards For Risk Assessment. Australian Wind Energy Association Report*. Brett Lane and Associates Pty Ltd. Published report to the Commonwealth Government of Australia, Department of Environment and Heritage. Available at: https://tethys.pnnl.gov/sites/default/files/publications/BrettLane-2005.pdf

Bullen, R. D. & McKenzie, N. L. 2002. Differentiating Western Australian *Nyctophilus* (Chiroptera: Vespertilionidae) echolocation calls. *Australian Mammalogy* **23**: 89–93.

Car, C. A. & Harvey, M. S. 2014. The millipede genus *Antichiropus* (Diplopoda: Polydesmida: Paradoxosomatidae), Part 2: species of the Great Western Woodlands region of Western Australia. *Records of the Western Australian Museum* **29**: 20–77.

Cogger, H. G., Cameron, E. E., Sadlier, R. A. & Eggler, P. 1993. *The action plan for Australian reptiles*. Australian Nature Conservation Agency, Canberra, ACT. Available at: http://www.environment.gov.au/biodiversity/threatened/publications/action/reptiles/index.html

Cowan, M. 2001a. Coolgardie 3 (COO3—Eastern Goldfields subregion). *In:* May, J. E. & McKenzie, N. L. (eds) *A biodiversity audit of Western Australia's 53 biogeographical subregions in 2002.* Department of Conservation and Land Mangement, Perth, W.A., pp. 156–169.

Cowan, M. 2001b. Murchison 1 (MUR1—East Murchison subregion). *In:* May, J. E. & McKenzie, N. L. (eds) *A biodiversity audit of Western Australia's 53 biogeographical subregions in 2002.* Department of Conservation and Land Management, Perth, WA, pp. 466–479.

DAWE. 2021a. *Onshore Wind Farms – interim guidance on bird and bat management*. Department of Agriculture, Water and the Environment, ACT.

DAWE. 2021b. *Species Profile and Threats Database*, Canberra.

DAWE. 2022. *Protected Matters Search Tool*. Department of Climate Change, Energy, the Environment and Water, Canberra, ACT. Available at: http://environment.gov.au/epbc/protected-matters-search-tool

DBCA. 2020. *Arid bronze azure butterfly (ABAB) survey in Western Australia additional information*. Department of Biodiversity, Conservation and Attractions. Available at: https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals/562-arid-bronze-azure-butterfly

DBCA. 2021. *Threatened and Priority fauna database*. Department of Biodiversity, Conservation and Attractions, Kensington, WA.

DBCA. 2022a. *NatureMap database*. Department of Biodiversity and Attractions, Perth, WA.

DBCA. 2022b. *Threatened and Priority fauna database*. Department of Biodiversity, Conservation and Attractions, Kensington, WA.

DBCA. 2024. *Threatened and Priority fauna database*. Department of Biodiversity, Conservation and Attractions, Kensington, WA.

DCCEEW. 2022. *Protected Matters Search Tool*. Department of Climate Change, Energy, the Environment and Water, Canberra, ACT. Available at: https://pmst.awe.gov.au

DCCEEW. 2023a. *Conservation Advice for Aphelocephala leucopsis (southern whiteface) in* Department of Climate Change, E., the Environment and Water, ed. Commonwealth of Australia, Canberra, ACT.

DCCEEW. 2023b. *Species Profile and Threats Database*. Department of Climate Change, Energy, Water and the Environment, Canberra, ACT. Available at: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

DCCEEW. 2024. *Species Profile and Threats Database*. Department of Climate Change, Energy, Environment and Water, Canberra, ACT. Available at: https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

DEC. 2010. *A biodiversity and cultural conservation strategy for the Great Western Woodlands*. Department of Environment and Conservation, Perth, WA.

DEC. 2012. *Chuditch (Dasyurus geoffroii) National Recovery Plan*. Government of Western Australia, Department of Environment and Conservation, Australian Government.

del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A. & de Juana, E. 2014. *Handbook of the Birds of the World Alive*. Lynx Edicions, Barcelona.

Department of the Environment. 2015. *Wildlife conservation plan for migratory shorebirds*. Department of the Environment, Canberra, ACT. Available at: http://www.environment.gov.au/system/files/resources/9995c620-45c9-4574-af8e-a7cfb9571deb/files/widlife-conservation-plan-migratory-shorebirds.pdf

DEWHA. 2010. *Survey guidelines for Australia's threatened bats: guidelines for detecting bats listed as threatened under the Environmental Protection and Biodiversity Conservation Act 1999*. Department of Environment, Water, Heritage and the Arts, Parkes, ACT. Available at: http://www.environment.gov.au/epbc/publications/pubs/survey-guidelines-bats.pdf

DoE. 2013. *Matters of National Environmental Significance. Significant impact guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999*. Australian Government, Department of the Environment, Canberra, ACT.

DoE. 2015. *Draft Referral guideline for 14 birds listed as migratory species under the EPBC Act*. Commonwealth of Australia, Department of the Environment, Canberra, Australia. Available at: https://www.awe.gov.au/sites/default/files/documents/migratory-birds-draft-referral-guideline.pdf

DoEE. 2016. *Maps: Australia's bioregions (IBRA)*. Department of the Environment and Energy, Canberra, ACT. Available at: http://www.environment.gov.au/topics/land/national-reserve-system/science-maps-and-data/australias-bioregions-ibra

DoEE. 2017. *EPBC Act Policy Statement 3.21—Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species*. Department of Environment and Energy, Canberra, Australia.

DoEE. 2020. *Species Profile and Threats Database*. Department of the Environment and Energy, Australian Government, Canberra, ACT. Available at: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Dotmatics. 2022. *Geneious 2022.2*. https://www.geneious.com.

DPaW. 2017a. *Interim guideline for preliminary surveys of Night Parrot (Pezoporus occidentalis) in Western Australia*. Department of Parks and Wildlife, Kensington, WA. Available at: https://www.dpaw.wa.gov.au/images/documents/plants-animals/animals/interim_guideline_for_night_parrot_survey.pdf

DPaW. 2017b. *Night Parrot*. Department of Parks and Wildlife, Kensington, WA. Available at: https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals/487-night-parrot (accessed 9 June 2017).

DSEWPaC. 2011. *Survey guidelines for Australia's threatened mammals. Guidelines for detecting mammals listed as threatened under the Environment Protection and Biodiversity*

Conservation Act 1999. Department of Sustainability, Environment, Water, Population and Communities, Parkes, ACT.

Duncan, A., Baker, G. & Montgomery, N. 1999. *The action plan for Australian bats*.

Environment Protection and Heritage Council. 2010. *National Wind Farm Development Guidelines (Draft)*. Available at: http://nepc.gov.au/system/files/resources/8e446a1a-ab93-5f84-99d0-12d3422d2a23/files/draft-national-wind-farm-development-guidelines-july-2010.pdf

EPA. 2016a. *Environmental Factor Guideline: Terrestrial fauna*. Environmental Protection Authority, Perth, WA. Available at: http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Guideline-Terrestrial-Fauna-131216_3.pdf

EPA. 2016b. *Technical Guidance: Sampling of short range endemic invertebrate fauna*. Environmental Protection Authority, Perth, WA. Available at: http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Tech%20guidance-%20Sampling-SREs-Dec-2016.pdf

EPA. 2020. *Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment*. Environmental Protection Authority, Perth, WA. Available at: https://epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPA-Technical-Guidance-Vertebrate-Fauna-Surveys.pdf

Garnett, S. & Crowley, G. M. 2000. *The action plan for Australian birds*. Environment Australia, Canberra.

Garnett, S. T. & Baker, G. B. 2020. *'The Action Plan for Australian Birds 2020.'*. CSIRO, Melbourne, Vic.

Geering, A., Agnew, L. & Harding, S. 2007. *Shorebirds of Australia*. CSIRO Publishing, Collingwood, Vic.

GHD. 2015. *Joint Venture Operation in the Bulong Area: Level 1 Vegetation, Flora and Fauna Assessment*.

Government of Western Australia. 2018a. *Wildlife Conservation Act 1950 Wildlife Conservation (Rare Flora) Notice 2018*. Government Gazette, WA. Government of Western Australia, Perth, WA.

Government of Western Australia. 2018b. *Wildlife Conservation Act 1950, Wildlife Conservation (Specially Protected Fauna) Notice 2018*. Government Gazette, WA, Perth, WA.

Harewood, G. 2015. *Fauna survey (Level 2 - Phase 1 and 2). Proposed Tails Storage Facility Expansion*. Bunbury, WA. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd and Botanica Consulting Pty Ltd.

Harvey, M. S. 2002. Short-range endemism among the Australian fauna: some examples from non-marine environments. *Invertebrate Systematics* **16**: 555–570.

Hebert, P. D. N., A., C., Ball, S. L. & de Waard, J. R. 2003a. Biological identifications through DNA barcodes. *Proceedings of the Royal Society London B* **270**: 313–321.

Hebert, P. D. N., Ratnasingham, S. & de Waard, J. R. 2003b. Barcoding animal life: Cytochrome c oxidase subunit 1 divergences among closely related species. *Proceedings of the Royal Society London B, Supplement* **270**: 96–99.

IBSA. 2022. *Index of Biodiversity Surveys for Assessment*. Department of Water and Environmental Regulation, Perth, WA.

IUCN. 2019. *The IUCN Red List of Threatened Species*.

Johnstone, R. E. & Storr, G. M. 1998. *Handbook of Western Australian birds. Volume 1: Non-passerines (Emu to Dollarbird)*. Western Australian Museum, Perth, WA.

KLA. 2011. *Targeted survey for Western Rosella at Mt Caudan within the Parker Range region*. Keith Lindbeck and Associates, Bullcreek, WA. Unpublished report prepared for Cazaly Resources Ltd.

McKenzie, N. L., Rolfe, J. K. & Youngson, W. K. 1992. The biological survey of the Eastern Goldfields of Western Australia. Part 8: Kurnalpi - Kalgoorlie study area - Vertebrate fauna. *Records of the Western Australian Museum,* **Supplement No. 41**: 37-64.

Morcombe, M. 2004. *Field guide to Australian birds. Complete compact edition*. Steve Parish Publishing, Archerfield, QLD.

Murphy, S. A., Silcock, J., Murphy, R., Reid, J. & Austin, J. J. 2017. Movements and habitat use of the night parrot *Pezoporus occidentalis* in south-western Queensland. *Austral Ecology* **42**: 858-868 10.1111/aec.12508.

NMRT. 2019. *National Malleefowl Monitoring Manual: Edition: 2019_1*. National Malleefowl Recovery Team, Australia.

NMRT. 2022. *National Malleefowl Monitoring Manual: Edition: v2022*. National Malleefowl Recovery Team. Available at: https://static1.squarespace.com/static/5ee48b83a257c239d965b32b/t/6315b9170e35b708af52e0db/1662368067328/2022+Monitoring+Manual.pdf

Payne, A. L. & Leighton, K. A. 2004. Land systems. *In:* van Vreeswyk, A. M. E., Payne, A. L., Leighton, K. A. & Hennig, P. (eds) *Technical Bulletin 9. An inventory and condition survey of the Pilbara region, Western Australia*. Department of Agriculture, Government of Western Australia, South Perth, WA, pp. 175–384.

Phoenix. 2013. *Level 2 flora and vegetation survey and level 1 fauna survey for the Bullabulling Gold Project*. Phoenix Environmental Sciences. Unpublished report prepared for Bullabulling Gold Ltd.

Phoenix. 2014a. *Biological survey for the Tycho Gold Prospect*. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished report prepared for MacPhersons Resources Ltd.

Phoenix. 2014b. *Terrestrial invertebrate fauna monitoring for the St Ives Gold Mine – annual survey 2013*. Phoenix Environmental Sciences Pty Ltd, Balcatta, W.A. Unpublished report prepared for St Ives Gold Mining Pty Ltd.

Phoenix. 2018a. *Flora and SRE review for the Fimiston II Tailings Storage Facility Expansion Project*. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Phoenix. 2018b. *Flora and vegetation, and terrestrial fauna survey for proposed infrastructure within the Development Envelope of the Fimiston Gold Mine Operations*. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Phoenix. 2018c. *Flora, vegetation and terrestrial fauna survey of Croesus, Fimiston Gold Mine Operations*. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished draft report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Phoenix. 2018d. *Flora, vegetation and terrestrial fauna survey of the Crossroads tenements (M24/462, L24/197)*. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Phoenix. 2018e. *Flora, vegetation and terrestrial fauna survey of the Southern Cutback, Fimiston Gold Mine Operations*. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Phoenix. 2018f. *Terrestrial fauna survey for the St Ives Gold Mine Beyond 2018 Project*. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished report prepared for St Ives Gold Mining Company Pty Ltd.

Phoenix. 2019a. *Fauna survey for Mungari Gold Operations Cutter's Ridge Project*. Phoenix Environmental Sciences, Balcatta, WA. Unpublished report prepared for Evolution Mining Ltd.

Phoenix. 2019b. *Regional flora and fauna survey for St Ives Gold Mine*. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished report prepared for St Ives Gold Mining Company Pty Ltd.

Phoenix. 2019c. *Regional flora, vegetation and terrestrial fauna survey for the Gidji Operations*. Phoenix Environmental Sciences, Balcatta, WA. Unpublished report prepared for KCGM Operations.

Phoenix. 2019d. *Targeted flora and SRE survey for the FIM IIE Project*. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Phoenix. 2020. *Kambalda West regional flora and fauna survey for the St Ives Gold Mine*. Phoenix Environmental Sciences Pty Ltd, Osborne Park, WA. Unpublished report prepared for St Ives Gold Mining Company Pty Ltd.

Phoenix. 2022a. *Memo report: Gidji survey for Camponotus sp. nr. terebrans and ABAB*. Phoenix Environmental Sciences Pty Ltd, Osborne Park, WA.

Phoenix. 2022b. *Memo report: records of Jalmenus aridus at Fimiston*. Phoenix Environmental Sciences Pty Ltd, Osborne Park, WA.

Phoenix. 2022c. *Memo report: Targeted survey for Camponotus sp. nr. terebrans and Jalmenus aridus within Kalgoorlie Operations*. Phoenix Environmental Sciences Pty Ltd, Osbourne Park, WA. Memo report prepared for Northern Star Resources.

Phoenix. 2022d. *Phoenix Biological Database*. Phoenix Environmental Sciences Pty Ltd, Osborne Park, WA.

Phoenix. 2022e. *Terrestrial fauna survey of the proposed Regional Coreyard for the Kalgoorlie Operations*. Phoenix Environmental Sciences Pty Ltd, Osbourne Park, WA. Unpublished report for Northern Star Resources.

Phoenix. 2023a. *Basic and Targeted Terrestrial Fauna Survey for the Kalgoorlie Operations - Black Flag Wind Farm*. Prepared for Northern Star Resources Limited, Osborne Park, WA.

Phoenix. 2023b. *Memo report: Avifauna survey for the Kalgoorlie Operations*. Prepared for Northern Star Resources Limited, Osborne Park, WA.

Phoenix. 2024a. *Basic fauna and SRE survey and targeted SRE survey for the Fimiston Gold Mine Operations*. Phoenix Environmental Sciences Pty Ltd, Osborne Park, WA. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Phoenix. 2024b. *Phoenix Biological Database*. Phoenix Environmental Sciences Pty Ltd, Osborne Park, WA.

Phoenix. 2024c. *Targeted survey for Camponotus sp. nr. terebrans and Jalmenus aridus for the Black Flag Windfarm Project*. Phoenix Environmental Sciences Pty Ltd, Osborne Park, WA.

Phoenix. 2025. *Targeted Malleefowl survey for the Black Flag Wind Farm Project*. Phoenix Environmental Sciences Pty Ltd, Osborne Park, WA.

Prószyński, J. 2017. Pragmatic classification of the world's Salticidae (Araneae). *Ecologica Montenegrina* **12**: 1–133.

Rix, M. G., Huey, J. A., Cooper, S. J. B., Austin, A. D. & Harvey, M. S. 2018. Conservation systematics of the shield-backed trapdoor spiders of the *nigrum*-group (Mygalomorphae, Idiopidae, *Idiosoma*): integrative taxonomy reveals a diverse and threatened fauna from south-western Australia. *Zookeys* **756**: 1–121 http://dx.doi.org/10.3897/zookeys.756.24397.

Rix, M. G., Raven, R. J., Main, B. Y., Harrison, S. E., Austin, A. D., Cooper, S. J. B. & Harvey, M. S. 2017. The Australasian spiny trapdoor spiders of the family Idiopidae (Mygalomorphae: Arbanitinae): a relimitation and revision at the generic level. *Invertebrate Systematics* **31**: 566–634.

Schoenjahn, J., Pavey, C. R. & Walter, G. H. 2019. Ecology of the Grey Falcon *Falco hypolecucos* - current and required knowledge. *Emu* **120**: 74-82 10.1080/01584197.2019.1654393.

Schoknecht, N. R. & Payne, A. L. 2011. *Land systems of the Kimberley region, Western Australia*. Department of Agriculture and Food, Western Australia, Perth.

Smith, J. A., Wright, L. J. & Morris, K. D. 2004. BiblioChuditch: The Chuditch, *Dasyurus geoffroii* (Gould 1841), a Wildlife Science Library subject-specific bibliography. *Conservation Science of Western Australia* **5**: 6–19.

TSSC. 2020. *Conservation Advice Falco hypoleucos Grey Falcon*. Threatened Species Scientific Committee, Canberra, ACT. Available at: http://www.environment.gov.au/biodiversity/threatened/species/pubs/929-conservation-advice-09072020.pdf

Van Dyck, S. & Strahan, R. 2008. *The mammals of Australia*. New Holland Publishers, Sydney, NSW.

WAM. 2013. *WAM short-range endemic categories and sub-categories*. Western Australian Museum, Welshpool.

Weerheim, M. S. 2008. *Distribution patterns and habitat use of black cockatoos (Calyptorhynchus spp.) in modified landscapes in the south-west of Western Australia.* Master of Science (Environmental Management) thesis. School of Natural Sciences, Edith Cowan University, Perth, WA.

Woinarski, J., Burbidge, A. & Harrison, P. 2014. *The Action Plan for Australian Mammals 2012*.

Appendix 1 Survey site locations

Site	Latitude	Longitude
KO-001	-30.718548	121.567495
KO-002	-30.713858	121.603927
KO-003	-30.676646	121.606962
KO-004	-30.74302	121.622168
KO-005	-30.670933	121.681594
KO-006	-30.683204	121.681391
KO-007	-30.691123	121.681261
KO-008	-30.677482	121.701893
KO-009	-30.686671	121.712616
KO-010	-30.699469	121.573051
KO-011	-30.685378	121.575135
KO-012	-30.672712	121.566563
KO-013	-30.666121	121.584574
KO-014	-30.657093	121.596921
KO-015	-30.687902	121.605806
KO-016	-30.722603	121.635739
KO-017	-30.695243	121.651859
KO-018	-30.670541	121.654824
KO-019	-30.672693	121.627572
KO-020	-30.707041	121.568086
KO-021	-30.735908	121.495357
KO-022	-30.740785	121.539606
KO-023	-30.741912	121.574518
KO-024	-30.691483	121.626609
KO-025	-30.728404	121.584926
KO-026	-30.647055	121.576111
KO-027	-30.610834	121.589416
KO-028	-30.671127	121.546745
KO-029	-30.700338	121.520548
KO-MF1	-30.701945	121.568119
KO-MF2	-30.72190231	121.5822829
KO-Opp01	-30.687571	121.606535
KO-Opp02	-30.730977	121.567727
KO-Opp03	-30.664475	121.586157
KO-Opp04	-30.691011	121.610264
BF001	-30.6439	121.5732
BF002	-30.6514	121.5496
BF003	-30.6576	121.5671
BF004	-30.6587	121.5642
BF005	-30.6906	121.557
BF005	-30.6906	121.557

BF006	-30.7008	121.5621
BF007	-30.7246	121.5636
BF008	-30.7407	121.556
BF009	-30.738	121.531
BF010	-30.7492	121.6044
BF011	-30.7533	121.592
BF012	-30.7509	121.6183
BF013	-30.7377	121.6169
BF014	-30.7099	121.6484
BF015	-30.7237	121.6479
BF016	-30.6721	121.5945
BF017	-30.7437	121.6237
BF018	-30.6887	121.597
BFOP001	-30.6694	121.5663
BFOP002	-30.7383	121.5578
BFOP003	-30.7489	121.6203
BFOP004	-30.7437	121.625
BFOP005	-30.6739	121.5492
BF01	-30.7282	121.6191
BF02	-30.7266	121.6186
BF03	-30.7212	121.6189
BF04	-30.715	121.619
BF05	-30.7102	121.6192
BF06	-30.7222	121.6207
BF07	-30.7253	121.6226
BF08	-30.7325	121.6223
BF_MFmound	-30.7052	121.6237

Appendix 2 Terrestrial fauna survey site descriptions

Site details			
Site	**KO-001**	**Position (WGS84)**	121.568931 -30.719151
Slope	moderate	**Topography**	breakaway
Soil colour	black	**Soil texture**	alluvium
Rock cover (%)	30	**Rock type**	limestone, laterite

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	12 Sep 2022	12 Sep 2022
1	Camera trap	12 Sep 2022	16 Sep 2022
1	Camera trap	12 Sep 2022	16 Sep 2022
1	Camera trap	12 Sep 2022	16 Sep 2022
1	Ultrasonic recording	12 Sep 2022	14 Sep 2022
1	Opportunistic sighting	12 Sep 2022	12 Sep 2022
1	Birding	14 Sep 2022	14 Sep 2022
1	Opportunistic sighting	14 Sep 2022	14 Sep 2022
1	Litter sieve	16 Sep 2022	16 Sep 2022
1	Foraging - SRE	16 Sep 2022	16 Sep 2022
1	Foraging - vertebrates	16 Sep 2022	16 Sep 2022

Site description - visit 1 (12 Sep 2022)

Low hills and breakaways with limestone and laterite supporting mixed low open Eucalyptus woodland over Melaleuca over scattered mixed low shrubs.

Habitat	woodland		
Disturbance	vehicle tracks, litter		
Vegetation condition	Good	**Fire age**	>10
Total veg. cover (%)	66.0	**Litter distribution**	
Tree cover (%)	30.0	**Litter depth (cm)**	3.0
Shrub cover (%)	35.0	**Litter cover (%)**	20.0
Grass cover (%)	0.0		
Herb cover (%)	1.0		



Site details			
Site	**KO-002**	**Position (WGS84)**	121.603284 -30.713662
Slope		**Topography**	drainage line
Soil colour	orange	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	12 Sep 2022	12 Sep 2022
1	Camera trap	12 Sep 2022	16 Sep 2022
1	Camera trap	12 Sep 2022	16 Sep 2022
1	Camera trap	12 Sep 2022	16 Sep 2022
1	Camera trap	12 Sep 2022	16 Sep 2022
1	Birding	15 Sep 2022	15 Sep 2022
1	Litter sieve	15 Sep 2022	15 Sep 2022
1	Foraging - SRE	15 Sep 2022	15 Sep 2022
1	Foraging - vertebrates	15 Sep 2022	15 Sep 2022

Site description - visit 1 (12 Sep 2022)

Tall Eucalyptus forest of gimlet in drainage line over mixed low shrubs including Eremophila, Senna, greybush and bluebush on orange clay loam soils.

Habitat	woodland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	131.0	**Litter distribution**	
Tree cover (%)	70.0	**Litter depth (cm)**	4.0
Shrub cover (%)	60.0	**Litter cover (%)**	60.0
Grass cover (%)	0.0		
Herb cover (%)	1.0		



Site details			
Site	**KO-003**	**Position (WGS84)**	121.607642 -30.676529
Slope	gentle	**Topography**	drainage line
Soil colour	orange, red	**Soil texture**	clay loam
Rock cover (%)		**Rock type**	none

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	12 Sep 2022	12 Sep 2022
1	Ultrasonic recording	12 Sep 2022	16 Sep 2022
1	Camera trap	12 Sep 2022	16 Sep 2022
1	Camera trap	12 Sep 2022	16 Sep 2022
1	Camera trap	12 Sep 2022	16 Sep 2022
1	Camera trap	12 Sep 2022	16 Sep 2022
1	Birding	14 Sep 2022	14 Sep 2022
1	Foraging - vertebrates	14 Sep 2022	14 Sep 2022
1	Foraging - SRE	14 Sep 2022	14 Sep 2022
1	Litter sieve	14 Sep 2022	14 Sep 2022

Site description - visit 1 (12 Sep 2022)

Drainage line with scattered Eucalyptus over mulga over mixed low shrubs on red orange clay loam. Puddles of standing water in drainage.

Habitat	shrubland
Disturbance	vehicle tracks

Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	97.0	**Litter distribution**	even/continuous
Tree cover (%)	10.0	**Litter depth (cm)**	3.0
Shrub cover (%)	80.0	**Litter cover (%)**	70.0
Grass cover (%)	5.0		
Herb cover (%)	2.0		

Site details			
Site	**KO-004**	**Position (WGS84)**	121.622136 -30.742829
Slope		**Topography**	plain
Soil colour	orange	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Birding	13 Sep 2022	13 Sep 2022
1	Opportunistic sighting	13 Sep 2022	13 Sep 2022
1	Camera trap	13 Sep 2022	16 Sep 2022
1	Site description	13 Sep 2022	13 Sep 2022
1	Camera trap	13 Sep 2022	16 Sep 2022
1	Camera trap	13 Sep 2022	16 Sep 2022
1	Camera trap	13 Sep 2022	16 Sep 2022
1	Ultrasonic recording	14 Sep 2022	16 Sep 2022
1	Birding	14 Sep 2022	14 Sep 2022

Site description - visit 1 (13 Sep 2022)

Open Eucalyptus woodland of gimlet over low succulent shrubs, Eremophila and greybush on orange clay loam.

Habitat	open woodland		
Disturbance	none evident		
Vegetation condition	Very Good	**Fire age**	>5
Total veg. cover (%)	81.0	**Litter distribution**	under vegetation
Tree cover (%)	40.0	**Litter depth (cm)**	2.0
Shrub cover (%)	40.0	**Litter cover (%)**	35.0
Grass cover (%)	0.0		
Herb cover (%)	1.0		

Site details			
Site	**KO-005**	**Position (WGS84)**	121.680682 -30.671339
Slope		**Topography**	plain
Soil colour	orange	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	13 Sep 2022	13 Sep 2022
1	Foraging - SRE	13 Sep 2022	13 Sep 2022
1	Litter sieve	13 Sep 2022	13 Sep 2022
1	Foraging - vertebrates	13 Sep 2022	13 Sep 2022
1	Birding	13 Sep 2022	13 Sep 2022

Site description - visit 1 (13 Sep 2022)

Tall open Eucalyptus woodland over Eremophila, Senna, greybush and wattle over Ptilotus on orange clay loam soil plain.

Habitat	woodland
Disturbance	vehicle tracks, litter, livestock tracks

Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	72.0	**Litter distribution**	under vegetation
Tree cover (%)	30.0	**Litter depth (cm)**	5.0
Shrub cover (%)	40.0	**Litter cover (%)**	30.0
Grass cover (%)	0.0		
Herb cover (%)	2.0		



Site details			
Site	**KO-006**	**Position (WGS84)**	121.681391 -30.683204
Slope		**Topography**	plain
Soil colour	orange	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	13 Sep 2022	13 Sep 2022

Site description - visit 1 (13 Sep 2022)

Low Eucalyptus open woodland of gimlet over greybush on orange clay loam plain.

Habitat	open woodland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	72.0	**Litter distribution**	under vegetation
Tree cover (%)	30.0	**Litter depth (cm)**	3.0
Shrub cover (%)	40.0	**Litter cover (%)**	20.0
Grass cover (%)	0.0		
Herb cover (%)	2.0		



Site details			
Site	**KO-007**	**Position (WGS84)**	121.681202 -30.691736
Slope	gentle	**Topography**	hill slope
Soil colour	orange	**Soil texture**	gravel, clay loam and laterite
Rock cover (%)	0	**Rock type**	basalt, laterite

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	13 Sep 2022	13 Sep 2022
1	Foraging - SRE	13 Sep 2022	13 Sep 2022
1	Birding	13 Sep 2022	13 Sep 2022
1	Litter sieve	13 Sep 2022	13 Sep 2022
1	Foraging - vertebrates	13 Sep 2022	13 Sep 2022

Site description - visit 1 (13 Sep 2022)

Scattered smooth bark Eucalyptus and Allocasuarina over Melaleuca shrubland over saltbush and bluebush over orange clay loam and gravel on low hill.

Habitat	shrubland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>5
Total veg. cover (%)	44.0	**Litter distribution**	scattered
Tree cover (%)	3.0	**Litter depth (cm)**	1.0
Shrub cover (%)	40.0	**Litter cover (%)**	5.0
Grass cover (%)	0.0		
Herb cover (%)	1.0		



Site details			
Site	**KO-008**	**Position (WGS84)**	121.701507 -30.678067
Slope		**Topography**	plain
Soil colour	orange	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Foraging - vertebrates	13 Sep 2022	13 Sep 2022
1	Birding	13 Sep 2022	13 Sep 2022
1	Site description	13 Sep 2022	13 Sep 2022
1	Litter sieve	13 Sep 2022	13 Sep 2022
1	Foraging - SRE	13 Sep 2022	13 Sep 2022

Site description - visit 1 (13 Sep 2022)

Open mallee woodland over mulga and tall Eremophila over mixed low shrubs on orange clay loam plain.

Habitat	shrubland
Disturbance	vehicle tracks, litter

Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	85.0	**Litter distribution**	under vegetation
Tree cover (%)	15.0	**Litter depth (cm)**	4.0
Shrub cover (%)	70.0	**Litter cover (%)**	70.0
Grass cover (%)	0.0		
Herb cover (%)	0.0		



Site details			
Site	**KO-009**	**Position (WGS84)**	121.712604 -30.686608
Slope		**Topography**	plain
Soil colour	orange	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	13 Sep 2022	13 Sep 2022
1	Birding	13 Sep 2022	13 Sep 2022

Site description - visit 1 (13 Sep 2022)

Scattered mallee over Allocasuarina and mulga over mixed low shrubs on orange clay loam plain.

Habitat	shrubland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	55.0	**Litter distribution**	under vegetation
Tree cover (%)	15.0	**Litter depth (cm)**	3.0
Shrub cover (%)	40.0	**Litter cover (%)**	20.0
Grass cover (%)	0.0		
Herb cover (%)	0.0		



Site details			
Site	**KO-010**	**Position (WGS84)**	121.573051 -30.699469
Slope		**Topography**	undulating plain
Soil colour	yellow	**Soil texture**	clay loam, sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	14 Sep 2022	14 Sep 2022

Site description - visit 1 (14 Sep 2022)

Low closed woodland dominated by gimlet over Eremophila shrub land on yellow clay loam with minor sand.

Habitat	woodland		
Disturbance	vehicle tracks, exploration (drill pads and access tracks)		
Vegetation condition	Very Good	**Fire age**	>5
Total veg. cover (%)	150.0	**Litter distribution**	under vegetation
Tree cover (%)	70.0	**Litter depth (cm)**	1.0
Shrub cover (%)	75.0	**Litter cover (%)**	20.0
Grass cover (%)	0.0		
Herb cover (%)	5.0		



Site details			
Site	**KO-011**	**Position (WGS84)**	121.575156 -30.685371
Slope		**Topography**	plain
Soil colour	orange	**Soil texture**	clay loam, sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	14 Sep 2022	14 Sep 2022
1	Litter sieve	14 Sep 2022	14 Sep 2022
1	Foraging - SRE	14 Sep 2022	14 Sep 2022
1	Foraging - vertebrates	14 Sep 2022	14 Sep 2022
1	Birding	14 Sep 2022	14 Sep 2022

Site description - visit 1 (14 Sep 2022)

Tall semi-closed Eucalypts woodland of gimlet over dense Eremophila shrubland on orange clay loam plain with minor sand.

Habitat	woodland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	121.0	**Litter distribution**	under vegetation
Tree cover (%)	40.0	**Litter depth (cm)**	3.0
Shrub cover (%)	80.0	**Litter cover (%)**	40.0
Grass cover (%)	0.0		
Herb cover (%)	1.0		



Site details			
Site	**KO-012**	**Position (WGS84)**	121.566557 -30.67269
Slope		**Topography**	plain
Soil colour	orange	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	14 Sep 2022	14 Sep 2022
1	Birding	14 Sep 2022	14 Sep 2022

Site description - visit 1 (14 Sep 2022)

Tall mixed Eucalyptus woodland over Senna, Eremophila and greybush on orange clay loam plain with minor sand.

Habitat	woodland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	81.0	**Litter distribution**	under vegetation
Tree cover (%)	40.0	**Litter depth (cm)**	
Shrub cover (%)	40.0	**Litter cover (%)**	50.0
Grass cover (%)	0.0		
Herb cover (%)	1.0		



Site details			
Site	**KO-013**	**Position (WGS84)**	121.584537 -30.666172
Slope	gentle	**Topography**	hill slope
Soil colour	orange	**Soil texture**	gravel, clay loam
Rock cover (%)	0	**Rock type**	quartz

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Birding	14 Sep 2022	14 Sep 2022
1	Site description	14 Sep 2022	14 Sep 2022

Site description - visit 1 (14 Sep 2022)

Very open Eucalyptus woodland over mixed low shrubs on low stony hill.

Habitat	woodland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	51.0	**Litter distribution**	under vegetation
Tree cover (%)	20.0	**Litter depth (cm)**	1.0
Shrub cover (%)	30.0	**Litter cover (%)**	10.0
Grass cover (%)	0.0		
Herb cover (%)	1.0		



Site details			
Site	**KO-014**	**Position (WGS84)**	121.596921 -30.657093
Slope	gentle	**Topography**	plain
Soil colour	red-orange	**Soil texture**	clay loam, gravel
Rock cover (%)	0	**Rock type**	quartz, laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	14 Sep 2022	14 Sep 2022

Site description - visit 1 (14 Sep 2022)

Scattered mallee and Allocasuarina over mulga shrubland over low mixed shrubs on gravel clay loam on low hill.

Habitat	shrubland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	65.0	**Litter distribution**	under vegetation
Tree cover (%)	5.0	**Litter depth (cm)**	2.0
Shrub cover (%)	60.0	**Litter cover (%)**	20.0
Grass cover (%)	0.0		
Herb cover (%)	0.0		



Site details			
Site	**KO-015**	**Position (WGS84)**	121.605806 -30.687902
Slope		**Topography**	plain
Soil colour	orange	**Soil texture**	clay loam, sand, alluvium
Rock cover (%)	0	**Rock type**	quartz

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	14 Sep 2022	14 Sep 2022

Site description - visit 1 (14 Sep 2022)

Groved Eucalyptus woodland over small green succulent shrubs and Eremophila on orange clay loam plain with alluvial sand and gravel.

Habitat	woodland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	57.0	**Litter distribution**	
Tree cover (%)	20.0	**Litter depth (cm)**	3.0
Shrub cover (%)	35.0	**Litter cover (%)**	10.0
Grass cover (%)	0.0		
Herb cover (%)	2.0		



Site details			
Site	**KO-016**	**Position (WGS84)**	121.635738 -30.722625
Slope		**Topography**	plain
Soil colour	orange	**Soil texture**	clay loam, sand, gravel
Rock cover (%)	0	**Rock type**	laterite

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	15 Sep 2022	15 Sep 2022
1	Birding	15 Sep 2022	15 Sep 2022

Site description - visit 1 (15 Sep 2022)

Open Eucalyptus woodland of gimlet over Acacia, Eremophila and greybush on red clay loam plain with minor sand.

Habitat	open woodland		
Disturbance	vehicle tracks		
Vegetation condition	Good	**Fire age**	>10
Total veg. cover (%)	75.0	**Litter distribution**	under vegetation
Tree cover (%)	20.0	**Litter depth (cm)**	2.0
Shrub cover (%)	35.0	**Litter cover (%)**	15.0
Grass cover (%)	5.0		
Herb cover (%)	15.0		



Site details			
Site	**KO-017**	**Position (WGS84)**	121.651877 -30.695245
Slope		**Topography**	plain
Soil colour	red-orange	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	15 Sep 2022	15 Sep 2022
1	Birding	15 Sep 2022	15 Sep 2022

Site description - visit 1 (15 Sep 2022)

Farm dam surrounded by clumps of grass, low shrubs and Eucalyptus trees on plain of red orange clay loam.

Habitat	waterhole		
Disturbance	excavation		
Vegetation condition	Degraded	**Fire age**	>10
Total veg. cover (%)	46.0	**Litter distribution**	none: 1% - do not use
Tree cover (%)	5.0	**Litter depth (cm)**	2.0
Shrub cover (%)	20.0	**Litter cover (%)**	5.0
Grass cover (%)	20.0		
Herb cover (%)	1.0		



Site details			
Site	**KO-018**	**Position (WGS84)**	121.654823 -30.670541
Slope		**Topography**	floodplain
Soil colour	red-orange	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	15 Sep 2022	15 Sep 2022
1	Birding	15 Sep 2022	15 Sep 2022

Site description - visit 1 (15 Sep 2022)

Floodplain with scattered Allocasuarina over halophytic shrubland over grasses and herbs on red orange clay loam.

Habitat	shrubland		
Disturbance	vehicle tracks, grazing-medium, livestock tracks		
Vegetation condition	Poor	**Fire age**	>10
Total veg. cover (%)	145.0	**Litter distribution**	under vegetation
Tree cover (%)	5.0	**Litter depth (cm)**	1.0
Shrub cover (%)	70.0	**Litter cover (%)**	5.0
Grass cover (%)	40.0		
Herb cover (%)	30.0		



Site details			
Site	**KO-019**	**Position (WGS84)**	121.627547 -30.672688
Slope		**Topography**	plain
Soil colour	red-orange	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	15 Sep 2022	15 Sep 2022
1	Foraging - SRE	15 Sep 2022	15 Sep 2022
1	Foraging - vertebrates	15 Sep 2022	15 Sep 2022
1	Litter sieve	15 Sep 2022	15 Sep 2022

Site description - visit 1 (15 Sep 2022)

Tall open Eucalyptus woodland over low mixed shrubs including greybush and Eremophila on red orange clay loam plain.

Habitat	woodland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	72.0	**Litter distribution**	under vegetation
Tree cover (%)	30.0	**Litter depth (cm)**	4.0
Shrub cover (%)	40.0	**Litter cover (%)**	40.0
Grass cover (%)	0.0		
Herb cover (%)	2.0		



Site details			
Site	**KO-020**	**Position (WGS84)**	121.568327 -30.707067
Slope	gentle	**Topography**	undulating plain
Soil colour	red-orange	**Soil texture**	clay loam, sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	15 Sep 2022	15 Sep 2022
1	Opportunistic sighting	15 Sep 2022	15 Sep 2022
1	Birding	15 Sep 2022	15 Sep 2022

Site description - visit 1 (15 Sep 2022)

Scattered mallee and Allocasuarina over mulga shrubland on red orange clay loam with sand.

Habitat	shrubland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	77.0	**Litter distribution**	under vegetation
Tree cover (%)	5.0	**Litter depth (cm)**	
Shrub cover (%)	70.0	**Litter cover (%)**	50.0
Grass cover (%)	0.0		
Herb cover (%)	2.0		



Site details			
Site	**KO-021**	**Position (WGS84)**	121.495357 -30.735908
Slope		**Topography**	plain
Soil colour	orange	**Soil texture**	gravel, clay loam
Rock cover (%)	0	**Rock type**	laterite

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	16 Sep 2022	16 Sep 2022
1	Birding	16 Sep 2022	16 Sep 2022
	Opportunistic sighting	16 Sep 2022	16 Sep 2022

Site description - visit 1 (16 Sep 2022)

Sparse Eucalyptus over Acacia greybush and Eremophila low open shrubland over tussock grasses and invasive weeds on clay loam with gravel.

Habitat	grassland
Disturbance	vehicle tracks, historic clearing, weed infestation

Vegetation condition	Poor	**Fire age**	>5
Total veg. cover (%)	98.0	**Litter distribution**	under vegetation
Tree cover (%)	3.0	**Litter depth (cm)**	1.0
Shrub cover (%)	15.0	**Litter cover (%)**	3.0
Grass cover (%)	70.0		
Herb cover (%)	10.0		



Site details			
Site	**KO-022**	**Position (WGS84)**	121.539614 -30.740782
Slope		**Topography**	plain
Soil colour	orange	**Soil texture**	clay, sand, loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	16 Sep 2022	16 Sep 2022
1	Birding	16 Sep 2022	16 Sep 2022

Site description - visit 1 (16 Sep 2022)

Open Eucalyptus woodland over Allocasuarina, mulga, Acacia, Eremophila and greybush over mixed herbs on orange clay loam with minor sand

Habitat	open woodland
Disturbance	vehicle tracks

Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	78.0	**Litter distribution**	under vegetation
Tree cover (%)	20.0	**Litter depth (cm)**	2.0
Shrub cover (%)	50.0	**Litter cover (%)**	10.0
Grass cover (%)	3.0		
Herb cover (%)	5.0		



Site details			
Site	**KO-023**	**Position (WGS84)**	121.574522 -30.741911
Slope	gentle	**Topography**	undulating plain
Soil colour	orange	**Soil texture**	clay loam, gravel
Rock cover (%)	1	**Rock type**	laterite

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	16 Sep 2022	16 Sep 2022
1	Birding	16 Sep 2022	16 Sep 2022
1	Foraging - SRE	16 Sep 2022	16 Sep 2022
1	Litter sieve	16 Sep 2022	16 Sep 2022
1	Foraging - vertebrates	16 Sep 2022	16 Sep 2022

Site description - visit 1 (16 Sep 2022)

Open Eucalyptus woodland over mulga, Melaleuca and Eremophila shrubs on gravel and clay loam hilltop.

Habitat	open woodland
Disturbance	vehicle tracks

Vegetation condition	Very Good	**Fire age**	>5
Total veg. cover (%)	83.0	**Litter distribution**	under vegetation
Tree cover (%)	20.0	**Litter depth (cm)**	2.0
Shrub cover (%)	60.0	**Litter cover (%)**	20.0
Grass cover (%)	0.0		
Herb cover (%)	3.0		



Site details			
Site	**KO-024**	**Position (WGS84)**	121.626609 -30.691483
Slope		**Topography**	plain
Soil colour	red-orange	**Soil texture**	gravel, clay loam
Rock cover (%)	0	**Rock type**	quartz, laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	16 Sep 2022	16 Sep 2022

Site description - visit 1 (16 Sep 2022)

Open Eucalyptus woodland over sparse mulga shrubs over greybush, Acacia and Senna on gravel, quarts and clay loam plain.

Habitat	open woodland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	50.0	**Litter distribution**	scattered
Tree cover (%)	15.0	**Litter depth (cm)**	1.0
Shrub cover (%)	30.0	**Litter cover (%)**	15.0
Grass cover (%)	0.0		
Herb cover (%)	5.0		



Site details			
Site	**KO-025**	**Position (WGS84)**	121.584926 -30.728404
Slope	moderate	**Topography**	undulating plain
Soil colour	orange	**Soil texture**	gravel, laterite, clay loam
Rock cover (%)	5	**Rock type**	laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	16 Sep 2022	16 Sep 2022

Site description - visit 1 (16 Sep 2022)

Scattered Eucalyptus and Allocasuarina over closed mulga shrubland over Acacia, greybush and saltbush on gravel and clay loam undulating plain.

Habitat	shrubland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	78.0	**Litter distribution**	under vegetation
Tree cover (%)	3.0	**Litter depth (cm)**	2.0
Shrub cover (%)	75.0	**Litter cover (%)**	10.0
Grass cover (%)	0.0		
Herb cover (%)	0.0		



Site details			
Site	**KO-026**	**Position (WGS84)**	121.576111 -30.647055
Slope	gentle	**Topography**	plain
Soil colour	orange	**Soil texture**	sand, clay loam, gravel
Rock cover (%)	1	**Rock type**	laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	16 Sep 2022	16 Sep 2022

Site description - visit 1 (16 Sep 2022)

Scattered Allocasuarina and Eucalyptus over mulga shrubland over mixed shrubs over scattered herbs on orange laterite and clay loam with sparse sand.

Habitat	shrubland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>5
Total veg. cover (%)	70.0	**Litter distribution**	under vegetation
Tree cover (%)	10.0	**Litter depth (cm)**	2.0
Shrub cover (%)	55.0	**Litter cover (%)**	15.0
Grass cover (%)	0.0		
Herb cover (%)	5.0		



Site details			
Site	**KO-027**	**Position (WGS84)**	121.589416 -30.610834
Slope		**Topography**	plain
Soil colour	orange	**Soil texture**	clay loam
Rock cover (%)	1	**Rock type**	laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	16 Sep 2022	16 Sep 2022

Site description - visit 1 (16 Sep 2022)

Scattered Eucalyptus over greybush and Acacia shrubland over scattered herbs on clay loam plain.

Habitat	shrubland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	65.0	**Litter distribution**	under vegetation
Tree cover (%)	5.0	**Litter depth (cm)**	1.0
Shrub cover (%)	50.0	**Litter cover (%)**	2.0
Grass cover (%)	5.0		
Herb cover (%)	5.0		



Site details			
Site	**KO-028**	**Position (WGS84)**	121.546756 -30.671126
Slope		**Topography**	plain
Soil colour	orange	**Soil texture**	clay loam, gravel
Rock cover (%)	1	**Rock type**	quartz, laterite

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	16 Sep 2022	16 Sep 2022
1	Opportunistic sighting	16 Sep 2022	16 Sep 2022

Site description - visit 1 (16 Sep 2022)

Open Eucalyptus woodland over greybush and Acacia over scattered herbs on orange clay loam and gravel.

Habitat	open woodland		
Disturbance	vehicle tracks		
Vegetation condition	Good	**Fire age**	>10
Total veg. cover (%)	80.0	**Litter distribution**	under vegetation
Tree cover (%)	15.0	**Litter depth (cm)**	5.0
Shrub cover (%)	60.0	**Litter cover (%)**	15.0
Grass cover (%)	0.0		
Herb cover (%)	5.0		



Site details			
Site	**KO-029**	**Position (WGS84)**	121.520548 -30.700338
Slope		**Topography**	plain
Soil colour	orange	**Soil texture**	clay loam, gravel
Rock cover (%)	0	**Rock type**	laterite

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	16 Sep 2022	16 Sep 2022

Site description - visit 1 (16 Sep 2022)

Eucalyptus woodland of gimlet over Acacia, greybush and Eremophila over scattered herbs on orange clay loam and gravel.

Habitat	woodland		
Disturbance	exploration (drill pads and access tracks), vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	105.0	**Litter distribution**	under vegetation
Tree cover (%)	50.0	**Litter depth (cm)**	3.0
Shrub cover (%)	50.0	**Litter cover (%)**	20.0
Grass cover (%)	0.0		
Herb cover (%)	5.0		



Site details			
Site	**KO-MF1**	**Position (WGS84)**	121.568151 -30.701977
Slope	gentle	**Topography**	undulating plain
Soil colour	orange	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	not recorded

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	14 Sep 2022	14 Sep 2022
1	Birding	14 Sep 2022	14 Sep 2022
1	Foraging - SRE	15 Sep 2022	15 Sep 2022
1	Litter sieve	15 Sep 2022	15 Sep 2022
1	Foraging - vertebrates	15 Sep 2022	15 Sep 2022
1	Opportunistic sighting	14 Sep 2022	14 Sep 2022

Site description - visit 1 (14 Sep 2022)

Closed Eucalyptus mallee woodland over mixed Acacia and Eremophila and mixed shrubs over orange clay loam.

Habitat	woodland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>5
Total veg. cover (%)	160.0	**Litter distribution**	under vegetation
Tree cover (%)	70.0	**Litter depth (cm)**	3.0
Shrub cover (%)	80.0	**Litter cover (%)**	80.0
Grass cover (%)	0.0		
Herb cover (%)	10.0		



Site details			
Site	**KO-MF2**	**Position (WGS84)**	121.58228211681308 -30.72190866266211
Slope	moderate	**Topography**	undulating plain
Soil colour	red-orange	**Soil texture**	clay loam
Rock cover (%)	1	**Rock type**	quartz, laterite

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Opportunistic sighting	20 Sep 2022	20 Sep 2022
1	Site description	20 Sep 2022	20 Sep 2022

Site description - visit 1 (20 Sep 2022)

Open Eucalyptus woodland over mulga and Melaleuca shrubland over Acacia, greybush and saltbush on gravel and clay loam undulating plain.

Habitat	shrubland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	80.0	**Litter distribution**	under vegetation
Tree cover (%)	5.0	**Litter depth (cm)**	2.0
Shrub cover (%)	75.0	**Litter cover (%)**	10.0
Grass cover (%)	0.0		
Herb cover (%)	0.0		



Site details			
Site	**BF001**	**Position (WGS84)**	121.5731803 -30.6438997
Slope		**Topography**	undulating plain
Soil colour	orange	**Soil texture**	sandy loam
Rock cover (%)		**Rock type**	ferrous - ironstone

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	21 Nov 2023	21 Nov 2023
1	Opportunistic sighting	21 Nov 2023	21 Nov 2023
1	Birding	21 Nov 2023	21 Nov 2023
1	Foraging - vertebrates	21 Nov 2023	21 Nov 2023

Site description - visit 1 (21 Nov 2023)

Salmon gum and gimlet over Allocasuarina, Eremophila, Senna artemisioides sub. filifolia, Acacia tetragonophylla and other Senna sp. over blue bush and salt bush. Understorey is open on sandy loam.

Habitat	open woodland
Disturbance	erosion channels, vehicle tracks

Vegetation condition	Good	**Fire age**	>10
Total veg. cover (%)	74.0	**Litter distribution**	under vegetation
Tree cover (%)	25.0	**Litter depth (cm)**	1.0
Shrub cover (%)	45.0	**Litter cover (%)**	1.0
Grass cover (%)	2.0		
Herb cover (%)	2.0		



Site details			
Site	**BF002**	**Position (WGS84)**	121.5496083 -30.6513716
Slope	gentle	**Topography**	undulating plain
Soil colour	orange, brown	**Soil texture**	loam
Rock cover (%)	5	**Rock type**	granite - rocks

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	21 Nov 2023	21 Nov 2023
1	Litter sieve	21 Nov 2023	21 Nov 2023
1	Opportunistic sighting	21 Nov 2023	21 Nov 2023
1	Birding	21 Nov 2023	21 Nov 2023
1	Foraging - vertebrates	21 Nov 2023	21 Nov 2023

Site description - visit 1 (21 Nov 2023)

Salmon gum over open middle and sparse understorey. The understory is open consisting of small shrubs of blue bush atop substrate.

Habitat	open woodland
Disturbance	erosion channels, vehicle tracks

Vegetation condition	Good	**Fire age**	>10
Total veg. cover (%)	52.0	**Litter distribution**	under vegetation
Tree cover (%)	15.0	**Litter depth (cm)**	1.0
Shrub cover (%)	35.0	**Litter cover (%)**	2.0
Grass cover (%)	1.0		
Herb cover (%)	1.0		



Site details			
Site	**BF003**	**Position (WGS84)**	121.5670748 -30.6575617
Slope	gentle	**Topography**	foot slope
Soil colour	orange	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	granite - rocks

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	22 Nov 2023	22 Nov 2023
1	Birding	22 Nov 2023	22 Nov 2023
1	Litter sieve	22 Nov 2023	22 Nov 2023
1	Foraging - vertebrates	22 Nov 2023	22 Nov 2023

Site description - visit 1 (22 Nov 2023)

Open mallee woodland consisting of salmon gums and gimlet over blue bush and acacia. Understorey is open with small herbs.

Habitat	open woodland
Disturbance	erosion channels, vehicle tracks

Vegetation condition	Good	**Fire age**	>5
Total veg. cover (%)	120.0	**Litter distribution**	under vegetation
Tree cover (%)	45.0	**Litter depth (cm)**	1.0
Shrub cover (%)	60.0	**Litter cover (%)**	10.0
Grass cover (%)	10.0		
Herb cover (%)	5.0		



Site details			
Site	**BF004**	**Position (WGS84)**	121.5639387 -30.6584909
Slope	moderate	**Topography**	breakaway
Soil colour	orange	**Soil texture**	gravel
Rock cover (%)		**Rock type**	granite - outcropping

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Camera trap	22 Nov 2023	26 Nov 2023
1	Ultrasonic recording	22 Nov 2023	26 Nov 2023
1	Site description	22 Nov 2023	22 Nov 2023
1	Birding	22 Nov 2023	22 Nov 2023
1	Foraging - vertebrates	22 Nov 2023	22 Nov 2023

Site description - visit 1 (22 Nov 2023)

Allocasuarina and sparse mallee over Acacia, blue bush, and Senna. Little understorey atop rocky substrate.

Habitat	open woodland		
Disturbance	litter		
Vegetation condition	Good	**Fire age**	>10
Total veg. cover (%)	96.0	**Litter distribution**	under vegetation
Tree cover (%)	30.0	**Litter depth (cm)**	1.0
Shrub cover (%)	60.0	**Litter cover (%)**	2.0
Grass cover (%)	5.0		
Herb cover (%)	1.0		



Site details			
Site	**BF005**	**Position (WGS84)**	121.5569578 -30.6905891
Slope		**Topography**	undulating plain
Soil colour	orange	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	granite - rocks

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	22 Nov 2023	22 Nov 2023
1	Opportunistic sighting	22 Nov 2023	22 Nov 2023
1	Litter sieve	22 Nov 2023	22 Nov 2023
1	Birding	22 Nov 2023	22 Nov 2023
1	Foraging - vertebrates	22 Nov 2023	22 Nov 2023

Site description - visit 1 (22 Nov 2023)

Mallee eucalypts over Acacia and blue bush. Understorey is open with little grasses or herbs atop loam substrate.

Habitat	open woodland
Disturbance	litter, vehicle tracks

Vegetation condition	Good	**Fire age**	>10
Total veg. cover (%)	119.0	**Litter distribution**	under vegetation
Tree cover (%)	50.0	**Litter depth (cm)**	1.0
Shrub cover (%)	65.0	**Litter cover (%)**	5.0
Grass cover (%)	2.0		
Herb cover (%)	2.0		



Site details			
Site	**BF006**	**Position (WGS84)**	121.5621367 -30.7007409
Slope	moderate	**Topography**	foot slope
Soil colour	orange	**Soil texture**	loam
Rock cover (%)	2	**Rock type**	granite - rocks

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	22 Nov 2023	22 Nov 2023

Site description - visit 1 (22 Nov 2023)

Open eucalypts and Allocasuarina over Acacia and Eremophila. Understorey is open atop rocky substrate.

Habitat	open woodland		
Disturbance	vehicle tracks		
Vegetation condition	Good	**Fire age**	>10
Total veg. cover (%)	83.0	**Litter distribution**	scattered
Tree cover (%)	35.0	**Litter depth (cm)**	1.0
Shrub cover (%)	45.0	**Litter cover (%)**	30.0
Grass cover (%)	2.0		
Herb cover (%)	1.0		



Site details			
Site	**BF007**	**Position (WGS84)**	121.563562 -30.7245804
Slope	gentle	**Topography**	hill slope
Soil colour	orange	**Soil texture**	loam
Rock cover (%)	1	**Rock type**	granite - rocks

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	22 Nov 2023	22 Nov 2023
1	Opportunistic sighting	22 Nov 2023	22 Nov 2023

Site description - visit 1 (22 Nov 2023)

Eucalypts and Allocasuarina over young Allocasuarina, Eremophila and Acacia. Mid-storey vegetation is more dense than canopy or understorey. Substrate is rocky loam.

Habitat	shrubland
Disturbance	erosion channels, litter

Vegetation condition	Good	**Fire age**	>10
Total veg. cover (%)	62.0	**Litter distribution**	under vegetation
Tree cover (%)	20.0	**Litter depth (cm)**	1.0
Shrub cover (%)	40.0	**Litter cover (%)**	1.0
Grass cover (%)	1.0		
Herb cover (%)	1.0		



Site details			
Site	**BF008**	**Position (WGS84)**	121.5559706 -30.7406767
Slope	gentle	**Topography**	hill slope
Soil colour	orange	**Soil texture**	clay loam
Rock cover (%)	1	**Rock type**	granite - rocks

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	22 Nov 2023	22 Nov 2023
1	Opportunistic sighting	22 Nov 2023	22 Nov 2023

Site description - visit 1 (22 Nov 2023)

Open mallee woodland over Allocasuarina younger eucalypts and Acacia. Understorey is sparse atop clay loam substrate.

Habitat	open woodland
Disturbance	litter, erosion channels, vehicle tracks

Vegetation condition	Good	**Fire age**	>10
Total veg. cover (%)	79.0	**Litter distribution**	scattered
Tree cover (%)	30.0	**Litter depth (cm)**	1.0
Shrub cover (%)	45.0	**Litter cover (%)**	25.0
Grass cover (%)	2.0		
Herb cover (%)	2.0		



Site details			
Site	**BF009**	**Position (WGS84)**	121.5309725 -30.7379933
Slope		**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	clay loam
Rock cover (%)	1	**Rock type**	granite - rocks

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	23 Nov 2023	23 Nov 2023

Site description - visit 1 (23 Nov 2023)

Open eucalypt woodland, substantially cleared with obvious signs of litter and vehicle tracks. Mid-storey vegetation consists of Acacia and Eremophila, while understorey is limited atop clay loam substrate.

Habitat	open woodland
Disturbance	erosion channels, historic clearing, litter, vehicle tracks, weed infestation

Vegetation condition	Degraded	**Fire age**	>10
Total veg. cover (%)	29.0	**Litter distribution**	under vegetation
Tree cover (%)	2.0	**Litter depth (cm)**	1.0
Shrub cover (%)	25.0	**Litter cover (%)**	2.0
Grass cover (%)	1.0		
Herb cover (%)	1.0		



Site details			
Site	**BF010**	**Position (WGS84)**	121.6044448 -30.7492272
Slope	gentle	**Topography**	hill slope
Soil colour	red-orange	**Soil texture**	clay loam
Rock cover (%)	1	**Rock type**	granite - rocks

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	23 Nov 2023	23 Nov 2023
1	Birding	23 Nov 2023	23 Nov 2023
1	Foraging - vertebrates	23 Nov 2023	23 Nov 2023

Site description - visit 1 (23 Nov 2023)

Open eucalypt woodland over Acacia and Eremophila. Understorey is open and small atop clay loam.

Habitat	open woodland		
Disturbance	erosion channels, vehicle tracks		
Vegetation condition	Good	**Fire age**	>10
Total veg. cover (%)	87.0	**Litter distribution**	under vegetation
Tree cover (%)	35.0	**Litter depth (cm)**	1.0
Shrub cover (%)	50.0	**Litter cover (%)**	10.0
Grass cover (%)	1.0		
Herb cover (%)	1.0		



Site details			
Site	**BF011**	**Position (WGS84)**	121.5913577 -30.7531877
Slope		**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	clay loam
Rock cover (%)	1	**Rock type**	granite - rocks

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Ultrasonic recording	23 Nov 2023	27 Nov 2023
1	Camera trap	23 Nov 2023	27 Nov 2023
1	Site description	23 Nov 2023	23 Nov 2023
1	Birding	23 Nov 2023	23 Nov 2023
1	Litter sieve	23 Nov 2023	23 Nov 2023
1	Foraging - vertebrates	23 Nov 2023	23 Nov 2023

Site description - visit 1 (23 Nov 2023)

Eucalypt and Allocasuarina over Eremophila, blue bush and Acacia. Large cleared areas atop rocky clay loam and quartz.

Habitat	open woodland		
Disturbance	erosion channels, historic clearing, vehicle tracks		
Vegetation condition	Degraded	**Fire age**	>10
Total veg. cover (%)	47.0	**Litter distribution**	sparse
Tree cover (%)	15.0	**Litter depth (cm)**	1.0
Shrub cover (%)	30.0	**Litter cover (%)**	1.0
Grass cover (%)	1.0		
Herb cover (%)	1.0		



Site details			
Site	**BF012**	**Position (WGS84)**	121.6182983 -30.7509096
Slope		**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	clay loam
Rock cover (%)	1	**Rock type**	granite - rocks

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	23 Nov 2023	23 Nov 2023
1	Litter sieve	23 Nov 2023	23 Nov 2023
1	Birding	23 Nov 2023	23 Nov 2023
1	Foraging - vertebrates	23 Nov 2023	23 Nov 2023

Site description - visit 1 (23 Nov 2023)

Open eucalypt woodland over Acacia and younger eucalypts. Middle and understorey very open atop clay loam substrate.

Habitat	open woodland		
Disturbance	erosion channels, litter, vehicle tracks		
Vegetation condition	Degraded	**Fire age**	>10
Total veg. cover (%)	45.0	**Litter distribution**	under vegetation
Tree cover (%)	15.0	**Litter depth (cm)**	1.0
Shrub cover (%)	30.0	**Litter cover (%)**	2.0
Grass cover (%)	0.0		
Herb cover (%)	0.0		



Site details			
Site	**BF013**	**Position (WGS84)**	121.6168492 -30.7377147
Slope		**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	23 Nov 2023	23 Nov 2023
1	Birding	23 Nov 2023	23 Nov 2023
1	Litter sieve		
1	Foraging - vertebrates	23 Nov 2023	23 Nov 2023

Site description - visit 1 (23 Nov 2023)

Eucalypt woodland over Eremophila, Senna, Acacia and blue bush. Understorey is open with scattered shrubs atop clay loam.

Habitat	open woodland
Disturbance	vehicle tracks

Vegetation condition	Good	**Fire age**	>10
Total veg. cover (%)	64.0	**Litter distribution**	scattered
Tree cover (%)	20.0	**Litter depth (cm)**	1.0
Shrub cover (%)	40.0	**Litter cover (%)**	35.0
Grass cover (%)	2.0		
Herb cover (%)	2.0		



Site details			
Site	**BF014**	**Position (WGS84)**	121.6484042 -30.7098569
Slope		**Topography**	undulating plain
Soil colour	orange	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	granite - rocks

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	23 Nov 2023	23 Nov 2023
1	Opportunistic sighting	23 Nov 2023	23 Nov 2023

Site description - visit 1 (23 Nov 2023)

Eucalypts over Acacia, Eremophila and salt bush. Understorey is bare with little leaf litter atop clay loam.

Habitat	open woodland		
Disturbance	erosion channels, livestock tracks, litter, vehicle tracks		
Vegetation condition	Degraded	**Fire age**	>10
Total veg. cover (%)	42.0	**Litter distribution**	under vegetation
Tree cover (%)	10.0	**Litter depth (cm)**	1.0
Shrub cover (%)	30.0	**Litter cover (%)**	2.0
Grass cover (%)	1.0		
Herb cover (%)	1.0		



Site details			
Site	**BF015**	**Position (WGS84)**	121.647868 -30.7236366
Slope		**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	clay loam
Rock cover (%)	1	**Rock type**	granite - rocks

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Ultrasonic recording	23 Nov 2023	27 Nov 2023
1	Camera trap	23 Nov 2023	27 Nov 2023
1	Site description	23 Nov 2023	23 Nov 2023
1	Opportunistic sighting	23 Nov 2023	23 Nov 2023

Site description - visit 1 (23 Nov 2023)

Open eucalypt woodland over blue bush, tea tree and eucalypt saplings. Large cleared areas atop clay loam.

Habitat	open woodland		
Disturbance	vehicle tracks, historic clearing		
Vegetation condition	Degraded	**Fire age**	>10
Total veg. cover (%)	82.0	**Litter distribution**	scattered
Tree cover (%)	38.0	**Litter depth (cm)**	1.0
Shrub cover (%)	40.0	**Litter cover (%)**	30.0
Grass cover (%)	2.0		
Herb cover (%)	2.0		



Site details			
Site	**BF016**	**Position (WGS84)**	121.5944223 -30.6720697
Slope		**Topography**	undulating plain
Soil colour	orange	**Soil texture**	clay loam
Rock cover (%)	1	**Rock type**	granite - rocks

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	24 Nov 2023	24 Nov 2023
1	Opportunistic sighting	24 Nov 2023	24 Nov 2023

Site description - visit 1 (24 Nov 2023)

Open eucalypt woodland and Allocasuarina over Eremophila and Acacia. Understorey is open atop clay loam

Habitat	open woodland		
Disturbance	erosion channels, livestock tracks		
Vegetation condition	Good	**Fire age**	>10
Total veg. cover (%)	52.0	**Litter distribution**	under vegetation
Tree cover (%)	20.0	**Litter depth (cm)**	1.0
Shrub cover (%)	30.0	**Litter cover (%)**	15.0
Grass cover (%)	1.0		
Herb cover (%)	1.0		



Site details			
Site	**BF018**	**Position (WGS84)**	121.5970148 -30.6886382
Slope		**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	clay loam
Rock cover (%)	1	**Rock type**	granite - rocks

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Site description	24 Nov 2023	24 Nov 2023
1	Opportunistic sighting	24 Nov 2023	24 Nov 2023

Site description - visit 1 (24 Nov 2023)

Open eucalypt woodland over blue bush, Acacia and Eremophila. Understorey is open atop clay loam substrate.

Habitat	open woodland
Disturbance	

Vegetation condition	Good	**Fire age**	>10
Total veg. cover (%)	70.0	**Litter distribution**	under vegetation
Tree cover (%)	20.0	**Litter depth (cm)**	1.0
Shrub cover (%)	35.0	**Litter cover (%)**	20.0
Grass cover (%)	10.0		
Herb cover (%)	5.0		



Site details			
Site	**KO-Opp04**	**Position (WGS84)**	121.610263 -30.691032
Slope	gentle	**Topography**	hill slope
Soil colour	red-orange	**Soil texture**	clay loam and laterite
Rock cover (%)	2	**Rock type**	laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Opportunistic sighting	16 Sep 2022	16 Sep 2022
1	Site description	16 Sep 2022	16 Sep 2022

Site description - visit 1 (16 Sep 2022)

Scattered mallee over Allocasuarina over Acacia and Eremophila on stony hill slope.

Habitat	shrubland		
Disturbance	vehicle tracks		
Vegetation condition	Very Good	**Fire age**	>10
Total veg. cover (%)	71.0	**Litter distribution**	under vegetation
Tree cover (%)	10.0	**Litter depth (cm)**	
Shrub cover (%)	60.0	**Litter cover (%)**	
Grass cover (%)	0.0		
Herb cover (%)	1.0		

Site details			
Site	**BF_MFmound**	**Position (WGS84)**	121.62364989157133 -30.705193279427764
Slope	gentle	**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	clay loam, gravel
Rock cover (%)	0	**Rock type**	laterite quartz

Sample and effort summary

Visit	Sample method	Date start	Date stop
1	Transect	14 Jun 2024	
1	Site description	05 Jul 2024	

Site description - visit 1 (05 Jul 2024)

Open Eucalyptus woodland over medium high shrubs of mulga form Acacia, Senna, Acacia tetragonophyla, Maireanna, and Dononaea on red brown clay loam with laterite and quartz gravel.

Habitat	open woodland
Disturbance	vehicle tracks vehicle tracks

Vegetation condition		**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	85.0	**Litter distribution**	under vegetation
Tree cover (%)	20.0	**Litter depth (cm)**	1.0
Shrub cover (%)	65.0	**Litter cover (%)**	20.0
Grass cover (%)	0.0		
Herb cover (%)	0.0		



Site details			
Site	**BF01**	**Position (WGS84)**	121.61905883071222 -30.728244612726893
Slope	negligible	**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	clay, gravel
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	12 Jun 2024	

Site description - visit 1 (12 Jun 2024)

Scattered eucalypts over shrubs of Eremophila, Atriplex, pearl blue bush on red brown clay with black gravel.

Habitat	shrubland		
Disturbance	evidence of feral animals, grazing-low, livestock tracks, vehicle tracks		
Vegetation condition	Excellent	**Fire age**	>10
Total veg. cover (%)	40.0	**Litter distribution**	under vegetation
Tree cover (%)	10.0	**Litter depth (cm)**	1.0
Shrub cover (%)	30.0	**Litter cover (%)**	20.0
Grass cover (%)	0.0		
Herb cover (%)	0.0		



Site details			
Site	**BF02**	**Position (WGS84)**	121.6188322263384 -30.72480512423276
Slope	gentle	**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	clay, clay loam, gravel, rocks
Rock cover (%)	0	**Rock type**	sandstone

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	12 Jun 2024	

Site description - visit 1 (12 Jun 2024)

Gimlet Eucalyptus over Acacia tetragonophylla, Eremophila, and Atriplex on large sandstone cobbles on red brown clay loam.

Habitat	open woodland		
Disturbance	grazing-low, livestock tracks		
Vegetation condition	Excellent	**Fire age**	>10
Total veg. cover (%)	55.0	**Litter distribution**	under vegetation
Tree cover (%)	25.0	**Litter depth (cm)**	1.0
Shrub cover (%)	30.0	**Litter cover (%)**	15.0
Grass cover (%)	0.0		
Herb cover (%)	0.0		



Site details			
Site	**BF03**	**Position (WGS84)**	121.61888519410677 -30.721187657272697
Slope	gentle	**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	clay, clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	12 Jun 2024	

Site description - visit 1 (12 Jun 2024)

Open gimlet Eucalyptus woodland over low shrubs of Eremophila, pearl blue bush, Atriplex, Exocarpus on red brown clay loam.

Habitat	open woodland		
Disturbance	grazing-low, livestock tracks, vehicle tracks		
Vegetation condition	Excellent	**Fire age**	>10
Total veg. cover (%)	35.0	**Litter distribution**	under vegetation
Tree cover (%)	20.0	**Litter depth (cm)**	1.0
Shrub cover (%)	15.0	**Litter cover (%)**	10.0
Grass cover (%)	0.0		
Herb cover (%)	0.0		



Site details			
Site	**BF04**	**Position (WGS84)**	121.61898162544036 -30.71496357211804
Slope	gentle	**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	clay, clay loam, gravel
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	12 Jun 2024	

Site description - visit 1 (12 Jun 2024)

Gimlet Eucalyptus woodland over low Atriplex and pearl blue bush and Eremophila on red brown clay loam.

Habitat	open woodland		
Disturbance	grazing-low, livestock tracks, vehicle tracks		
Vegetation condition	Excellent	**Fire age**	>10
Total veg. cover (%)	70.0	**Litter distribution**	under vegetation
Tree cover (%)	30.0	**Litter depth (cm)**	1.0
Shrub cover (%)	40.0	**Litter cover (%)**	20.0
Grass cover (%)	0.0		
Herb cover (%)	0.0		



Site details			
Site	**BF05**	**Position (WGS84)**	121.61929291916859 -30.703875825272195
Slope	gentle	**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	clay, clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	12 Jun 2024	

Site description - visit 1 (12 Jun 2024)

Gimlet Eucalyptus over shrubs of Eremophila, Acacia tetragonophylla, Santalum, and Atriplex and pearl blue bush on red brown clay loam.

Habitat	open woodland		
Disturbance	evidence of feral animals, grazing-low, livestock tracks		
Vegetation condition	Excellent	**Fire age**	>10
Total veg. cover (%)	85.0	**Litter distribution**	under vegetation
Tree cover (%)	25.0	**Litter depth (cm)**	1.0
Shrub cover (%)	60.0	**Litter cover (%)**	20.0
Grass cover (%)	0.0		
Herb cover (%)	0.0		



Site details			
Site	**BF06**	**Position (WGS84)**	121.62247997561494 -30.717255571897518
Slope	gentle	**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	clay, clay loam, gravel
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	12 Jun 2024	

Site description - visit 1 (12 Jun 2024)

Open gimlet Eucalyptus woodland over pearl blue bush, Eremophila, Santalum and Exocarpus on red brown clay loam with black gravel.

Habitat	open woodland		
Disturbance	evidence of feral animals, grazing-low, livestock tracks, vehicle tracks		
Vegetation condition	Excellent	**Fire age**	>10
Total veg. cover (%)	45.0	**Litter distribution**	under vegetation
Tree cover (%)	20.0	**Litter depth (cm)**	1.0
Shrub cover (%)	25.0	**Litter cover (%)**	20.0
Grass cover (%)	0.0		
Herb cover (%)	0.0		



Site details			
Site	**BF07**	**Position (WGS84)**	121.62250591588311 -30.726752220613918
Slope	gentle	**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	clay, clay loam, gravel
Rock cover (%)		**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	12 Jun 2024	

Site description - visit 1 (12 Jun 2024)

Scattered gimlet Eucalyptus over low shrubs of Eremophila, Atriplex, pearl blue bush, Acacia tetragonophylla on red brown clay loam with black gravel.

Habitat	shrubland		
Disturbance	evidence of feral animals, grazing-low, livestock tracks, vehicle tracks		
Vegetation condition	Excellent	**Fire age**	>10
Total veg. cover (%)	45.0	**Litter distribution**	sparse
Tree cover (%)	10.0	**Litter depth (cm)**	1.0
Shrub cover (%)	35.0	**Litter cover (%)**	5.0
Grass cover (%)	0.0		
Herb cover (%)	0.0		



Site details			
Site	**BF08**	**Position (WGS84)**	121.62228832541201 -30.733627418056326
Slope	gentle	**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	clay, clay loam, gravel
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	12 Jun 2024	

Site description - visit 1 (12 Jun 2024)

Open gimlet Eucalyptus woodland over Atriplex, Eremophila, Exocarpus, pearl blue bush and Senna on red brown clay loam with black gravel.

Habitat	open woodland		
Disturbance	grazing-low, livestock tracks, vehicle tracks		
Vegetation condition	Excellent	**Fire age**	>10
Total veg. cover (%)	50.0	**Litter distribution**	under vegetation
Tree cover (%)	20.0	**Litter depth (cm)**	1.0
Shrub cover (%)	30.0	**Litter cover (%)**	5.0
Grass cover (%)	0.0		
Herb cover (%)	0.0		



Appendix 3 Vertebrate fauna desktop and field survey results

Family	Species	Common name	Status	Introduced	ALA	EPBC	NM	PHO	TFA	This survey	UPR
Amphibians											
Hylidae	*Litoria moorei*	Motorbike Frog					x				
Limnodynastidae	*Neobatrachus kunapalari*	Kunapalari Frog					x				
	Neobatrachus pelobatoides	Humming Frog					x				
	Neobatrachus sutor	Shoemaker Frog					x				x
	Neobatrachus wilsmorei	Plonking Frog					x				x
Myobatrachidae	*Pseudophryne occidentalis*	Western Toadlet					x				
Birds											
Acanthizidae	*Acanthiza apicalis*	Broad-tailed Thornbill			x		x	x			x
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill			x		x	x		x	x
	Acanthiza iredalei	Slender-billed Thornbill			x						
	Acanthiza robustirostris	Slaty-backed Thornbill			x		x				
	Acanthiza uropygialis	Chestnut-rumped Thornbill			x		x	x		x	x
	Aphelocephala leucopsis	Southern Whiteface	VU (EPBC Act)		x		x	x			x
	Calamanthus campestris	Rufous Fieldwren			x			x			
	Gerygone fusca	Western Gerygone			x		x	x			x
	Hylacola cauta	Shy Groundwren			x		x				
	Sericornis maculatus	Spotted Scrubwren			x						
	Pyrrholaemus brunneus	Redthroat			x		x	x		x	x
	Smicrornis brevirostris	Weebill			x		x	X		x	x
Accipitridae	*Accipiter cirrocephalus*	Collared Sparrowhawk			x		x				
	Accipiter fasciatus	Brown Goshawk			x		x			x	x
	Aquila audax	Wedge-tailed Eagle			x		x	X			x
	Circus assimilis	Spotted Harrier			x			X			
	Elanus axillaris	Black-shouldered Kite			x		x	X			x
	Haliastur sphenurus	Whistling Kite			x		x			x	
	Hamirostra melanosternon	Black-breasted Buzzard			x						
	Hieraaetus morphnoides	Little Eagle			x		x				
	Milvus migrans	Black Kite			x			X			
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar			x		x				
Anatidae	*Anas castanea*	Chestnut Teal			x						
	Anas gracilis	Grey Teal			x		x	X			x
	Anas platyrhynchos	Mallard			x		x				
	Anas rhynchotis	Australasian Shoveler			x		x				
	Anas superciliosa	Pacific Black Duck			x		x				x
	Aythya australis	Hardhead			x		x				

Family	Species	Common name	Status	Introduced	ALA	EPBC	NM	PHO	TFA	This survey	UPR
	Biziura lobata	Musk Duck			x		x				
	Chenonetta jubata	Australian Wood Duck			x		x			x	x
	Cygnus atratus	Black Swan			x		x				x
	Malacorhynchus membranaceus	Pink-eared Duck			x		x				
	Oxyura australis	Blue-billed Duck	P4 (DBCA list)		x						
	Stictonetta naevosa	Freckled Duck			x		x				
	Tadorna tadornoides	Australian Shelduck			x		x				x
Anhingidae	*Anhinga novaehollandiae*	Australasian Darter			x		x				
Apodidae	*Apus pacificus*	Fork-tailed Swift	Mig. (EPBC & BC Acts)			x					
Ardeidae	*Ardea ibis*	Cattle Egret			x	x					
	Ardea alba	Great Egret			x		x				
	Ardea novaehollandiae	White-faced Heron			x		x				x
	Ardea pacifica	White-necked Heron			x		x				
	Nycticorax caledonicus	Rufous Night Heron			x		x				
Artamidae	*Artamus cinereus*	Black-faced Woodswallow			x		x				x
	Artamus minor	Little Woodswallow			x						
	Artamus cyanopterus	Dusky Woodswallow			x		x	x		x	x
	Artamus personatus	Masked Woodswallow			x		x			x	
	Artamus superciliosus	White-browed Woodswallow			x						
Campephagidae	*Coracina maxima*	Ground Cuckoo-shrike			x		x	x			
	Coracina novaehollandiae	Black-faced Cuckoo-shrike			x		x	x		x	x
	Lalage tricolor	White-winged Triller			x		x			x	x
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar			x		x				x
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover			x		x	x			x
	Elseyornis melanops	Black-fronted Dotterel			x		x	x			
	Erythrogonys cinctus	Red-kneed Dotterel			x		x				
	Thinornis cucullatus	Hooded Plover	P4 (DBCA list)		x	x	x		x		
	Vanellus tricolor	Banded Lapwing			x		x				x
Cinclosomatidae	*Psophodes occidentalis*	Western Wedgebill			x			x			x
	Cinclosoma clarum	Western Chestnut Quail-thrush			x		x	x		x	x
Climacteridae	*Climacteris affinis*	White-browed Treecreeper			x		x				
	Climacteris rufus	Rufous Treecreeper			x		x				x
Columbidae	*Columba livia*	Rock Dove		*	x		x				x

Family	Species	Common name	Status	Introduced	ALA	EPBC	NM	PHO	TFA	This survey	UPR
	Ocyphaps lophotes	Crested Pigeon			x		x	x			x
	Phaps chalcoptera	Common Bronzewing			x		x	x		x	x
	Streptopelia chinensis	Spotted Dove		*	x						
	Streptopelia senegalensis	Laughing Dove		*	x		x				
Corvidae	*Corvus bennetti*	Little Crow			x		x	x		x	
	Corvus coronoides	Australian Raven			x		x	x			x
	Corvus orru	Torresian Crow			x		x			x	
Cracticidae	*Cracticus nigrogularis*	Pied Butcherbird			x		x	x		x	x
	Cracticus tibicen	Australian Magpie			x		x	x		x	x
	Cracticus torquatus	Grey Butcherbird			x		x	x			x
	Strepera versicolor	Grey Currawong			x		x	x		x	x
Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo			x		x				
	Heteroscenes pallidus	Pallid Cuckoo			x		x	x			x
	Chalcites basalis	Horsfield's Bronze Cuckoo			x		x	x		x	x
	Chalcites osculans	Black-eared Cuckoo			x	x	x	x			
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird			x		x			x	x
Dicruridae	*Grallina cyanoleuca*	Magpie-lark			x		x	x		x	x
	Myiagra inquieta	Restless Flycatcher								x	
	Rhipidura albiscapa	Grey Fantail			x		x			x	x
	Rhipidura leucophrys	Willie Wagtail			x		x	x		x	x
Dromaiidae	*Dromaius novaehollandiae*	Emu			x		x	x		x	x
Estrilidae	*Taeniopygia guttata*	Zebra Finch			x		x	x		x	
Falconidae	*Falco berigora*	Brown Falcon			x		x	x		x	x
	Falco cenchroides	Nankeen Kestrel			x		x			x	x
	Falco hypoleucos	Grey Falcon	VU (BC Act)		x	x					
	Falco longipennis	Australian Hobby			x		x				x
	Falco peregrinus	Peregrine Falcon	OS (BC Act)		x				x		x
Halcyonidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher			x		x				x
	Todiramphus sanctus	Sacred Kingfisher			x		x	x			
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow			x		x				x
	Hirundo neoxena	Welcome Swallow			x		x				x
	Petrochelidon ariel	Fairy Martin			x		x				
	Petrochelidon nigricans	Tree Martin			x		x	x			x
	Larus novaehollandiae	Silver Gull			x		x				
Laridae	*Sterna hybrida*	Whiskered Tern			x						
Maluridae	*Amytornis textilis* subsp. *textilis*	Western Grasswren	P4 (DBCA list)		x		x		x		
	Malurus assimilis	Purple-backed fairy wren									

Family	Species	Common name	Status	Introduced	ALA	EPBC	NM	PHO	TFA	This survey	UPR
	Malurus lamberti	Variegated Fairy-wren			x			x			x
	Malurus leucopterus	White-winged Fairy-wren			x		x	x			x
	Malurus pulcherrimus	Blue-breasted Fairy-wren			x		x				
	Malurus splendens	Splendid Fairy-wren			x		x	x		x	x
Megapodiidae	*Leipoa ocellata*	Malleefowl	VU (EPBC & BC Acts)		x	x	x	x	x	x	x
Meliphagidae	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater			x		x	x		x	x
	Anthochaera carunculata	Red Wattlebird			x		x	x		x	x
	Certhionyx variegatus	Pied Honeyeater			x						
	Epthianura albifrons	White-fronted Chat			x		x	x			
	Epthianura aurifrons	Orange Chat			x						
	Epthianura tricolor	Crimson Chat			x		x	x			
	Gavicalis virescens	Singing Honeyeater			x		x	x		x	x
	Gliciphila melanops	Tawny-crowned honeyeater			x						
	Lichenostomus cratitius	Purple-gaped Honeyeater			x						
	Lichenostomus leucotis	White-eared Honeyeater			x		x	x		x	x
	Lichmera indistincta	Brown Honeyeater			x		x	x		x	x
	Manorina flavigula	Yellow-throated Miner			x		x	x		x	x
	Melithreptus brevirostris	Brown-headed Honeyeater			x		x	x		x	x
	Phylidonyris niger	White-cheeked Honeyeater			x						
	Phylidonyris novaehollandiae	New Holland Honeyeater			x						
	Ptilotula ornata	Yellow-plumed Honeyeater			x		x	x		x	x
	Ptilotula penicillata	White-plumed Honeyeater			x						x
	Ptilotula plumula	Grey-fronted Honeyeater			x		x	x			x
	Purnella albifrons	White-fronted Honeyeater			x		x	x		x	x
	Stomiopera unicolor	White-gaped Honeyeater			x						
	Sugomel nigrum	Black Honeyeater			x		x				
Meropidae	*Merops ornatus*	Rainbow Bee-eater			x	x	x	x			x
Motacillidae	*Anthus australis*	Australian Pipit			x		x				x
	Motacilla cinerea	Grey Wagtail	Mig. (EPBC & BC Acts)			x					
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella			x		x				x
Otididae	*Ardeotis australis*	Australian Bustard			x		x				

Family	Species	Common name	Status	Introduced	ALA	EPBC	NM	PHO	TFA	This survey	UPR
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush			x		x	x		x	x
	Falcunculus frontatus	Crested Shrike-tit			x						
	Oreoica gutturalis	Crested Bellbird			x		x	x		x	x
	Pachycephala inornata	Gilbert's Whistler			x		x				x
	Pachycephala occidentalis	Western Golden Whistler			x		x	x			
	Pachycephala rufiventris	Rufous Whistler			x		x	x		x	x
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote			x		x				
	Pardalotus striatus	Striated Pardalote			x		x	x		x	x
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican			x		x				
Petroicidae	*Eopsaltria griseogularis*	Western Yellow Robin			x		x			x	
	Melanodryas cucullata	Hooded Robin			x		x			x	x
	Microeca fascinans	Jacky Winter			x		x	x			x
	Petroica goodenovii	Red-capped Robin			x		x	x		x	x
Phalacrocoracidae	*Phalacrocorax melanoleucos*	Little Pied Cormorant			x		x				
Phasianidae	*Coturnix pectoralis*	Stubble Quail			x						
Podargidae	*Podargus strigoides*	Tawny Frogmouth			x		x	x			x
Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe			x		x				x
	Tachybaptus novaehollandiae	Australasian Grebe			x		x				x
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler			x		x	x			x
	Pomatostomus temporalis	Grey-crowned Babbler			x						x
Psittacidae	*Eolophus roseicapilla*	Galah			x		x	x			x
	Cacatua sanguinea	Little Corella			x		x				
	Lophochroa leadbeateri	Major Mitchell's Cockatoo			x						
	Melopsittacus undulatus	Budgerigar			x		x			x	x
	Neophema splendida	Scarlet-chested Parrot			x					x	
	Nymphicus hollandicus	Cockatiel			x		x				x
	Parvipsitta porphyrocephala	Purple-crowned Lorikeet			x		x	x		x	x
	Polytelis alexandrae	Princess Parrot	P4 (DBCA list)		x						
	Pezoporus occidentalis	Night Parrot	EN/CR (EPBC Act; BC Act)			x					
	Platycercus icterotis subsp. *xanthogenys*	Western Rosella (inland)	P4 (DBCA list)		x		x	x			
	Psephotellus varius	Mulga Parrot			x		x	x		x	x
	Barnardius zonarius	Australian Ringneck			x		x	x		x	x
	Polytelis anthopeplus	Regent Parrot			x		x	x			
	Zanda latirostris	Carnaby's Cockatoo	EN (EPBC & BC Acts)				x		x		

Family	Species	Common name	Status	Introduced	ALA	EPBC	NM	PHO	TFA	This survey	UPR
Rallidae	*Fulica atra*	Eurasian Coot			x		x				
	Porzana fluminea	Australian Spotted Crake			x		x				
	Tribonyx ventralis	Black-tailed Native-hen			x		x				
Recurvirostridae	*Cladorhynchus leucocephalus*	Banded Stilt			x		x	x			x
	Himantopus himantopus	Black-winged Stilt			x		x				
	Recurvirostra novaehollandiae	Red-necked Avocet			x		x				
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	Mig. (EPBC & BC Acts)		x	x	x		x		
	Calidris acuminata	Sharp-tailed Sandpiper	Mig. (EPBC & BC Acts)		x	x	x		x		
	Calidris alba	Sanderling	Mig. (EPBC & BC Acts)		x		x		x		
	Calidris ferruginea	Curlew Sandpiper	CR/Mig./CR (EPBC Act; BC Act)		x	x	x		x		
	Calidris melanotos	Pectoral Sandpiper	Mig. (EPBC & BC Acts)			x					
	Calidris ruficollis	Red-necked Stint	Mig. (EPBC & BC Acts)		x		x		x		
	Limosa limosa	Black-tailed Godwit	En/Mig./Mig. (EPBC Act; BC Act)		x						
	Tringa brevipes	Grey-tailed Tattler	Mig. EPBC and BC Acts; P4 DBCA list				x		x		
	Tringa glareola	Wood Sandpiper	Mig. (EPBC & BC Acts)				x		x		
	Tringa nebularia	Common Greenshank	Mig. (EPBC & BC Acts)			x	x		x		
	Tringa stagnatilis	Marsh Sandpiper	Mig. (EPBC & BC Acts)								
Strigidae	*Ninox boobook*	Australian Boobook			x		x			x	x
Sylviidae	*Cincloramphus mathewsi*	Rufous Songlark			x		x				
	Cincloramphus cruralis	Brown Songlark			x		x				x
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill			x		x				
	Plegadis falcinellus	Glossy Ibis	Mig. (EPBC & BC Acts)		x		x		x		
	Threskiornis moluccus	Australian White Ibis			x						
	Threskiornis spinicollis	Straw-necked Ibis			x		x				
Turnicidae	*Turnix velox*	Little Button-quail			x		x	x			x
Tytonidae	*Tyto alba*	Barn Owl			x		x				
Zosteropidae	*Zosterops lateralis*	Silvereye			x		x			x	
Mammals											
Bovidae	*Bos taurus*	European Cattle		*			x	x		x	x
	Capra hircus	Goat		*			x				x
	Ovis aries	Sheep					x				x
Burramyidae	*Cercartetus concinnus*	Western Pygmy-possum					x				x
Canidae	*Canis familiaris*	Dog		*			x	x		x	x
	Vulpes vulpes	Red Fox		*						x	
Dasyuridae	*Antechinomys laniger*	Kultarr					x				

Family	Species	Common name	Status	Introduced	ALA	EPBC	NM	PHO	TFA	This survey	UPR
	Dasyurus geoffroii	Chuditch	VU (EPBC & BC Acts)			x		x	x		
	Ningaui ridei	Wongai Ningaui					x				
	Ningaui yvonneae	Southern Ningaui					x				
	Pseudantechinus woolleyae	Woolley's Pseudantechinus					x				
	Sminthopsis crassicaudata	Fat-tailed Dunnart					x				x
	Sminthopsis dolichura	Little long-tailed Dunnart					x				x
	Sminthopsis gilberti	Gilbert's Dunnart					x				
	Sminthopsis ooldea	Ooldea Dunnart					x				x
Emballonuridae	*Taphozous hilli*	Hill's Sheathtail-bat					x				x
Equidae	*Equus asinus*	Donkey		*						x	
Felidae	*Felis catus*	Cat		*			x	x		x	x
Leporidae	*Oryctolagus cuniculus*	Rabbit		*			x	x		x	x
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo					x	x		x	x
	Osphranter robustus	Euro					x				x
	Osphranter rufus	Red Kangaroo					x	x		x	x
Molossidae	*Austronomus australis*	White-striped Free-tailed Bat					x	x		x	x
	Ozimops kitcheneri	South-western Free-tailed Bat					x	x			
	Ozimops petersi	Inland Free-tailed Bat								x	x
Muridae	*Mus musculus*	House Mouse		*			x				x
	Notomys mitchellii	Mitchell's Hopping-mouse						x			
	Pseudomys albocinereus	Ash-grey Mouse					x				
	Pseudomys bolami	Bolam's Mouse					x				x
	Pseudomys hermannsburgensis	Sandy Inland Mouse					x				
Myrmecobiidae	*Myrmecobius fasciatus*	Numbat	EN (EPBC & BC Acts)				x		x		
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna					x	x		x	x
Thylacomyidae	*Macrotis lagotis*	Bilby	VU (EPBC & BC Acts)				x		x		
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat					x	x		x	x
	Chalinolobus morio	Chocolate Wattled Bat					x	x		x	x
	Nyctophilus geoffroyi	Lesser Long-eared Bat					x	x		x	x
	Nyctophilus major subsp. *tor*	Central Long-eared Bat	P3 (DBCA list)				x				x
	Nyctophilus sp.	Unidentified Long-eared Bat						x			
	Scotorepens balstoni	Inland Broad-nosed Bat					x	x		x	x
	Vespadelus baverstocki	Inland Forest Bat					x	x		x	x

Family	Species	Common name	Status	Introduced	ALA	EPBC	NM	PHO	TFA	This survey	UPR
	Vespadelus finlaysoni	Finlayson's Cave Bat					x				x
	Vespadelus regulus	Southern Forest Bat					x	x		x	x
Reptiles											
Agamidae	*Ctenophorus caudicinctus*	Ring-tailed Dragon					x				
	Ctenophorus cristatus	Bicycle Dragon					x	x			x
	Ctenophorus fordi	Mallee Sand Dragon					x				x
	Ctenophorus isolepis	Central Military Dragon					x			x	
	Ctenophorus maculatus	Spotted Military Dragon						x			
	Ctenophorus nuchalis	Central Netted Dragon					x				
	Ctenophorus reticulatus	Western Netted Dragon					x				x
	Ctenophorus salinarum	Salt Pan Dragon					x				
	Ctenophorus scutulatus	Lozenge-marked Dragon					x	x			x
	Moloch horridus	Thorny Devil					x				x
	Pogona minor	Dwarf Bearded Dragon					x	x		x	
	Tympanocryptis cephalus	Pebble Dragon					x	x			
	Tympanocryptis lineata						x				
Pythonidae	*Morelia spilota* subsp. *imbricata*	Carpet Python					x				
Carphodactylidae	*Nephrurus laevissimus*						x				
	Nephrurus vertebralis						x				x
Cheluidae	*Chelodina oblonga*						x				
Diplodactylidae	*Diplodactylus granariensis*	Western Stone Gecko					x				x
	Diplodactylus pulcher	Fine-faced gecko					x	x			x
	Hesperoedura reticulata	Reticulated Velvet Gecko					x				x
	Lucasium damaeum						x				
	Lucasium maini	Main's Ground Gecko					x				x
	Rhynchoedura ornata	Western Beaked Gecko					x				x
	Strophurus assimilis	Goldfields Spiny-tailed Gecko					x				x
	Strophurus elderi	Jewelled Gecko					x				x
Elapidae	*Acanthophis pyrrhus*	Desert Death Adder					x				
	Brachyurophis fasciolatus	Narrow-banded Shovel-nosed Snake					x				
	Brachyurophis semifasciatus	Southern Shovel-nosed Snake					x				
	Demansia psammophis	Yellow-faced Whipsnake					x				x
	Echiopsis curta	Bardick					x				
	Furina ornata	Moon Snake					x				
	Neelaps bimaculatus	Black-naped Snake					x				

Family	Species	Common name	Status	Introduced	ALA	EPBC	NM	PHO	TFA	This survey	UPR
	Parasuta gouldii						x				
	Parasuta monachus	Monk Snake					x				x
	Pseudechis australis	Mulga Snake					x				x
	Pseudonaja affinis	Dugite					x	x			
	Pseudonaja mengdeni	Western Brown Snake					x				x
	Pseudonaja modesta	Ringed Brown Snake					x				x
	Pseudonaja nuchalis	Gwardar					x				
	Simoselaps bertholdi	Jan's Banded Snake					x				
	Suta fasciata	Rosen's Snake					x				
Gekkonidae	*Christinus marmoratus*	Marbled Gecko						x			
	Gehyra purpurascens						x				
	Gehyra variegata	Variegated Dtella					x	x			x
	Hemidactylus frenatus	Asian House Gecko		*			x				
	Heteronotia binoei	Bynoe's Gecko					x	x		x	x
	Underwoodisaurus milii	Barking Gecko					x	x			x
Pygopodidae	*Delma australis*	Marble-faced Delma					x	x			x
	Delma butleri	Unbanded Delma					x				x
	Lialis burtonis	Burton's Legless Lizard					x	x			x
	Pygopus lepidopodus	Common Scaly Foot					x				
	Pygopus nigriceps						x				
Scincidae	*Cryptoblepharus buchananii*	Buchanan's Snake-eyed Skink					x	x			x
	Cryptoblepharus plagiocephalus	Peron's Snake-eyed Skink					x	x			x
	Ctenotus atlas						x				x
	Ctenotus leonhardii	Leonhard's Ctenotus					x				x
	Ctenotus schomburgkii	Barred Wedge-snout Ctenotus					x	x			x
	Ctenotus uber	Spotted Ctenotus					x	x			x
	Cyclodomorphus melanops	Slender Blue-tongue					x				x
	Egernia depressa	Southern Pygmy Spiny-tailed Skink					x				
	Egernia formosa	Goldfields Crevice-skink					x	x			x
	Egernia stokesii subsp. badia		EN/VU (EPBC Act; BC Act)				x		x		
	Eremiascincus richardsonii	Broad-banded Sand Swimmer					x				
	Hemiergis initialis	Southwestern Earless Skink					x				x

Family	Species	Common name	Status	Introduced	ALA	EPBC	NM	PHO	TFA	This survey	UPR
	Hemiergis peronii						x				
	Lerista kingi	King's Three-toed Slider					x				x
	Lerista muelleri	Wood Mulch-slider					x				
	Lerista picturata						x				x
	Lerista stictopleura						x				
	Lerista timida	Timid Slider					x	x		x	x
	Liopholis inornata	Desert Skink					x				x
	Menetia greyii	Common Dwarf Skink					x	x		x	x
	Morethia adelaidensis						x				x
	Morethia butleri	Woodland Morethia Skink					x				x
	Morethia obscura						x				
	Tiliqua occipitalis	Western Bluetongue					x	x			x
	Tiliqua rugosa	Bobtail					x	x		x	x
Typhlopidae	*Anilios australis*	Southern Blind Snake					x				
	Anilios bicolor						x				
	Anilios bituberculatus						x				
	Anilios hamatus						x				
	Anilios waitii						x				
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor					x				x
	Varanus gouldii	Bungarra or Sand Monitor					x	x			x
	Varanus tristis	Racehorse Monitor					x	x			

Appendix 4 SRE invertebrate desktop results

Family	Taxon	SRE Status
Centipedes		
Chilenophilidae	*Sepedonophilus* `sp. G1`	Potential
Chilenophilidae	*Sepedonophilus* `sp. G2`	Potential
Chilenophilidae	*Sepedonophilus* `sp. indet.`	Uncertain
Cryptopidae	*Cryptops* `sp. G1`	Potential
Mecistocephalidae	*Mecistocephalus* `sp. indet.`	Uncertain
Scolopendridae	*Arthrorhabdus paucispinus*	Widespread/ Not SRE
Scolopendridae	*Cormocephalus bungalbinensis*	Widespread/ Not SRE
Scolopendridae	*Cormocephalus strigosus*	Widespread/ Not SRE
Scolopendridae	*Cormocephalus turneri*	Widespread/ Not SRE
Scolopendridae	*Ethmostigmus curtipes*	Widespread/ Not SRE
Scolopendridae	*Ethmostigmus rubripes*	Widespread/ Not SRE
Scolopendridae	*Scolopendra laeta*	Widespread/ Not SRE
Scolopendridae	*Scolopendra morsitans*	Widespread/ Not SRE
Scolopendromorpha	Scolopendromorpha `sp. indet.`	Uncertain
Scutigeridae	*Allothereua maculata*	Widespread/ Not SRE
Scutigeridae	*Thereuopoda lesueurii*	Widespread/ Not SRE
Isopods (slaters)		
Armadillidae	*Acanthodillo* '1'	Potential
Armadillidae	Armadillidae 'gen4 sp2'	Potential
Armadillidae	*Buddelundia* `sp. 39`	Widespread/ Not SRE
Armadillidae	*Buddelundia* `sp. 72MS`	Potential
Armadillidae	*Buddelundia* `sp. indet.`	Uncertain
Armadillidae	*Buddelundia* cf. *monticola*	Potential
Armadillidae	*Buddelundia frontosa*	Potential
Armadillidae	*Buddelundia* 'lefroy A'	Potential
Armadillidae	*Buddelundia* 'lefroy B'	Potential
Armadillidae	*Buddelundia* 'lefroy C'	Potential
Armadillidae	*Buddelundia sulcata*	Widespread/ Not SRE
Armadillidae	*Cubaris* 'lefroy'	Potential
Armadillidae	*Pseudodiploexochus* `sp. indet.`	Uncertain
Armadillidae	*Spherillo* 'sp. indet. A1' (fimiston)	Potential
Armadillidae	*Spherillo* 'sp. indet. A2' (fimiston)	Potential
Armadillidae	*Spherillo* 'sp. indet. B' (fimiston)	Potential
Paraplatyarthridae	*Paraplatyarthrus* `sp. indet.`	Uncertain
Paraplatyarthridae	*Paraplayarthrus* `sp. G1`	Potential
Paraplatyarthridae	*Paraplayarthrus* `sp. G2`	Potential
Philosciidae	Philosciidae `sp. G1`	Potential
Philosciidae	Philosciidae 'lefroy'	Potential
Philosciidae	Philosciidae `sp. indet.`	Uncertain
Porcellionidae	*Porcellionides pruinosus*	Widespread/ Not SRE

Millipedes		
Paradoxosomatidae	*Antichiropus* `DIP065, binduli 2`	Confirmed
Paradoxosomatidae	*Antichiropus* `DIP067, Broad Arrow`	Confirmed
Paradoxosomatidae	*Antichiropus* `DIP145, kalgoorlie`	Confirmed
Paradoxosomatidae	*Antichiropus* `DIP185, goongarrie`	Confirmed
Paradoxosomatidae	*Antichiropus* `sp. G1`	Potential
Paradoxosomatidae	*Antichiropus* `sp. indet.`	Uncertain
Paradoxosomatidae	*Antichiropus* 'DIP176'	Confirmed
Polyxenidae	*Unixenus mjoebergi*	Widespread/ Not SRE
Siphonotidae	Siphonotidae `sp. G1`	Potential
Siphonotidae	Siphonotidae `sp. indet.`	Uncertain
Spiders		
Actinopodidae	*Missulena* `sp. indet.`	Uncertain
Actinopodidae	*Missulena harewoodi*	Confirmed
Actinopodidae	*Missulena occatoria*	Widespread/ Not SRE
Anamidae	*Aname* `mainae`	Widespread/ Not SRE
Anamidae	*Aname* `Mt Vetters sp. 03`	Potential
Anamidae	*Aname* `Mt Vetters sp. 04`	Potential
Anamidae	*Aname* `Mt Vetters sp. 05`	Potential
Anamidae	*Aname* `Mt Vetters sp. 06`	Potential
Anamidae	*Aname* `MYG212`	Widespread/ Not SRE
Anamidae	*Aname* `MYG347`	Potential
Anamidae	*Aname* `MYG364`	Potential
Anamidae	*Aname* `MYG738`	Potential
Anamidae	*Aname* `sp. indet.`	Uncertain
Anamidae	*Aname* `sp. nov. curved embolus`	Potential
Anamidae	*Aname lillianae*	Widespread/ Not SRE
Anamidae	*Aname* 'MYG181'	Potential
Anamidae	*Aname* 'PES0053'	Potential
Anamidae	*Aname* 'SIGM121'	Potential
Anamidae	*Aname simoneae*	Widespread/ Not SRE
Anamidae	*Aname tepperi*	Widespread/ Not SRE
Anamidae	*Aname whitei*	Widespread/ Not SRE
Anamidae	*Kwonkan* `Mt Vetters sp. 02`	Potential
Anamidae	*Kwonkan* `MYG213`	Potential
Anamidae	*Kwonkan* `Phoenix0082`	Potential
Anamidae	*Kwonkan* `Phoenix0085`	Potential
Anamidae	Kwonkan `SIGM104`	Potential
Anamidae	*Kwonkan* `sp. indet.`	Uncertain
Anamidae	*Kwonkan* 'MYG175'	Widespread/ Not SRE
Anamidae	*Kwonkan* 'MYG263'	Potential
Anamidae	Nemesiidae `sp. indet.`	Uncertain
Anamidae	*Proshermacha* `MYG435`	Potential
Anamidae	*Proshermacha* `MYG502`	Potential

Anamidae	*Proshermacha* `MYG506`	Potential
Anamidae	*Proshermacha* `sp. indet.`	Uncertain
Anamidae	*Teyl* `door-building Diplurid`	Potential
Anamidae	*Teyl* `door-building`	Potential
Anamidae	*Teyl* `double-door`	Potential
Anamidae	*Teyl* `MYG021`	Widespread/ Not SRE
Anamidae	*Teyl* `Phoenix0081`	Potential
Anamidae	*Teyl* `sp. G1`	Potential
Anamidae	*Teyl* `sp. indet.`	Uncertain
Anamidae	*Teyl luculentus*	Widespread/ Not SRE
Anamidae	*Teyl* 'MYG021'	Widespread/ Not SRE
Barychelidae	*Aurecocrypta lugubris*	Confirmed
Barychelidae	Barychelidae `sp. indet.`	Uncertain
Barychelidae	*Idiommata* `kalgoorlie`	Potential
Barychelidae	*Idiommata* `sp. indet.`	Uncertain
Barychelidae	*Idiommata* blackwalli	Widespread/ Not SRE
Barychelidae	*Mandjelia* 'MYG035'	Widespread/ Not SRE
Barychelidae	*Synothele* `Phoenix0083`	Potential
Barychelidae	*Synothele* `Phoenix0084`	Potential
Barychelidae	*Synothele* `sp. G1`	Potential
Barychelidae	*Synothele meadhunteri*	Not SRE
Barychelidae	*Synothele* 'MYG264'	Potential
Euagridae	*Cethegus* `fugax`	Potential
Euagridae	*Cethegus* `MYG050`	Widespread/ Not SRE
Euagridae	*Cethegus* `sp. G1`	Potential
Euagridae	*Cethegus* `sp. G2`	Potential
Euagridae	*Cethegus* `sp. indet.`	Uncertain
Euagridae	*Cethegus ischnotheloides*	Widespread/ Not SRE
Euagridae	*Cethegus* 'MYG050'	Widespread/ Not SRE
Halonoproctidae	*Conothele* `MYG549`	Potential
Halonoproctidae	*Conothele* `MYG554`	Potential
Halonoproctidae	*Conothele* `sp. indet.`	Uncertain
Idiopidae	*Bungulla* `MYG677`	Potential
Idiopidae	*Bungulla* `sp. G1`	Potential
Idiopidae	*Gaius* `sp. indet.`	Uncertain
Idiopidae	*Gaius austini*	Widespread/ Not SRE
Idiopidae	*Gaius villosus*	Widespread/ Not SRE
Idiopidae	Idiopidae `sp. indet.`	Uncertain
Idiopidae	*Idiosoma* `goldfields sp. group`	Potential
Idiopidae	*Idiosoma* `MYG159`	Potential
Idiopidae	*Idiosoma* `MYG244`	Potential
Idiopidae	*Idiosoma* `MYG256`	Widespread/ Not SRE
Idiopidae	*Idiosoma* `occidentalis sp. group`	Potential
Idiopidae	*Idiosoma* `Phoenix0086`	Potential

Idiopidae	*Idiosoma* `sp. near MYG224`	Potential
Idiopidae	*Idiosoma* `squama`	Potential
Idiopidae	*Idiosoma* 'kalgoorlie 1'	Potential
Idiopidae	*Idiosoma* 'MYG721'	Widespread/ Not SRE
Idiopidae	*Idiosoma* 'SIGM120'	Potential
Theraphosidae	*Selenotholus foelschei*	Widespread/ Not SRE
Pseudoscorpions		
Atemnidae	*Oratemnus* `sp. indet.`	Uncertain
Cheiridiidae	Cheiridiidae `sp. indet.`	Uncertain
Cheliferidae	Cheliferidae `sp. Fi01`	Potential
Cheliferidae	*Protochelifer* `sp. indet.`	Uncertain
Chernetidae	Chernetidae `sp. indet.`	Uncertain
Chernetidae	*Conicochernes* `PSE024`	Widespread/ Not SRE
Chernetidae	*Conicochernes* `sp. indet.`	Uncertain
Chernetidae	*Haplochernes* `sp. indet.`	Uncertain
Chernetidae	*Nesidiochernes* `sp. Fi01`	Potential
Chernetidae	*Nesidiochernes* `sp. Fi02`	Potential
Chernetidae	*Nesidiochernes* `sp. G1`	Potential
Chernetidae	*Nesidiochernes* `sp. indet.`	Uncertain
Chernetidae	*Sundochernes* `sp. G1`	Potential
Chernetidae	*Sundochernes* `sp. indet.`	Uncertain
Chthoniidae	*Austrochthonius* `sp. indet.`	Uncertain
Garypidae	*Amblyolpium* `sp. indet.`	Uncertain
Garypidae	*Synsphyronus* `cf. mimulus`	Potential
Garypidae	*Synsphyronus* `PSE216`	Potential
Garypidae	*Synsphyronus* `sp. indet.`	Uncertain
Garypidae	*Synsphyronus* '7/2 goldfields (PSE117)'	Potential
Garypidae	*Synsphyronus callus*	Widespread/ Not SRE
Garypidae	*Synsphyronus dorothyae*	Widespread/ Not SRE
Garypidae	*Synsphyronus lathrius*	Widespread/ Not SRE
Garypidae	*Synsphyronus mimulus*	Potential
Garypinidae	*Amblyolpium* `sp. indet.`	Uncertain
Geogarypidae	*Geogarypus taylori*	Widespread/ Not SRE
Olpiidae	*Austrohorus* `salt lake species`	Potential
Olpiidae	*Austrohorus* `sp. Fi01`	Potential
Olpiidae	*Austrohorus* `sp. indet.`	Uncertain
Olpiidae	*Beierolpium* `8/4-Fi02`	Potential
Olpiidae	*Beierolpium* `sp. 8/4 small`	Potential
Olpiidae	*Beierolpium* `sp. 8/4`	Widespread/ Not SRE
Olpiidae	*Beierolpium* `sp. indet.`	Uncertain
Olpiidae	*Indolpium* `Fi03`	Potential
Olpiidae	*Indolpium* `sp. indet.`	Uncertain
Olpiidae	Olpiidae `sp. indet.`	Uncertain
Olpiidae	*Xenolpium* `sp. indet.`	Uncertain

Sternophoridae	*Afrosternophorus* `sp. indet.`	Uncertain
Scorpions		
Bothriuridae	*Cercophonius* `sp. indet.`	Uncertain
Bothriuridae	*Cercophonius michaelseni*	Widespread/ Not SRE
Buthidae	Buthidae `sp. indet.`	Uncertain
Buthidae	*Isometroides* `goldfields1`	Widespread/ Not SRE
Buthidae	*Isometroides* `sp. indet.`	Uncertain
Buthidae	*Isometroides* `vescus`	Widespread/ Not SRE
Buthidae	*Lychas* `adonis`	Potential
Buthidae	*Lychas* `annulatus complex`	Potential
Buthidae	*Lychas* `bituberculatus complex`	Potential
Buthidae	*Lychas* `sp. indet.`	Uncertain
Buthidae	*Lychas annulatus*	Widespread/ Not SRE
Buthidae	*Lychas* 'annulatus grp'	Widespread/ Not SRE
Buthidae	*Lychas jonesae*	Widespread/ Not SRE
Buthidae	*Lychas* 'pilbara1'	Widespread/ Not SRE
Buthidae	*Lychas* 'SIGM132'	Potential
Buthidae	*Lychas* 'splendens'	Widespread/ Not SRE
Urodacidae	*Urodacus* `armatus`	Widespread/ Not SRE
Urodacidae	*Urodacus* `magestic`	Potential
Urodacidae	*Urodacus* `sp. G1`	Potential
Urodacidae	*Urodacus* `sp. G2`	Potential
Urodacidae	*Urodacus* `sp. indet.`	Uncertain
Urodacidae	*Urodacus hoplurus*	Widespread/ Not SRE
Urodacidae	*Urodacus* 'lefroy'	Potential
Urodacidae	*Urodacus* 'SIGM131'	Potential
Urodacidae	*Urodacus similis*	Widespread/ Not SRE
Urodacidae	*Urodacus yaschenkoi*	Widespread/ Not SRE
Snails		
Bothriembryontidae	*Bothriembryon* `sp. indet.`	Uncertain
Camaenidae	*Sinumelon* `sp. indet.`	Uncertain
Camaenidae	*Sinumelon* cf. jimberlanensis	Potential
Camaenidae	*Sinumelon* cf. kalgum	Potential
Camaenidae	*Sinumelon* cf. vagente	Potential
Camaenidae	*Sinumelon jimberlanensis*	Widespread/ Not SRE
Camaenidae	*Sinumelon kalgum*	Widespread/ Not SRE
Punctidae	*Westralaoma* cf. *expicta*	Potential
Punctidae	*Westralaoma expicta*	Widespread/ Not SRE
Pupillidae	*Gastrocopta* `sp. indet.`	Widespread/ Not SRE
Pupillidae	*Gastrocopta* aff. *margaretae*	Widespread/ Not SRE
Pupillidae	*Gastrocopta bannertonensis*	Widespread/ Not SRE
Pupillidae	*Gastrocopta* cf. *bannertonensis*	Widespread/ Not SRE
Pupillidae	*Gastrocopta margaretae*	Widespread/ Not SRE
Pupillidae	*Pupilla* cf. *ficulnea*	Widespread/ Not SRE

Pupillidae	*Pupoides* `sp. indet.`	Widespread/ Not SRE
Pupillidae	*Pupoides* adelaidae	Widespread/ Not SRE
Pupillidae	*Pupoides* cf. beltianus	Widespread/ Not SRE
Pupillidae	*Pupoides* cf. myoporinae	Widespread/ Not SRE
Pupillidae	*Pupoides myoporinae*	Widespread/ Not SRE
Succineidae	*Succinea* `sp. indet.`	Uncertain

Appendix 5 Fauna species by site matrix

Scientific name	Common name	BF001	BF002	BF003	BF004	BF005	BF007	BF008	BF010	BF011	BF012	BF013	BF014	BF015	BF016	BF017	BF018	BFOP001	BFOP002	BFOP003	BFOP004	BFOP005	BFOP006	KO-001	KO-002	KO-003	KO-004	KO-005	KO-007	KO-008	KO-009	KO-011	KO-012	KO-013	KO-016	KO-017	KO-018	KO-019	KO-020	KO-021	KO-022	KO-023	KO-028	KO-MF1	KO-MF2	KO-Opp01	KO-Opp02	KO-Opp03	KO-Opp04
Birds																																																		
Chenonetta jubata	Australian Wood Duck																																			2														
Phaps chalcoptera	Common Bronzewing																									1										1														
Chrysococcyx basalis	Horsfield's Bronze Cuckoo																										1		1											1	1			2						
Accipiter fasciatus	Brown Goshawk													1																																				
Haliastur sphenurus	Whistling Kite																													1																				
Falco berigora	Brown Falcon																			3																															1
Falco cenchroides	Australian Kestrel																										2																						
Leipoa ocellata	Malleefowl																																						1					1	1				
Acanthiza chrysorrhoa	Yellow-rumped Thornbill			1		1		1	1	1																																							
Acanthiza uropygialis	Chestnut-rumped Thornbill																										1		4					1										1					
Pyrrholaemus brunneus	Redthroat			1																				1			3		1					1					2		5	1						
Smicrornis brevirostris	Weebill			1			1	1	1	1		1	1		1									1		1	5			1	4	1			1				4			5		4				
Artamus cyanopterus	Dusky Woodswallow																											2																				
Artamus personatus	Masked Woodswallow																																	1														
Coracina novaehollandiae	Black-faced Cuckoo-shrike			1				1				1																																				
Lalage tricolor	White-winged Triller															4																																		
Cinclosoma clarum	Western Chestnut Quail-thrush			1																							2																						
Corvus bennetti	Little Crow																									1																			1					
Corvus orru	Torresian Crow																								1																								
Cracticus nigrogularis	Pied Butcherbird																																												1					
Cracticus tibicen	Australian Magpie															1																																		
Strepera versicolor	Grey Currawong																1				1				1	1	1																1							
Dicaeum hirundinaceum	Mistletoebird											1																																					
Grallina cyanoleuca	Magpie-lark								1		1	1	1																																				
Myiagra inquieta	Restless Flycatcher											1		1																																				
Rhipidura albiscapa	Grey Fantail		1																																														
Rhipidura leucophrys	Willie Wagtail																						1														1	1											
Taeniopygia guttata	Zebra Finch																																								30									
Malurus splendens	Splendid Fairy-wren												1		4		1																																	
Acanthagenys rufogularis	Spiny-cheeked Honeyeater					1								1										1			1	2						1						1				2					
Anthochaera carunculata	Red Wattlebird															1									1									1	1	1	5						2					
Gavicalis virescens	Singing Honeyeater																										2							1		1			1	1	1							

| | | |

| | | |