ATTACHMENT 1:
NATIVE VEGETATION CLEARING PERMIT AMENDMENT (CPS 8938/1)
KING OF THE HILLS PROJECT

PREPARED FOR:

RED 5 LIMITED

JUNE 2021

PREPARED BY:

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environmental and geoscience consultants

KING OF THE HILLS
CLEARING PERMIT APPLICATION

Distribution List:

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Draft Report	Avril Crawford	Justine Hyams	31 May 2021
Final Report	Justine Hyams	Kristy Sell	3 June 2021

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1. SUMMARY

Red 5 Limited (Red 5) previously proposed to expand the existing King of the Hills (KOTH) Project. The project is located 35 km north of the town of Leonora in the northern Goldfields of Western Australia. Expansion works include ongoing development of the Tarmoola open pit, mining of new satellite deposits to the north west and re-entering the Rainbow pit to the south of the existing operation, and construction of a conventional carbon in leach (CIL) gold recovery plant with associated infrastructure. A Native Vegetation Clearing Permit (NVCP) was submitted for the project expansion to include 918.5 ha of native vegetation clearing and was granted on 30 July 2020 (CPS 8938-1).

This NVCP Amendment seeks approval for:

- Change in the Purpose Permit boundary to excise the gas pipeline tenure on L37/248 (a separate NVCP application is being submitted by APA for this area).
- Change (increase) in Purpose Permit boundary to align with the Disturbance Envelope for the Mining Proposal.
- Increase in area of allowed clearing.
- Five year validity for the clearing permit.

An assessment against the ten clearing principles was undertaken based on information collected from site specific flora, fauna and hydrological surveys of the project area.

This assessment of the proposed clearing against the ten clearing principles determined that the proposed additional clearing of 73.5 ha for the KOTH Project expansion will not be at variance with the ten clearing principles. Appropriate environmental management procedures will be implemented to ensure potential impacts associated with the clearing are avoided or minimised where practicable.

2. INTRODUCTION

The KOTH Project (the Project) is owned by Greenstone Resources (WA) Pty Ltd (Greenstone), a wholly owned subsidiary of Red 5 Limited (Red 5). The Project was purchased under the Tarmoola Project name from Saracen Metals Pty Ltd (Saracen) in October 2017 whilst the site was under care and maintenance. The Project has been previously owned by Mt Edon Gold Mines, PacMin Mining Corporation Ltd, Sons of Gwalia and St Barbara Mines.

Red 5 aims to develop the KOTH Project to be an open pit and underground mine and conventional gold recovery plant. The KOTH project is anticipated to include:

- The Tarmoola open pit mine to be cut back to form a single KOTH pit.
- Alterations to the existing KOTH waste rock dumps (WRD) to accommodate the KOTH pit expansion and additional mine waste.
- Underground mining of the KOTH underground will be continued.
- Construction of an onsite CIL processing facility and mining infrastructure area.
- Re-commissioning of TSF4 and completion of TSF5.
- Development of satellite open pits to the north west (Centauri and Cerebus-Eclipse) and re-entering the satellite pit to the south (Rainbow).
- Development of WRD adjacent to satellite open pits at Centauri, Cerebus-Eclipse and Rainbow.
- Construction of a low-grade stockpile on top of the decommissioned and rehabilitated TSF1.
- Development of ore stockpiles at the satellite open pit operating areas.
- Power Plant with associated gas supply corridor.
- Construction of accommodation village, WWTP and landfill approved under Reg ID 87634.

This Native Vegetation Clearing Permit amendment application is being submitted for the additional clearing required for the KOTH expansion project. Clearing will be undertaken in a staged manner as necessary approvals are obtained for the project over time.

In April 2021, Red 5 was granted tenure over L37/248. This tenure is designated for the express purpose of isolating the proposed gas pipeline licence PL127 into separate tenure which will be transferred to the pipeline operator (APA Operations Pty Ltd) in the near future. This NVCP amendment reflects the excision of the PL127 license area (L37/248) from the current NVCP (CPS 8938/1) see Figure 1. APA will submit a standalone application for Purpose Permit over the PL127 licence area.

Scale: 1:80000
Original Size: A4
Air Photo Date: Landgate 2014
Grid: Australia MGA94 (51)
0 2 km

Red 5 Limited
King of the Hills Mine
Native Vegetation
Clearing Permit

Figure 1

L37/248 excision from CPS 8938/1

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3. BACKGROUND

3.1 LOCATION

The KOTH Project is a gold deposit located approximately 35 km north of Leonora in the northeastern Goldfields. The site lies within the Shire of Leonora, on the Tarmoola pastoral lease, and is currently accessed via the Goldfields Highway (Figure 1)

3.2 TENURE

The KOTH Project is owned by Greenstone Resources (WA) Pty Ltd (Greenstone), a wholly owned subsidiary of Red 5 Limited.

KOTH consists of thirty-four (34) granted Mining Leases, three (3) Miscellaneous Licenses, three (3) Exploration Licences and thirty-six (36) Prospecting Licenses covering an area of approximately 33,532 hectares.

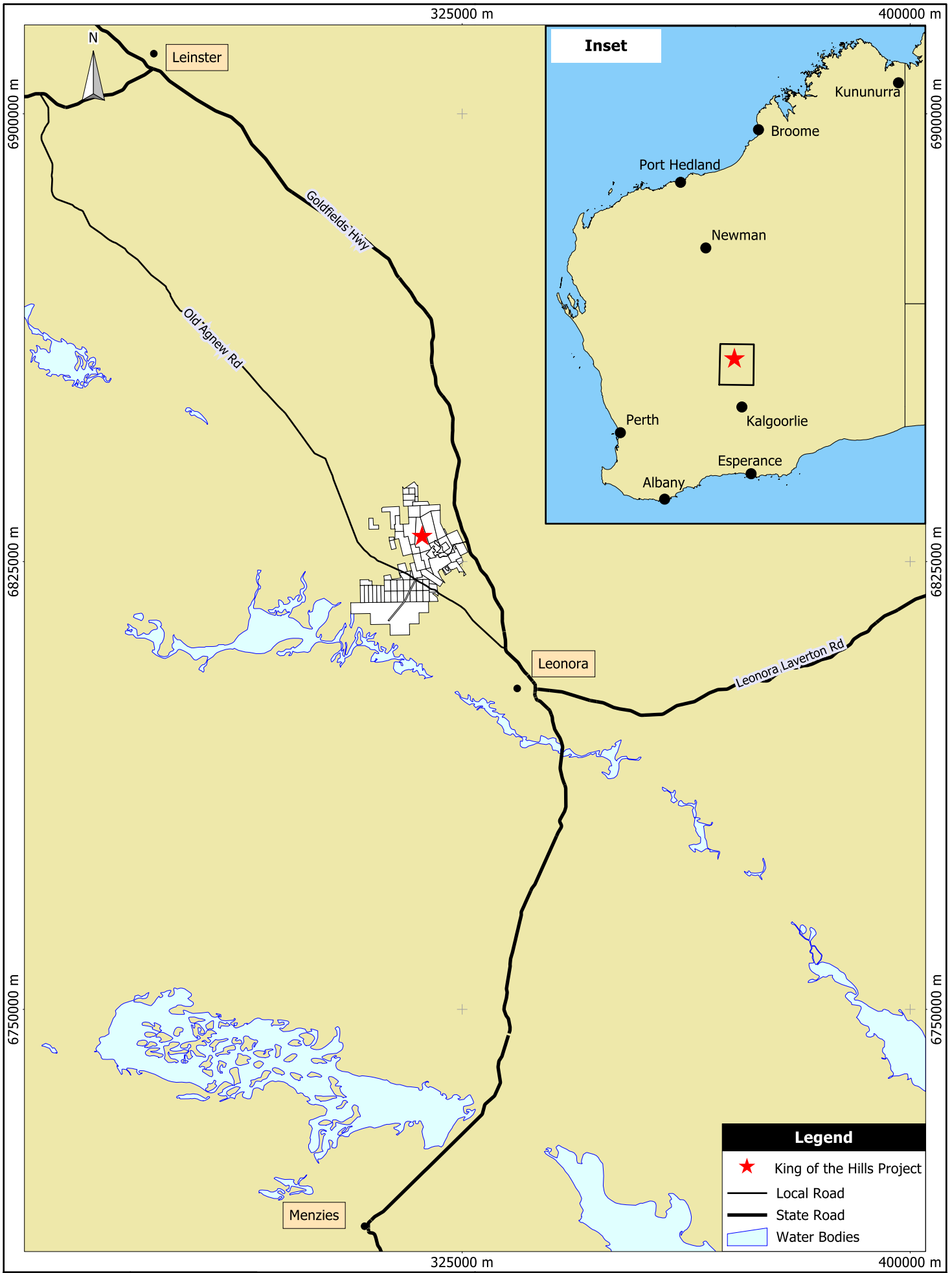
A summary of the tenements applicable to this Clearing Permit Amendment is provided in Table 1 and displayed in Figure 3. Evidence of ownership is provided in Appendix 1.

Table 1: KOTH Project Tenements

Tenement	Tenement Holder	Area (ha)	Grant Date	Expiry Date
P 37/9157	Greenstone Resources (WA) Pty Ltd	56.88	14/01/2019	13/01/2023
M 37/67	Greenstone Resources (WA) Pty Ltd	38.095	23/12/1986	04/01/2029
M 37/76	Greenstone Resources (WA) Pty Ltd	65.555	10/05/1986	20/05/2028
M 37/90	Greenstone Resources (WA) Pty Ltd	166.85	23/12/1986	04/01/2029
M 37/179	Greenstone Resources (WA) Pty Ltd	97.345	26/12/1988	16/01/2031
M 37/201	Greenstone Resources (WA) Pty Ltd	227.5	19/04/1989	19/04/2031
M 37/222	Greenstone Resources (WA) Pty Ltd	416.25	09/07/1989	12/07/2031
M 37/248	Greenstone Resources (WA) Pty Ltd	2.24	28/09/1989	03/10/2031
M 37/330	Greenstone Resources (WA) Pty Ltd	299.35	20/06/1991	01/07/2033
M 37/394	Greenstone Resources (WA) Pty Ltd	187.75	24/08/1993	30/08/2035
M 37/407	Greenstone Resources (WA) Pty Ltd	292.05	14/09/1993	15/09/2035
M 37/410	Greenstone Resources (WA) Pty Ltd	360.15	15/11/1993	23/11/2035
M 37/416	Greenstone Resources (WA) Pty Ltd	658.5	14/10/1993	20/10/2035
M 37/429	Greenstone Resources (WA) Pty Ltd	133.4	21/02/1994	22/02/2036
M 37/451	Greenstone Resources (WA) Pty Ltd	264.7	11/11/1994	15/11/2036
M 37/457	Greenstone Resources (WA) Pty Ltd	689.95	07/11/1994	06/11/2036
M 37/496	Greenstone Resources (WA) Pty Ltd	281.55	26/07/1999	25/07/2020
M 37/547	Greenstone Resources (WA) Pty Ltd	901.35	12/11/1999	11/11/2020
M 37/548	Greenstone Resources (WA) Pty Ltd	312.8	12/11/1999	11/11/2020
M 37/551	Greenstone Resources (WA) Pty Ltd	176.9	16/01/2008	30/01/2029
M 37/570	Greenstone Resources (WA) Pty Ltd	514.6	07/01/2008	09/01/2029
M 37/571	Greenstone Resources (WA) Pty Ltd	688.65	19/09/2000	20/09/2021
M 37/572	Greenstone Resources (WA) Pty Ltd	936.95	19/09/2000	20/09/2021
M 37/573	Greenstone Resources (WA) Pty Ltd	853.2	19/09/2000	20/09/2021
M 37/574	Greenstone Resources (WA) Pty Ltd	628.95	19/09/2000	20/09/2021

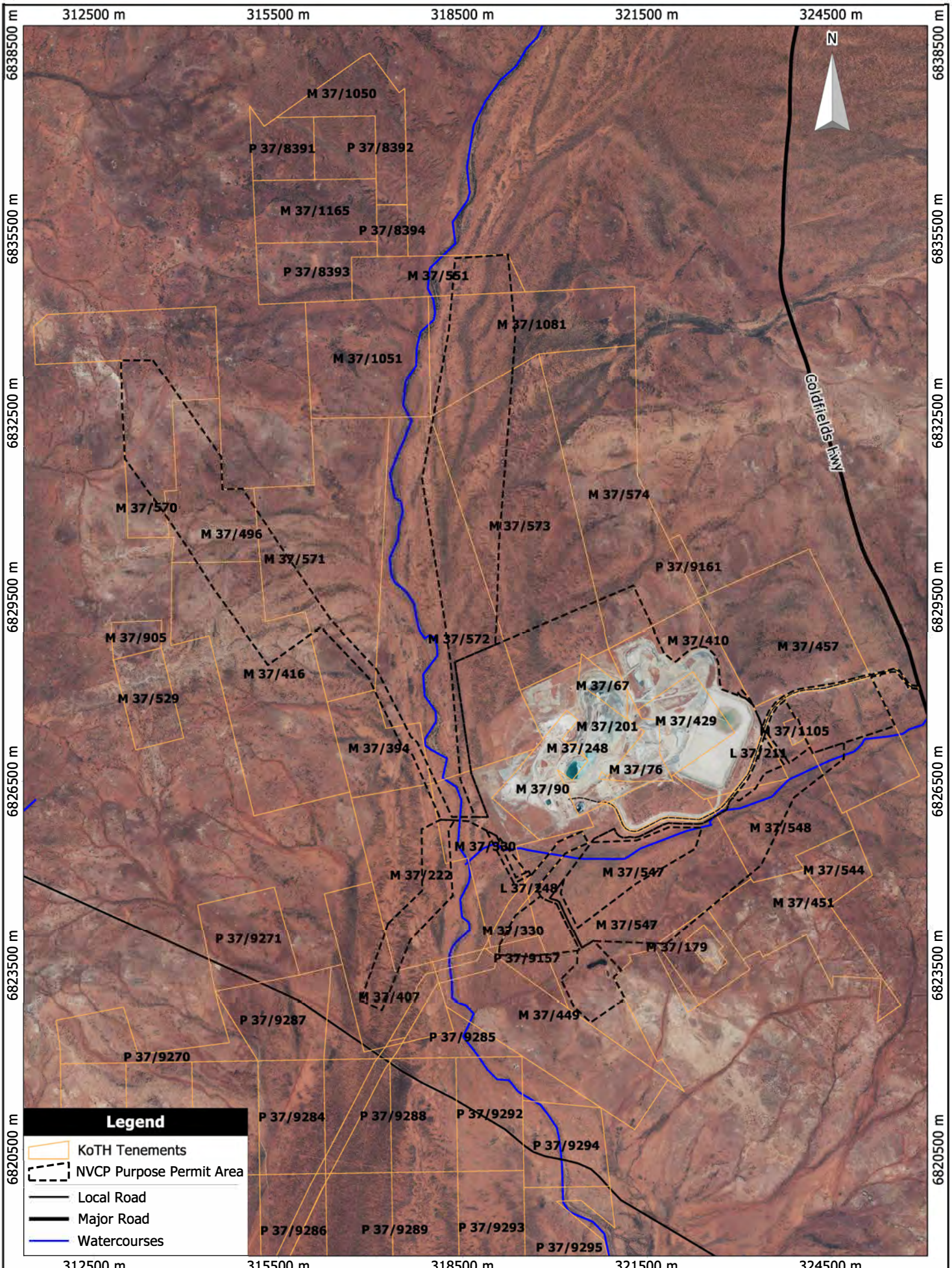
Tenement	Tenement Holder	Area (ha)	Grant Date	Expiry Date
M 37/1081	Greenstone Resources (WA) Pty Ltd	422.15	11/06/2008	17/06/2029
M 37/1105	Greenstone Resources (WA) Pty Ltd	9.713	19/04/2001	14/05/2022
L 37/211	Greenstone Resources (WA) Pty Ltd	30	10/06/2014	09/06/2035
L 37/248[1]	Greenstone Resources (WA) Pty Ltd	272.96	20/04/2022	20/04/2042

1. L37/248 is being excised from Purpose Permit CPS 8398/1



Scale: 1:820000 Original Size: A4 Grid: Australia MGA94 (51) 0 20 km	Red 5 Limited King of the Hills Mine Native Vegetation Clearing Permit	**Figure 2** **Location Plan**	Martinick Bosch Sell Pty Ltd 4 Cook St West Perth WA 6005 Australia t: +61 8 9226 3166 info@mbsenvironmental.com.au www.mbsenvironmental.com.au MBS ENVIRONMENTAL

W:\RED5\KoTH\GIS\Location and Tenement Plan.map 2/06/2021 Location Plan Layout



Scale: 1:80000
Original Size: A4
Air Photo Date: Landgate 2014
Grid: Australia MGA94 (51)
0 2 km

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Figure 3

KOTH Project Tenements Applicable to NVCP

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W:\RED5\KoTH\KoTH Expansion\Approvals\NVCP\NVCP Amendment 2021\GIS\KoTH NVCP Amended Application.map 2/06/2021 Tenement Plan Layout

3.3 EXISTING OPERATIONS

Mining at the KOTH Project has been undertaken since 1989, with the site going into care and maintenance from 2004 to 2015. The existing KOTH Project comprises two open pits, Tarmoola and Galahad, as well as the KOTH underground operation. The site contains five associated mine waste dumps, a deconstructed Processing Plant, four tailings storage facilities (including the early stages of TSF5 construction), and associated workshops and offices. Other infrastructure includes an access road and haul roads, Reverse Osmosis (RO) plant, and borefields. A crushing and screening plant is also located on site and is operated by a third party. Two small satellite sites are located just south of Tarmoola, the shallow oxide Rainbow pit and minor workings at the Puzzle deposit. The existing site layout is detailed in Figure 4.

Mining operations are currently centred around underground workings in the KOTH underground mine.

The approved Purpose Permit area for the KOTH Project was approximately 2,272 ha, with an approved area of clearing of 918.5 ha as per CPS 8938/1.

An indicative site plan is presented in Figure 4 showing the activities associated with the KOTH Project and the proposed amendments to Purpose Permit in relation to the previously approved activities.

A summary of the amendments to vegetation clearing areas granted under CPS 8938/1 is provided in Table 4.

312000 m | 316000 m | 320000 m | 324000 m | 328000 m

6834000 m

6830000 m

6826000 m

N

P 37/8393
M 37/551
M 37/1081
M 37/1051
Cerebus-Eclipse Satellite Site
M 37/570
M 37/496
M 37/571
M 37/574
M 37/573
P 37/9161
Centauri Satellite Site
M 37/905
M 37/572
M 37/410
M 37/457
KOTH Mine Area
M 37/416
M 37/67
M 37/529
M 37/429
M 37/201
M 37/1105
L 37/211
M 37/248
M 37/394
M 37/76
M 37/90
M 37/548
M 37/330
M 37/547
M 37/544
M 37/222
L 37/248
M 37/451
M 37/330
M 37/547
P 37/9271
M 37/179
M 37/21
P 37/9157
Rainbow Satellite Site
M 37/407
M 37/449
P 37/9287

Legend

- Indicative Clearing Footprint
- Purpose Permit Area
- Project Tenements

312000 m | 316000 m | 320000 m | 324000 m | 328000 m

Scale: 1:51000
Original Size: A3
Air Photo Date: Landgate 2014
Grid: Australia MGA94 (51)

0 1 km

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King of the Hills Mine
Native Vegetation Clearing Permit

Figure 4

Purpose Permit Area and Indicative Clearing Footprint

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3.4 ENVIRONMENTAL SETTING

3.4.1 Climate

Climate in the KOTH project region (Eastern Murchison IBRA subregion) is arid. Mean annual rainfall is approximately 236.4 mm, with annual rainfall recorded at the closest meteorological station (Leonora) ranging from 57.8 mm to 552.2 mm (Chart 1; BOM 2020). Rainfall is influenced by decaying tropical cyclones which originate off the north-west coast in summer, and anticyclonic systems in winter. Evaporation greatly exceeds rainfall with annual average pan evaporation rate for the Leonora region at 2.8 m. The hottest month is January with an average maximum temperature of 37°C; however, temperatures above 40.0°C occur frequently when the hot and dry, north to north easterly winds prevail. Winters tend to be cool, and July is the coldest month with average maximum and minimum temperatures of 18.4°C and 6.1°C, respectively (BOM 2020).

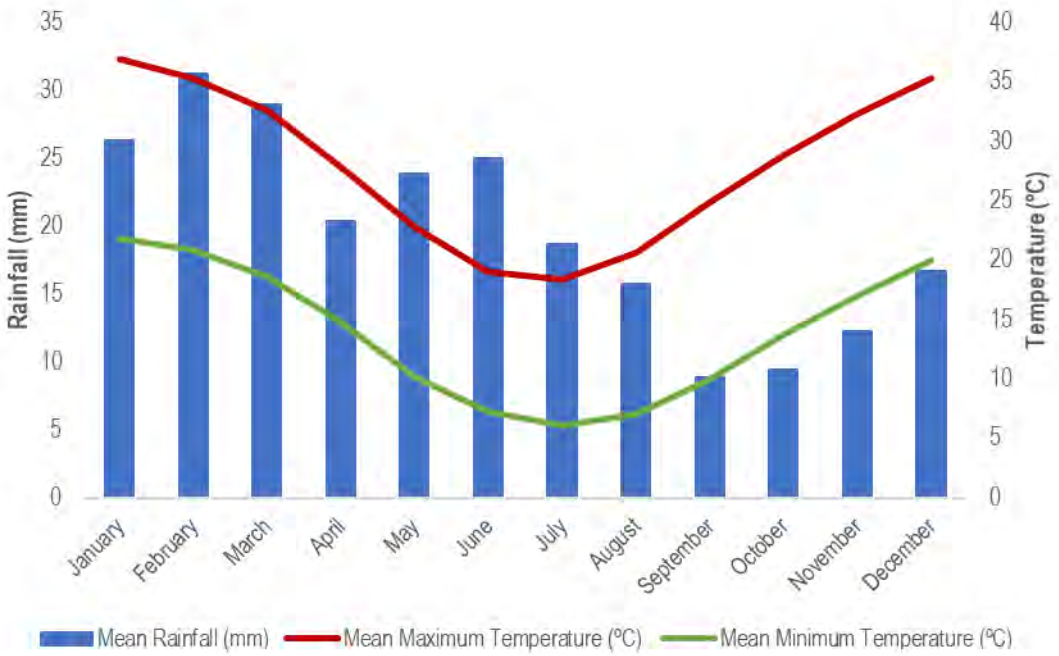


Chart 1: Climate Data for Leonora Station (BOM 2020)

3.4.2 Soils and Landscape

The KOTH Project is located within the Salinaland Plains Zone of the Murchison Province (DPIRD 2019). Landforms associated with the Salinaland Plains Zone include plains (with hardpan wash plains and some mesas, stony plains and salt lakes) on granitic and minor greenstone rocks of the Yilgarn Craton. The area within 40 km of KOTH has topography with elevations in the range 380 to 500 m Australian Height Datum (AHD), with low hills of bedrock occurring to the east and west of the mine (BDH 2019).

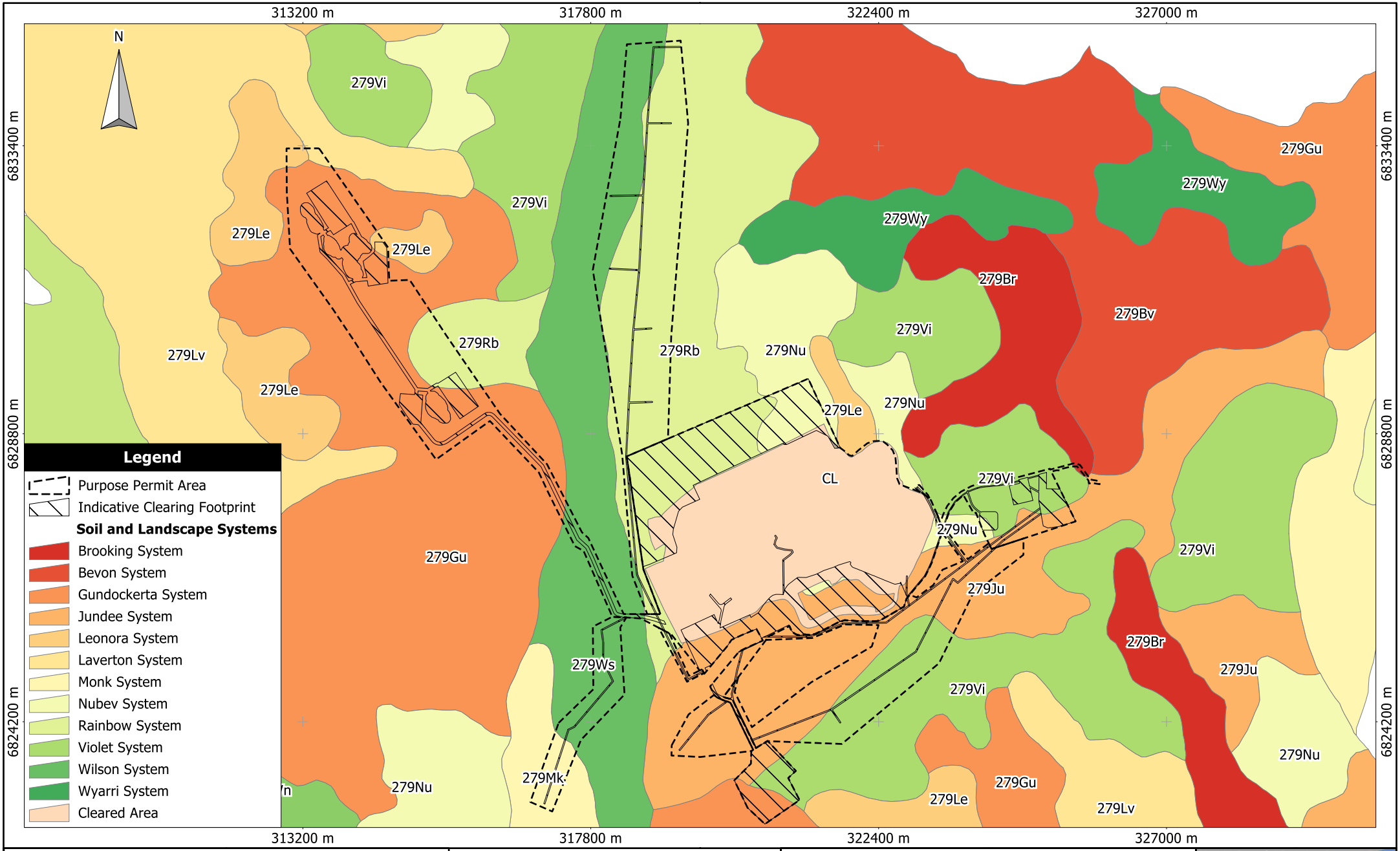
The Project occurs across a number of different landscape systems as displayed in Figure 5. The proposed amendments to vegetation clearing areas occurs largely within previously disturbed areas. The landscape systems mapped for the area associated with the KOTH Project are listed in Table 2.

Soils of the project area include red sandy earths, red deep sands, red shallow loams and red loamy earths with some red-brown hardpan shallow loams, salt lake soils and red shallow sandy duplexes. Characterisation of soils to the north and south of the existing operation was completed during 2006 by the Centre for Land Rehabilitation, University of Western Australia (UWA 2006). Soils are typical of the Goldfields region; topsoils (upper 0 to 50 cm of the soil profile) are non-saline, with deeper subsoils below 1 m typically characterised by higher salinity and sodicity.

A review of the Atlas of Australian Acid Sulphate Soils (ASS) database identified that the entire Purpose Permit Area occurs in an area of Extremely Low Probability of Occurrence of ASS (CSIRO 2011). The key area with the potential for ASS to occur is the Sullivan Creek watercourse. However, the creek is mostly dry throughout the year and has a low risk of ASS materials occurring.

Table 2: Landscape Systems of the Project (DPIRD 2018)

Land System	Description
Brooking System	Prominent ridges of banded iron formation supporting mulga shrublands and occasional minor halophytic communities.
Gundockerta System	Extensive, gently undulating calcareous stony plains supporting bluebush shrublands.
Jundee System	Hardpan plains with variable gravelly mantles and minor sandy banks supporting weakly groved mulga shrublands.
Laverton System	Greenstone hills and ridges with acacia shrublands.
Leonora System	Low greenstone hills and stony plains supporting mixed chenopod shrublands.
Nubev System	Gently undulating stony plains, minor limonitic low rises and drainage floors supporting mulga and halophytic shrublands.
Rainbow System	Hardpan plains supporting mulga tall shrublands.
Violet System	Gently undulating gravelly plains on greenstone, laterite and hardpan, with low stony rises and minor saline plains; supporting groved mulga and bowgada shrublands and occasionally chenopod shrublands.
Wilson System	Large creeks with extensive distributary fans, supporting mulga and chenopod shrublands.
Cleared Area	Cleared areas



Scale: 1:78000
Original Size: A4
Grid: Australia MGA94 (51)

0 2 km

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Figure 5

Landscape Systems of the Project Area

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W:\RED5\KoTH\KoTH Expansion\Approvals\NVCP\NVCP Amendment 2021\GIS\KoTH Stage 3 MP copy for NVCP.map 2/06/2021 F05 Landscape Systems Layout

3.4.3 Flora and Vegetation

The KOTH Project lies within the East Murchison (MUR-1) subregion of the Murchison bioregion under the Interim Biogeographical Regionalisation for Australia (IBRA). Vegetation within this subregion is described as being 'dominated by Mulga Woodlands often rich in ephemerals; hummock grasslands, saltbush shrublands and Tecticornia shrublands'.

Several studies have been completed on flora and vegetation for the KOTH Project, including the satellite deposits to the south:

- Mine Site Rehabilitation Services (1997) Tarmoola Gold Mine Flora and Fauna Survey. Report for Mt Edon Gold Mines, February 1997.
- Mattiske Consulting Ltd (1999) Flora and Vegetation of Sullivan Creek. Report for Tarmoola Operations Pty Ltd, July 1999.
- Mine Site Rehabilitation Services (2000) Flora Survey of the Area North of the Present Tarmoola Mining Operation. Report for Tarmoola Operations Pty Ltd, December 2000.
- Mattiske Consulting Ltd (2003) Flora and Vegetation Survey Prospects South of Tarmoola. Report for Sons of Gwalia Pty Ltd, July 2003.
- Law (2004) Tarmoola Minesite TSF 5 – Flora Survey. Report for Sons of Gwalia Ltd, January 2004.
- Mattiske Consulting Ltd (2006) Flora and Vegetation Survey of St Barbara, Tarmoola Mine Site. Report for St Barbara Limited, June 2006.
- Mattiske Consulting Pty Ltd (2019) Assessment of Potential Flora and Vegetation Values – King of the Hills Mine Expansion. Desktop Flora and Vegetation Report for Red 5 Limited, November 2019.
- Mattiske Consulting Pty Ltd (2019) Assessment of Flora and Vegetation Values – King of the Hills Mine Expansion. Level 2 Flora and Vegetation Survey. Report for Red 5 Limited, November 2019.
- Mattiske Consulting Pty Ltd (2020) Flora and Vegetation Values on Proposed Expansion Areas at Tarmoola. Level 1 Flora and Vegetation Survey. Memorandum for Red 5 Limited, April 2020 (Appendix 2).

3.4.3.1 Significant Flora Species

No Threatened flora species as listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), or the WA *Biodiversity Conservation Act 2016* (BC Act) were recorded as occurring in the KOTH project area (Mattiske 2020).

Three Priority species were identified during the Mattiske (2020) survey of the broader KOTH site, however these species were recorded outside of the Purpose Permit area, and the amended disturbance areas also avoid Priority species (Figure 6):

- *Frankenia georgei* (P1).
- *Stenanthemum patens* (P1).
- *Grevillea inconspicua* (P4).

Of the three Priority flora species, only *Frankenia georgei* was recorded as occurring in the KOTH project area (Mattiske 2020). Two large populations of *Frankenia georgei,* both exceeding 1,000 individuals, were recorded along the proposed haul road route, as shown in Figure 6.

3.4.3.2 Vegetation Communities

Fifteen vegetation communities have been mapped and described for the KOTH Project, with the majority of communities represented as *Acacia* open woodlands that are commonly represented in the region (Mattiske 2006). The vegetation communities within the KOTH Project area are described in Table 3 and displayed in Figure 7.

There are no Threatened Ecological Communities (TECs), or Priority Ecological Communities (PECs) listed at Commonwealth or State level within the KOTH Project area or surrounds. The nearest PEC to the proposed survey areas is located on the ex-Bulga Downs pastoral lease 90 km to the east.

Table 3: Vegetation Communities Within the KOTH Project Area

Vegetation Community	Description
A1	Low Open Forest of *Acacia* spp. over *Eremophila youngii* subsp. *youngii*, *Eremophila forrestii* subsp *forrestii*, *Rhagodia drummondii*, *Ptilotus obovatus*, *Solanum lasiophyllum* over *Aristida contorta, Enneapogon caerulescens*, annual herbs and grasses on sandy loams on flats and flowlines.
A2	Low Open Woodland of *Acacia* spp. over *Hakea preisii*, *Eremophila forrestii subsp. forrestii*, *Spartothamnella teucriiflora*, *Ptilotus calostachyus*, *Ptilotus obovatus*, *Solanum lasiophyllum* over *Maireana suaedifolia*, *Aristida contorta*, *Enneapogon caerulescens*, annual herbs and grasses on sandy-loams on flats and lower slopes.
A3	Low Open Woodland of *Acacia* spp. over *Hakea preissii*, *Eremophila galeata*, *Ptilotus obovatus*, *Solanum lasiophyllum* over mixed Chenopods, annual herbs and grasses on flats and lower slopes with pebbles and quartz on surface.
A5	Low Open Woodland of *Acacia* spp. and patches of *Casuarina pauper* over *Senna* and Chenopod species over annual herbs and grasses on ridges and slopes, with sandy-loams with mixed volcanic rocks on surface.
A6	Low Open Woodland of *Acacia fuscaneura* and *Acacia aneura* over *Ptilotus obovatus, Solanum lasiophyllum, Eremophila galeata* with occasional *Brachychiton gregorri* over mixed Chenpods, annual herbs and grasses on lower slopes with calcrete soils and quartz on surface.
A7	Low Open Woodland of *Acacia* spp. over *Ptilotus obovatus*, *Solanum lasiophyllum*, *Eremophila galeata* over mixed Chenopods, annual herbs and grasses on flats and lower slopes with calcrete soils.
A8	Low Open Woodland of *Acacia* spp. over *Eremophila* species, *Dodonaea lobulata*, *Prostanthera albiflora* on volcanic rockier hills and slopes or on erosional slopes.
A9	Low Open Woodland of *Acacia aneura* and *Hakea preissii* over mixed Chenopods and *Eremophila* species on sandy-loam soils with pebbles and quartz.
A10	Low Open Woodland of *Acacia aneura* and *Acacia ramulosa* var. *ramulosa* over *Eremophila youngii* subsp. *youngii* over *Cheilanthes austrotenuifolia*, annual herb and grasses on quartz ridge.
A11	Low Open Woodland of *Acacia aneura – Acacia tetragonophylla* over *Dodonaea rigida, Scaevola spinescens* over annual herbs and grasses on ironstone outcropping ridge.
A13	Low woodland of *Acacia ?incurvaneura* over *Acacia* spp. tall open shrubland over *Eremophila ?platycalyx, Scaevola spinescens, Senna artemisioides* subsp. x *artemisioides*, *Eremophila latrobei* subsp. *glabra* and *Psydrax* spp. mid sparse shrubland on hard red clay flats.
C1	Open Chenopod Shrubland with *Atriplex nummularia*, *Maireana pyramidata* and mixed *Sclerolaena* species with occasional emergent *Hakea preissii* and patches of *Acacia aneura* on calcrete soils.
E1	Open Woodland of *Eucalyptus camaldulensis* subsp. *obtusa* with pockets of *Casuarina* and *Acacia citrinoviridis* over *Bossiaea walkeri* over mixed grasses and annual herbs on sandy soils in creeklines.
D	Disturbed Sites. These sites include tracks old coal load out areas near Leonora and very disturbed sites.
CL	Cleared Sites. These sites include all the mining areas and the previously cleared areas near Leonora.

315000 m 322500 m 330000 m

6832500 m

N

Yeelirie
Leinster
Windarra
Project Area
Laverton
Leonora
Kalgoorlie
Coolgardie
Kambalda
0 100 km

6825000 m

Legend

- Purpose Permit Area
- Indicative Disturbance Footprint
- **KOTH Priority Flora**
- Frankenia georgei (P1)
- Grevillea inconspicua (P4)
- Stenanthemum patens (P1)
- Frankenia georgei population

315000 m 322500 m 330000 m

Scale: 1:61000
Original Size: A3
Air Photo Date: Landgate 2014
Grid: Australia MGA94 (51)

0 4 km

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Native Vegetation Clearing Permit

Figure 6

Priority Flora in the KOTH Project Area

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312000 m | 315000 m | 318000 m | 321000 m | 324000 m | 327000 m

6838000 m | 6835000 m | 6832000 m | 6829000 m | 6826000 m | 6823000 m | 6820000 m | 6817000 m

N

Legend

- Purpose Permit Area
- Indicative Disturbance Footprint

Vegetation Communities

- A1
- A2
- A3
- A5
- A6
- A7
- A8
- A9
- A10
- A11
- A12
- A13
- C1
- E1
- Er1
- D
- CL

Scale: 1:65000
Original Size: A3
Air Photo Date: Landgate 2014
Grid: MGA94(51)

0 2 km

Red 5 Limited
King of the Hills Project
Native Vegetation Clearing Permit

Figure 7

Vegetation Communities in the KOTH Project Area

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3.4.4 Terrestrial Fauna and Habitats

A Level 2 vertebrate fauna survey was undertaken in Spring 2019 for the KOTH project area (Appendix 3). Based on the assessment, it was determined that two broad fauna habitats exist within the project area (Terrestrial Ecosystems 2020):

- Open Mulga Woodland over Mixed Shrubs and Scattered Grasses or Bare Ground.
- Woodland of large Eucalypts over mixed shrubs and scattered grasses located along the ephemeral creekline that runs north south through the project area.

The assessment concluded the majority of the project area is disturbed as cattle and probably goats have foraged on both stations for many years and much of the grasses and lower level vegetation has either been lost, depleted or altered. The consequence is that the vertebrate fauna assemblage will differ significantly from what existed prior to it becoming pastoral lease. There are limited areas of fauna habitat as the majority of the proposed disturbance footprint of the Project is existing disturbance. The remaining area, which includes the Centauri and Cerebus-Eclipse satellite sites is classed as Open Mulga Woodland.

A desktop assessment of the DBCA NatureMap database did not identify any Threatened or Priority fauna species records in and surrounding the KOTH Project area (DBCA 2020). A database search of the Department of Agriculture, Water and Environment (DAWE) Protected Matters Search Tool (PMST) identified three Threatened fauna species listed under the EPBC Act as potentially occurring in the project area, these being:

- Malleefowl *(Leipoa ocellata)* – Vulnerable under both the EPBC Act and BC Act.
- Chuditch *(Dasyurus geoffroii)* – Vulnerable under both the EPBC Act and BC Act.
- Princess Parrot *(Polytelis alexandrae)* – Vulnerable under the EPBC Act and Priority 4 as listed by DBCA.

A Level 2 vertebrate fauna survey was undertaken in Spring 2019 for the KOTH Project area. Based on the assessment, it was determined that two major fauna habitats exist within the project area: Mulga Woodlands and the Sullivan Creek habitat type (Terrestrial Ecosystems 2020).

The assessment recorded no Threatened or significant species as defined by the EPBC Act or BC Act including the three species identified by database searches as potentially being present. In total, 60 species of birds, 34 reptiles and 2 mammal species were recorded during the survey (Terrestrial Ecosystems 2020). The overall number of mammal species caught was low, but consistent with the very dry conditions that have been experienced in the region or the past two years (Terrestrial Ecosystems 2020). These results are consistent with those recorded in previous site-specific studies.

3.4.5 Surface Water

The KOTH Project is located within the Raeside-Ponton Catchment of the Western Plateau Basin. The local surface topography is dominated by the 1,400 km^2 catchment of Sullivan Creek, which flows through a 30 km channel from north to south through the centre of the project to discharge into the Lake Raeside drainage approximately 15 km south of KoTH (Figure 8).

Sullivan Creek has formed an alluvial plain ranging from 2 to 3 km in width and broadening downstream, and flows infrequently after periods of heavy rainfall, usually arising from summer cyclonic storms (Big Dog Hydrology 2019). Sullivan Creek is of significance to the local Traditional Owners and is a registered heritage site. An unnamed minor creek also occurs directly to the south of the project.

No wetlands occur within the project area or surrounds. Two nationally important wetlands as listed under the Directory of Important Wetlands in Australia occur to the south west of the project, these being the Lake Ballard and the Lake Barlee System, which are located approximately 80 km south and 115 km south west of the project respectively.

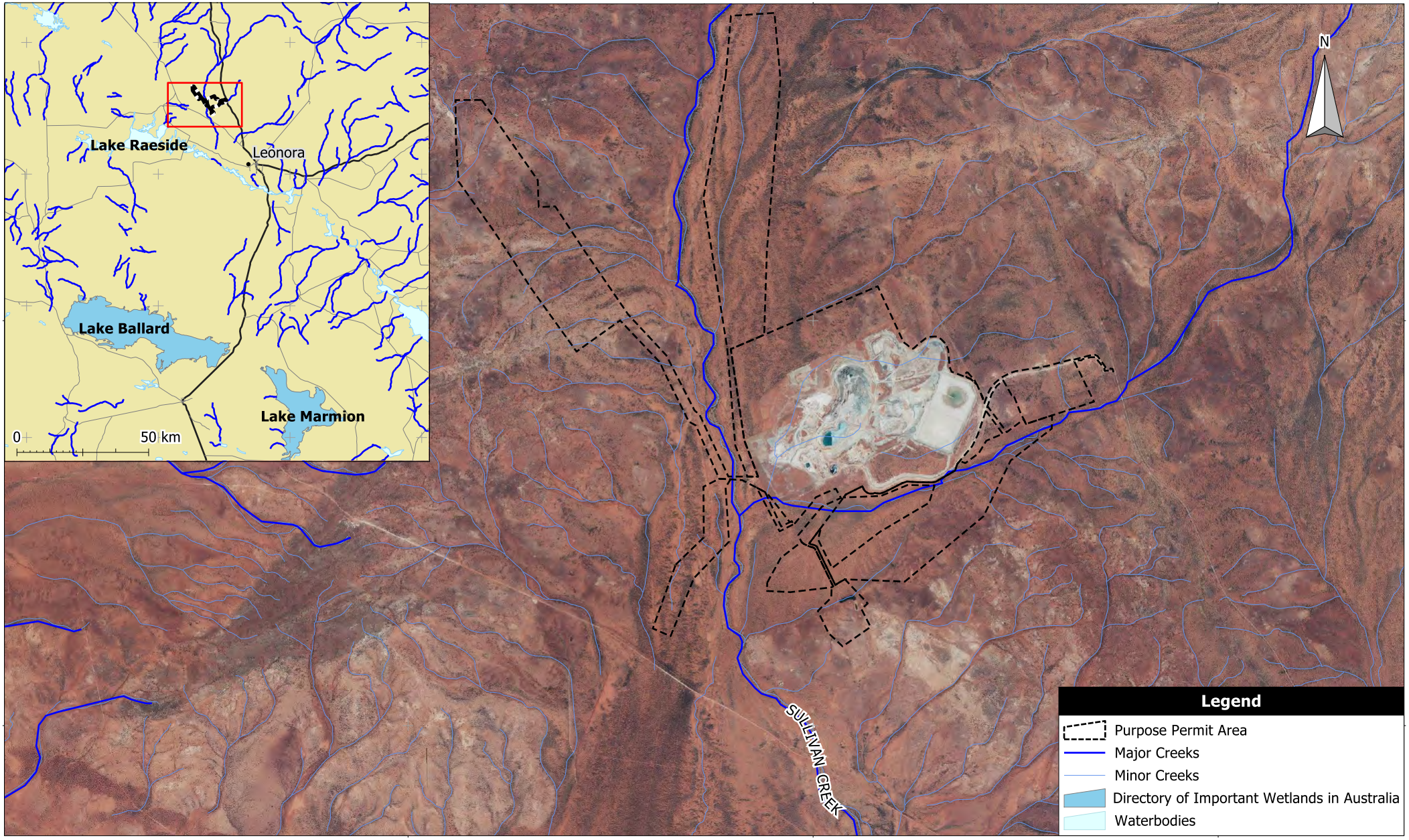
The project area does not occur within a proclaimed surface water area under the *Rights in Water and Irrigation Act 1991* (RIWI Act).

3.4.6 Groundwater

The KOTH Project is situated in the Goldfields Groundwater Proclamation Area under Section 26B (1) of the RIWI Act. Three existing groundwater licences are valid for the KOTH Project (GWL6377, GWL204011 and GWL204012).

The Leonora Water Reserve occurs immediately to the south of the Purpose Permit Area, as proclaimed under the *Country Areas Water Supply Act 1947*. It is a Priority 1 (P1) public drinking water source area (PDWSA), which has a water quality objective of risk avoidance (DoW 2010). The reserve supplies water for the Leonora township from the Station Creek wellfield (DoW 2010). The wellfield draws water from the Station Creek aquifer, which is a shallow, unconfined, fractured rock aquifer that forms part of the Lake Raeside palaeodrainage system (DoW 2010). Groundwater is abstracted from both shallow sedimentary rocks and fractured bedrock from depths of 6 to 11 m (DoW 2010).

Groundwater quality in the area is generally fresh to brackish, however bores near the existing Tarmoola Pit have previously intercepted saline to hypersaline groundwater. Groundwater quality ranges from potable in recharge areas to hypersaline in discharge areas (DoW 2010).



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Grid: Australia MGA94 (51)

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Figure 8

Project and Regional Hydrology

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4. PROPOSED LAND CLEARING

The proposed land clearing for this amended NVCP is:

- Change in Purpose Permit boundary to excise the gas pipeline tenure on L37/248.
- Change (increase) in Purpose Permit boundary to align with the Mining Proposal Disturbance Envelope.

The revised Purpose Permit area is approximately 3,874 ha.

The KOTH Project expansion will require clearing of 992 ha. This reflects a net increase of 73.5 ha within the amended Purpose Permit application area.

A shapefile is provided for the amended Purpose Permit application area, as displayed in Figure 4 and summary of amendments is provided in Table 4.

Table 4: Summary of Amendments to Land Clearing

Item	Description	Area (ha)
Previously approved clearing area (CPS 8938/1)		918.5
Additional Area	Power Corridor & Borefields	73.5
TOTAL		992.00
Relinquished Purposed Permit area cleared under CPS 89398/1	Gas pipeline corridor (L37/248)[1]	-15.5

1. Relinquished areas that have been cleared under CPS8938/1 will be reported in AER under CPS8938/1.

5. ASSESSMENT OF CLEARING PRINCIPLES

5.1 NATIVE VEGETATION CLEARING PRINCIPLES

Clearing applications are assessed against ten principles outlined in Schedule 5 of the *EP Act 1986*. These principles aim to ensure that all potential impacts resulting from removal of native vegetation are assessed in an integrated way and apply to all lands throughout Western Australia. The principles address the four environmental areas of biodiversity significance, land degradation, conservation estate and ground and surface water quality.

The following sections discuss the potential impacts associated with clearing for the Project. A summary of the outcomes of the assessment against the ten Clearing Principles is provided in Table 5.

Table 5: Summary of Clearing Assessment Against Clearing Principles

Principle	Clearing Principle	Outcome
A	Native vegetation should not be cleared if it comprises a high level of biological diversity.	Not at variance
B	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	Not at variance
C	Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, Threatened (rare) flora.	Not at variance
D	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a Threatened Ecological Community.	Not at variance
E	Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	Not at variance
F	Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	Not at variance
G	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	Not at variance
H	Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation areas.	Not at variance
I	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	Unlikely to be at variance
J	Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.	Not at variance

5.2 BIODIVERSITY

Clearing Principle A: Native vegetation should not be cleared if it comprises a high level of biological diversity.

Impacts to the biological diversity of native vegetation associated with clearing for the project expansion are limited to localised flora/habitat loss from clearing in the project area as well as the potential spread of existing weed species and the introduction of new weed species into the area.

No Threatened fauna species or TECs were identified within or adjacent to the KOTH Project Area.

Flora and fauna surveys of the KOTH Project area identified one Priority flora species, *Frankenia georgei,* within the proposed footprint of the haul road to the Centauri and Cerebus-Eclipse satellite sites. Impacts on this species are discussed in more detail in Section 5.4.

The vegetation communities of the project area and within the application area are predominantly *Acacia* open woodlands that are commonly represented in the region (Mattiske 2006). Potential impacts to the vegetation communities mapped within the project area are detailed in Table 6. The proposed disturbance to the mapped vegetation communities does not exceed 50%. The vegetation communities mapped within the Level 2 survey are well represented at a local, sub-regional and regional scale.

Management and mitigation measures to reduce impacts on biological diversity comprise:

- Clearing of vegetation will be kept to the minimum required for the project.
- As disturbed areas become available for rehabilitation, stockpiled topsoil and vegetation will be spread over disturbed areas to act as a seed source and mulch to protect the soil from erosion and provide habitat for fauna.
- Vehicle and equipment hygiene procedures will be implemented to minimise entry of weed and soil borne diseases.
- A weed hygiene system will be developed and implemented, and site weed control will be conducted, as necessary.
- Developing and implementing a fire management plan, as/if necessary.
- Installing fire breaks to protect key infrastructure and assist with minimising spread of fire.
- Firefighting equipment will be located on site and personnel trained in fire response.
- Implementing dust control measures.
- Implementing speed limits to minimise dust emissions and to minimise the risk of fauna injury or death due to vehicle traffic.

Given the widespread and common nature of vegetation communities in the region, and absence of Threatened species or ecological communities in the proposed Purpose Permit Area, the project area is not considered to comprise a high level of biological diversity. Therefore, the proposed clearing is not at variance to Clearing Principle A.

Table 6: Potential Impacts to Vegetation Communities

Vegetation Community	Description	Total Area Mapped (ha)	Previously Approved Application Area (ha)	Amended Application Area (Increase)	% Total Area Mapped within Purpose Permit[1]
A1	Low Open Forest of *Acacia* spp. over *Eremophila youngii* subsp. *youngii*, *Eremophila forrestii* subsp *forrestii*, *Rhagodia drummondii*, *Ptilotus obovatus*, *Solanum lasiophyllum* over *Aristida contorta, Enneapogon caerulescens*, annual herbs and grasses on sandy loams on flats and flowlines.	2,719.1	284.6	422.4 (137.8)	16%
A2	Low Open Woodland of *Acacia* spp. over *Hakea preisii*, *Eremophila forrestii subsp. forrestii*, *Spartothamnella teucriiflora*, *Ptilotus calostachyus*, *Ptilotus obovatus*, *Solanum lasiophyllum* over *Maireana suaedifolia*, *Aristida contorta*, *Enneapogon caerulescens*, annual herbs and grasses on sandy-loams on flats and lower slopes.	4,521.4	609	828.3 (219.3)	18%
A3	Low Open Woodland of *Acacia* spp. over *Hakea preissii*, *Eremophila galeata*, *Ptilotus obovatus*, *Solanum lasiophyllum* over mixed Chenopods, annual herbs and grasses on flats and lower slopes with pebbles and quartz on surface.	3,788.4	327.1	327.1	9%
A5	Low Open Woodland of *Acacia* spp. and patches of *Casuarina pauper* over *Senna* and Chenopod species over annual herbs and grasses on ridges and slopes, with sandy-loams with mixed volcanic rocks on surface.	264.6	0.0	0.5 (0.5)	0%
A6	Low Open Woodland of *Acacia fuscaneura* and *Acacia aneura* over *Ptilotus obovatus, Solanum lasiophyllum, Eremophila galeata* with occasional *Brachychiton gregorri* over mixed Chenpods, annual herbs and grasses on lower slopes with calcrete soils and quartz on surface.	837.7	85.9	85.9	10%
A7	Low Open Woodland of *Acacia* spp. over *Ptilotus obovatus*, *Solanum lasiophyllum*, *Eremophila galeata* over mixed Chenopods, annual herbs and grasses on flats and lower slopes with calcrete soils.	295.4	25.3	25.3	9%
A8	Low Open Woodland of *Acacia* spp. over *Eremophila* species, *Dodonaea lobulata*, *Prostanthera albiflora* on volcanic rockier hills and slopes or on erosional slopes.	115.3	0.0	0	0%

Vegetation Community	Description	Total Area Mapped (ha)	Previously Approved Application Area (ha)	Amended Application Area (Increase)	% Total Area Mapped within Purpose Permit[1]
A9	Low Open Woodland of *Acacia aneura* and *Hakea preissii* over mixed Chenopods and *Eremophila* species on sandy-loam soils with pebbles and quartz.	156.1	40.8	40.8	26%
A10	Low Open Woodland of *Acacia aneura* and *Acacia ramulosa* var. *ramulosa* over *Eremophila youngii* subsp. *youngii* over *Cheilanthes austrotenuifolia*, annual herb and grasses on quartz ridge.	3.6	1.8	1.8	50%
A11	Low Open Woodland of *Acacia aneura – Acacia tetragonophylla* over *Dodonaea rigida, Scaevola spinescens* over annual herbs and grasses on ironstone outcropping ridge.	25.7	0.0	0	0%
A13	Low woodland of *Acacia ?incurvaneura* over *Acacia* spp. tall open shrubland over *Eremophila ?platycalyx, Scaevola spinescens, Senna artemisioides* subsp. x *artemisioides*, *Eremophila latrobei* subsp. *glabra* and *Psydrax* spp. mid sparse shrubland on hard red clay flats.	6.0	0.0	0	0%
C1	Open Chenopod Shrubland with *Atriplex nummularia*, *Maireana pyramidata* and mixed *Sclerolaena* species with occasional emergent *Hakea preissii* and patches of *Acacia aneura* on calcrete soils.	516.4	32	69.5 (37.3)	13%
E1	Open Woodland of *Eucalyptus camaldulensis* subsp. *obtusa* with pockets of *Casuarina* and *Acacia citrinoviridis* over *Bossiaea walkeri* over mixed grasses and annual herbs on sandy soils in creeklines.	22.1	0.0	0	0%
D	Disturbed Sites. These sites include tracks old coal load out areas near Leonora and very disturbed sites.	109.7	72.6	72.6	66%
CL	Cleared Sites. These sites include all the mining areas and the previously cleared areas near Leonora.	1,010.1	990.3	990.3	98%
Not Surveyed	Section of access road to site not surveyed.	3.3	3.3	3.3	100%
	Total	14,395.0	2,472.5	2867.8[2]	-

1. Purpose Permit area, NOT disturbance footprint.

2. Application area increase total does not take into account area to be excised. Table represents total Purpose Permit area prior to surrender of L37/248 in order to accurately represent overall PP areas.

5.3 SIGNIFICANT FAUNA HABITAT

Clearing Principle B: Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

The Level 2 fauna survey of the project did not identify any Threatened or Priority fauna species occurring within the project area (Terrestrial Ecosystems 2020). A desktop database search identified three species as potentially occurring, however they were not recorded during the fauna survey. As such, the proposed clearing is unlikely to impact significant habitat for Threatened or Priority fauna and is therefore not at variance to Clearing Principle B.

5.4 SIGNIFICANT FLORA

Clearing Principle C: Native vegetation should not be cleared if it includes, or is necessary for the continued existence of rare (Threatened) flora.

No Threatened flora species as listed under the EPBC Act and BC Act were identified within the amended Purpose Permit Application area during the large number of project specific flora and vegetation surveys.

The 2020 survey identified two populations of the Priority flora species, *Frankenia georgei*, occurring along the proposed haul road to the Cerebus-Eclipse and Centauri satellite sites. The populations each contained in excess of 1,000 individuals and covered approximately 29 ha (Mattiske 2020). Of this area, about 11.8 ha occur within the Purpose Permit Application area.

The proposed amended Purpose Permit application area includes access roads for borefields and power services (with 20 m wide corridors) that are not expected to impact on the Priority flora species populations identified within the KOTH project area.

Management measures for significant flora comprise:

- Utilising existing disturbed area and roads to avoid *Frankenia georgei* where possible.
- Managing clearing via an internal Land Clearing Procedure.
- Clearly delineating the clearing area with survey pegs and flagging tape to ensure only that required for a safe working area is cleared.
- Implement a procedure to record the amount of clearing undertaken and report the cumulative total in the Annual Environmental Report (AER).
- Weed hygiene practices will be implemented. Site weed control will be conducted as required.

No impacts are expected on any Threatened species under either the BC Act or EPBC Act. Although a Priority 1 species is present and individual plants will be taken during project implementation, the proportion taken will be low, with a significant number of individuals in two known local populations remaining. Given this species is also known from a number of other locations distant from the KOTH Project, the loss of individual plants is not considered likely to adversely impact its conservation status. Therefore, the proposed clearing is not considered to have adverse impacts to Threatened flora species and is not at variance with Clearing Principle C.

5.5 THREATENED ECOLOGICAL COMMUNITIES

Clearing Principle D: Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.

No TECs or Priority Ecological Communities (PECs) listed under either the EPBC Act or the BC Act are within the KOTH Project Area or surrounds. Therefore, the proposed clearing will have no impacts on a TEC and is not at variance to Principle D.

5.6 REMNANT VEGETATION

Clearing Principle E: Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

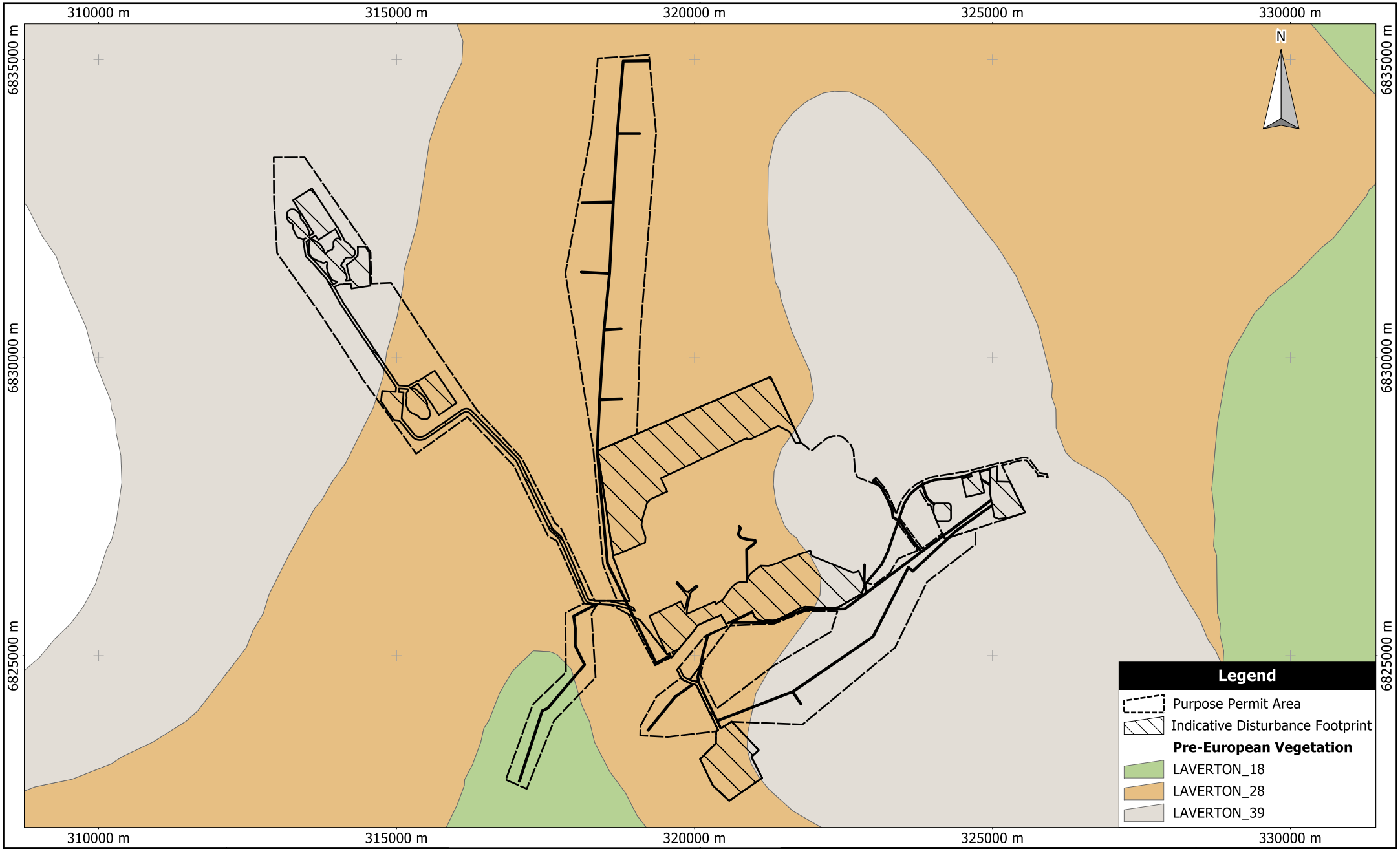
The KOTH Project intersects two pre-European vegetation associations, as detailed in Table 7 and as shown in Figure 9.

The EPA uses a standard level of native vegetation retention of at least 30% of the pre-clearing extent of an ecological community as a benchmark. The levels of native vegetation retention have most recently been recognised in the National Objectives and Targets for Biodiversity Conservation 2001-2005, which recognised that the retention of 30%, or more, of the pre-clearing extent of an ecological community is necessary if Australia's biological diversity is to be protected (Department of the Environment and Heritage 2001). The pre-European vegetation types occupying the KOTH Purpose Permit Area are the Laverton_18, Laverton_28 and Laverton_39 system associations, which will have at least 99 % remaining at a State level after the proposed clearing (Table 7) (DBCA 2018).

The vegetation to be cleared is not significant as a remnant of native vegetation in an area that has been extensively cleared and the proposed clearing will not be at variance with Clearing Principle E.

Table 7: Pre-European Vegetation Associations in the Purpose Permit Application Area (ha)

System Association	SA Code	Description	Structure Description	Current Extent in State	Extent in Purpose Permit Application Area	Extent (ha) in Amended Clearing Footprint	% Remaining (after Proposed Clearing)
Laverton_18	18.16	Mulga *Acacia aneura* and associated species.	Low woodland, open low woodland or sparse woodland	2342961	110.4	5.27	99.55 %
Laverton_28	28	Mulga *Acacia aneura* and associated species.	Low woodland, open low woodland or sparse woodland	131,531	320,459	951.88	99.34 %
Laverton_39	39.3	Wattle, teatree & other species Acacia spp. Melaleuca spp.	Scrub, open scrub or sparse scrub	151,580	1731.3	306.95	99.94 %



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Original Size: A4
Grid: Australia MGA94 (51)

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Figure 9

Pre-European Vegetation Associations

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5.7 WATERCOURSE OR WETLAND ENVIRONMENTS

Clearing Principle F: Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

The proposed disturbance footprint crosses Sullivan Creek to the west of the current main area of disturbance for the KOTH Project. The proposed Cerebus-Eclipse and Centauri satellite open pit mines intersect a number of lesser ephemeral watercourses that feed into Sullivan Creek. The proposed disturbance footprint does not require any additional disturbance to Sullivan Creek, or its tributaries compared to the existing approval.

Clearing within Sullivan Creek will be for the purposes of constructing a causeway for a haul road to the satellite open pits north west of the main project area. The causeway will be about 50 m wide to accommodate the haul road and water pipelines. It is estimated that about 0.44 ha of riparian vegetation (Community A1) associated with Sullivan Creek is likely to need to be cleared for the causeway.

Clearing within Sullivan Creek will be kept to a minimum, particularly given the known Aboriginal heritage value of the creek. Disturbance of mature trees, particularly *Eucalyptus camaldulensis,* will be avoided wherever practicable. A Section 18 permit (69-19514) has been obtained under the *Aboriginal Heritage Act 1972* (AHA) and Traditional Owners will be consulted prior to clearing within the creek.

Approval under the *Rights in Water and Irrigation Act* for disturbance of the watercourse (Bed and Banks Permit) will not be required as the project area is not within any proclaimed surface water resource management area and as the area of Sullivan Creek proposed to be affected is not accessed via any public road or reserve.

Clearing of riparian vegetation may result in increased bank instability and increased release of sediments during flow events. Given Sullivan Creek and other watercourses in the area are ephemeral and do not have well defined, steep banks, the risk of long-term bank instability is considered low. Construction of the causeway consistent with industry engineering practices will ensure long-term stability. The ephemeral nature and infrequent occurrence of flows in Sullivan Creek will limit opportunities for sediment release with the greatest risk period being during construction. Causeway design will minimise the risk of blockage of the waterway by debris during and following flow events.

Where land clearing requires disturbance of watercourses and associated riparian vegetation, appropriate measures will be implemented to manage the watercourse crossing. This includes:

- Project design has considered locations of ephemeral drainages and minimised disturbance of these.
- A causeway will be installed to prevent blockage of Sullivan Creek.
- Appropriate sediment control measures will be implemented during construction to minimise sediment release into watercourses.

Impacts to wetlands will not occur as a result of the proposed activities given the distance of the project from any recognised wetlands.

Despite the need to clear riparian vegetation, the widespread and common nature of the riparian vegetation community within the goldfields, combined with the ephemeral nature of the watercourse, short period of construction and implementation of standard industry management and mitigation measures, means that adverse impacts on the waterway associated with the project are considered low. As such, the proposed activity is not considered to be at variance with Clearing Principle F.

5.8 LAND DEGRADATION

Clearing Principle G: Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

The region has a significant level of existing land degradation due to pastoral practices and the impacts of feral herbivores (Cowan 2001). The proposed clearing activities are for the expansion of the existing KOTH Project, and the area has historical disturbance. The satellite deposits surrounding the existing KOTH Project have had extensive exploration drilling undertaken. Therefore, the KOTH Project area and surrounding area within the Purpose Permit Area has had considerable disturbance to date.

Potential sources of land degradation from mining and construction activities include:

- Wind erosion during vegetation and topsoil stripping activities.
- Wind and water erosion of topsoil stockpiles and cleared areas.
- Wind and water erosion of rehabilitated surfaces, e.g. waste landforms
- Water erosion due to changes in surface water flow.
- Soil compaction.
- Soil contamination.
- Introduction and/or spread of weeds.

Minimisation of land degradation will be achieved by applying recognised clearing and rehabilitation methods. Management and mitigation strategies to achieve this include:

- Minimising the area requiring vegetation removal.
- Confining vehicle movements to defined roads and tracks.
- Conducting topsoil-stripping activities during periods of low winds.
- Stockpiling topsoil and vegetation for use in rehabilitation.
- Storing hydrocarbons and refuelling in bunded areas.
- Progressive rehabilitation of completed surfaces to minimise active areas exposed where possible.
- Scarifying or deep ripping (as appropriate) compacted tracks and roads prior to rehabilitation.

In the context of the low erodibility of the land system, intact vegetation on a regional scale and existing level of localised land degradation, the scale of disturbance from the proposed clearing is not anticipated to increase land degradation. As such, the project will not be at variance with Clearing Principle G.

5.9 CONSERVATION ESTATE

Clearing Principle H: Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

No Environmentally Sensitive Areas (ESA) as declared in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005* occur within or surrounding the Purpose Permit Area. The closest ESA is Lake Ballard, located approximately 80 km south of the project. Therefore, the clearing is not considered at variance with Clearing Principle H.

5.10 SURFACE AND GROUNDWATER QUALITY

Clearing Principle I: Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

There are no permanent water bodies, wetlands or groundwater dependent ecosystems near the project. There are no water management areas in the project area, other than the proclaimed Goldfields Groundwater Area, which covers a large proportion of Western Australia.

The proposed clearing is not anticipated to cause long-term impacts upon the water quality of groundwater or surface water. The depth to the water table in the KOTH Project area is between 6 and 11 m and ranges from fresh to brackish, with some bores intercepting saline to hypersaline groundwater. It is predicted that there will be no impact associated with vegetation removal on groundwater levels and quality.

Significant impacts to the surface water quality of Sullivan Creek are unlikely as it is an ephemeral creek and only typically flows after high intensity rainfall events in the summer wet season. Any potential impacts to the water quality will be negligible and short-term during construction of the causeway from the potentially increased sediment load.

Management measures to prevent contamination of surface and groundwater quality include:

- Hydrocarbons and process reagents will be stored in bunded areas.
- Refuelling activities to be conducted in bunded areas.
- Project design has considered locations of ephemeral drainages and minimised disturbance of these.
- Potentially contaminated water will be captured and either re-used or treated before discharge.
- Diversion bunds will be constructed to separate clean and potentially contaminated water.
- Pipelines will be bunded to contain any potential spills.

No impacts to groundwater from the proposed clearing are anticipated. Although the project is in close proximity to a P1 PDWSA, the *Leonora Water Reserve drinking water source protection plan* states that mining is a compatible activity with conditions in a P1 area (DoW 2010).

Overall, the proposed clearing is considered unlikely to be at variance with Clearing Principle I.

5.11 FLOODING POTENTIAL

Clearing Principle J: Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.

The proposed clearing is within a semi-arid region that experiences low average rainfall of 236.4 mm (BOM 2020). Sullivan Creek flows intermittently based on seasonal rainfall events and remains dry for much of the year.

Management strategies to prevent flooding include:

- Project design has considered location of drainage lines and flood levels with the aim of minimising disturbance of these areas.
- Existing flow paths will be maintained where possible.
- Diversions will be installed where necessary to direct surface flow away from operational areas.
- Diversion will be constructed such that surface water will flow into local drainage lines at rates similar to natural flows.

- Culverts or floodways will be installed where the roads cross ephemeral drainages.

Overall, the proposed clearing will have no detectable increased impact on flooding potential for the KOTH Project area or its immediate surrounds. Therefore, the proposed clearing will not be at variance with Clearing Principle J.

6. REPORTING AND AUDITING

Disturbance as a result of the proposed vegetation clearing will be reported yearly under the KOTH Annual Environmental Report (AER) and Mine Rehabilitation Fund (MRF) reporting.

Upon approval of the amendment to Clearing Permit CPS 8938/1, subsequent environmental approvals will be sought to construct and develop the KOTH expansion. These approvals will include additional conditions and commitments relating to environmental monitoring and reporting.

7. CONCLUSION

The vegetation and habitats present within the proposed Purpose Permit Area are well represented on a regional scale. It is considered unlikely that there will be any impact on the conservation status of relevant flora and fauna species and there are likely to be only minor local impacts from loss and fragmentation of vegetation.

The proposed clearing will not impact significantly upon the ten clearing principles and a range of environmental management procedures are in place to ensure that clearing will be managed to minimise any potential adverse impacts. Rehabilitation will minimise exposed areas and the long-term loss of vegetation cover.

8. REFERENCES

Big Dog Hydrogeology (BDH). 2019. Hydrogeological Assessment of Open Pit Mining King of the Hill Mine, Leonora. Report prepared for Red 5.

Bureau of Meteorology (BOM). 2020. Climate Statistics for Australian Locations: Leonora. Accessed 29 February 2020. Available from: http://www.bom.gov.au/climate/averages/tables/cw_012046_All.shtml.

Cowan, M. 2001. *Murchison 1 (MUR1 – East Murchison subregion).* A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002. Perth: CALM. Available from: https://www.dpaw.wa.gov.au/images/documents/about/science/projects/waaudit/murchison01_p466-479.pdf.

CSIRO. 2011. Atlas of Australian Acid Sulphate Soils. Available from: https://www.data.gov.au/dataset/ds-dap-csiro%3A6181/details?q=Atlas%20of%20Australian%20Acid%20Sulfate%20Soils.

Department of Biodiversity, Conservation and Attractions (DBCA). 2018. DBCA Statewide Vegetation Statistics. Perth: DBCA. Available: https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics.

Department of Primary Industries and Regional Development (DPIRD). 2019. *Soil Landscape Mapping – Systems (DPIRD-064).* GIS Dataset. Perth: DPIRD. Available from: https://catalogue.data.wa.gov.au/dataset/soil-landscape-mapping-systems

Department of Water (DoW). 2010. *Leonora Water Reserve: Drinking water source protection plan.* Perth: DWER. Available from: https://www.water.wa.gov.au/__data/assets/pdf_file/0004/4882/93551.pdf

Department of Water and Environmental Regulation (DWER). 2018. *RIWI Act, Groundwater Areas (DWER-034).* GIS Dataset. Perth: DWER. Spatial data available from: https://catalogue.data.wa.gov.au/dataset/riwi-act-groundwater-areas.

Mattiske Consulting Pty Ltd (Mattiske). 2006. *Flora and vegetation survey of St. Barbara, Tarmoola mine site*. Unpublished report prepared for St. Barbara Ltd.

University of Western Australia (UWA). 2006. *Groundwater Fauna from the Vicinity of Tarmoola Gold Mine, Western Australia (2006).* Report for St Barbara Limited, October 2006.

APPENDICES

APPENDIX 1: PROOF OF OWNERSHIP

Government of Western Australia
Department of Mines, Industry Regulation and Safety

eMiTS MINERAL TITLES ONLINE

TENEMENT ENQUIRY REPORT

Holder: Currently held by GREENSTONE RESOURCES (WA) PTY LTD and in that name name only

Tenement Status: Live

Tenement Type: P - Prospecting Licence

Tenement Id	Status	Area	Lodgement	Commencement	Expiry	Markout	Death Date	Death Reason
P 37/8391	Live	103.10310 HA.	29/04/2013 13:22:57	29/11/2013	28/11/2021 23:59:59	25/04/2013 13:04:00		

Active Holder(s) :

GREENSTONE RESOURCES (WA) PTY LTD

Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

P 37/8392	Live	101.92310 HA.	29/04/2013 13:22:57	29/11/2013	28/11/2021 23:59:59	25/04/2013 12:37:00		

Active Holder(s) :

GREENSTONE RESOURCES (WA) PTY LTD

Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

P 37/8393	Live	159.04800 HA.	29/04/2013 13:22:57	29/11/2013	28/11/2021 23:59:59	25/04/2013 11:27:00		

Active Holder(s) :

GREENSTONE RESOURCES (WA) PTY LTD

Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

P 37/8394	Live	41.82250 HA.	29/04/2013 13:22:57	29/11/2013	28/11/2021 23:59:59	26/04/2013 11:20:00		

Active Holder(s) :

GREENSTONE RESOURCES (WA) PTY LTD

Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

P 37/9157	Live	56.88000 HA.	23/05/2018 15:58:34	14/01/2019	13/01/2023 23:59:59	22/05/2018 08:44:00		

Tenement Id	Status	Area	Lodgement	Commencement	Expiry	Markout	Death Date	Death Reason
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9160	Live	196.00000 HA.	19/06/2018 10:49:39	14/01/2019	13/01/2023 23:59:59	13/06/2018 13:32:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9161	Live	20.87000 HA.	19/06/2018 10:49:39	14/01/2019	13/01/2023 23:59:59	14/06/2018 10:15:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9270	Live	153.62804 HA.	28/08/2019 08:30:00	11/03/2020	10/03/2024 23:59:59	18/08/2019 16:42:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9271	Live	136.62931 HA.	28/08/2019 08:30:00	11/03/2020	10/03/2024 23:59:59	18/08/2019 16:04:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9281	Live	198.66757 HA.	28/08/2019 12:13:07	12/03/2020	11/03/2024 23:59:59	23/08/2019 11:41:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9282	Live	199.01198 HA.	28/08/2019 12:13:07	12/03/2020	11/03/2024 23:59:59	23/08/2019 12:32:00		
Active Holder(s) :								

Tenement Id	Status	Area	Lodgement	Commencement	Expiry	Markout	Death Date	Death Reason
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9283	Live	198.55486 HA.	28/08/2019 12:13:07	12/03/2020	11/03/2024 23:59:59	23/08/2019 12:32:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9284	Live	198.84965 HA.	28/08/2019 12:13:07	12/03/2020	11/03/2024 23:59:59	23/08/2019 12:32:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9286	Live	198.54668 HA.	28/08/2019 12:13:07	12/03/2020	11/03/2024 23:59:59	23/08/2019 12:32:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9287	Live	198.97975 HA.	28/08/2019 16:23:26	12/03/2020	11/03/2024 23:59:59	22/08/2019 16:12:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9289	Live	198.54994 HA.	28/08/2019 16:23:26	01/04/2020	31/03/2024 23:59:59	23/08/2019 13:48:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9291	Live	198.65376 HA.	28/08/2019 16:23:26	01/04/2020	31/03/2024 23:59:59	23/08/2019 13:48:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								

Tenement Id	Status	Area	Lodgement	Commencement	Expiry	Markout	Death Date	Death Reason
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9392	Live	125.52713 HA.	13/08/2020 14:25:29	02/03/2021	01/03/2025 23:59:59	07/08/2020 13:23:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9393	Live	161.45892 HA.	13/08/2020 14:25:29	02/03/2021	01/03/2025 23:59:59	07/08/2020 12:43:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9394	Live	117.62308 HA.	13/08/2020 14:25:29	02/03/2021	01/03/2025 23:59:59	07/08/2020 13:23:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9395	Live	199.33989 HA.	13/08/2020 14:25:29	02/03/2021	01/03/2025 23:59:59	06/08/2020 10:36:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9396	Live	197.08707 HA.	13/08/2020 14:25:29	02/03/2021	01/03/2025 23:59:59	06/08/2020 10:36:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9397	Live	191.23572 HA.	13/08/2020 14:25:29	02/03/2021	01/03/2025 23:59:59	06/08/2020 11:21:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								

Tenement Id	Status	Area	Lodgement	Commencement	Expiry	Markout	Death Date	Death Reason
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9398	Live	199.05553 HA.	13/08/2020 14:25:29	02/03/2021	01/03/2025 23:59:59	06/08/2020 09:33:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9399	Live	196.41107 HA.	13/08/2020 14:25:29	02/03/2021	01/03/2025 23:59:59	06/08/2020 11:57:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9400	Live	197.23178 HA.	13/08/2020 14:25:29	02/03/2021	01/03/2025 23:59:59	06/08/2020 11:57:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9401	Live	191.79112 HA.	13/08/2020 14:25:29	02/03/2021	01/03/2025 23:59:59	06/08/2020 11:21:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9402	Live	198.97860 HA.	13/08/2020 14:25:29	02/03/2021	01/03/2025 23:59:59	06/08/2020 09:33:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9403	Live	199.31678 HA.	13/08/2020 14:25:29	04/03/2021	03/03/2025 23:59:59	06/08/2020 13:17:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								

Tenement Id	Status	Area	Lodgement	Commencement	Expiry	Markout	Death Date	Death Reason
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9404	Live	190.18630 HA.	13/08/2020 14:25:29	04/03/2021	03/03/2025 23:59:59	06/08/2020 16:22:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9405	Live	195.03482 HA.	13/08/2020 14:25:29	04/03/2021	03/03/2025 23:59:59	06/08/2020 16:22:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9406	Live	195.83293 HA.	13/08/2020 14:25:29	04/03/2021	03/03/2025 23:59:59	06/08/2020 15:40:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9407	Live	197.37953 HA.	13/08/2020 14:25:29	04/03/2021	03/03/2025 23:59:59	06/08/2020 15:40:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9408	Live	194.30840 HA.	13/08/2020 14:25:29	04/03/2021	03/03/2025 23:59:59	07/08/2020 09:44:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9409	Live	197.23406 HA.	13/08/2020 14:25:29	04/03/2021	03/03/2025 23:59:59	07/08/2020 09:44:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								

Tenement Id	Status	Area	Lodgement	Commencement	Expiry	Markout	Death Date	Death Reason
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
P 37/9410	Live	193.96410 HA.	13/08/2020 14:25:29	04/03/2021	03/03/2025 23:59:59	07/08/2020 10:34:00		

Active Holder(s) :

GREENSTONE RESOURCES (WA) PTY LTD

Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

-- End of Report --

Total Tenements Found: 36

Government of Western Australia
Department of Mines, Industry Regulation and Safety

eMiTS MINERAL TITLES ONLINE

TENEMENT ENQUIRY REPORT

Holder: Currently held by GREENSTONE RESOURCES (WA) PTY LTD and in that name name only

Tenement Status: Live

Tenement Type: L - Miscellaneous Licence

Tenement Id	Status	Area	Lodgement	Commencement	Expiry	Markout	Death Date	Death Reason
L 37/211	Live	30.00000 HA.	10/02/2014 08:36:13	10/06/2014	09/06/2035 23:59:59			

Active Holder(s) :

GREENSTONE RESOURCES (WA) PTY LTD

Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

L 37/248	Live	272.95677 HA.	21/09/2020 14:17:42	21/04/2021	20/04/2042 23:59:59			

Active Holder(s) :

GREENSTONE RESOURCES (WA) PTY LTD

Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

L 37/250	Live	174.25729 HA.	18/12/2020 10:45:02	23/03/2021	22/03/2042 23:59:59			

Active Holder(s) :

GREENSTONE RESOURCES (WA) PTY LTD

Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

-- End of Report --

Total Tenements Found: 3

Government of Western Australia
Department of Mines, Industry Regulation and Safety

eMiTS MINERAL TITLES ONLINE

TENEMENT ENQUIRY REPORT

Holder: Currently held by GREENSTONE RESOURCES (WA) PTY LTD and in that name name only

Tenement Status: Live

Tenement Type: M - Mining Lease

Tenement Id	Status	Area	Lodgement	Commencement	Expiry	Markout	Death Date	Death Reason
M 37/21	Live	23.77000 HA.	18/07/1983 16:00:00	22/06/1984	21/06/2026 23:59:59	11/07/1983 08:30:00		

Active Holder(s) :

GREENSTONE RESOURCES (WA) PTY LTD

Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

M 37/67	Live	38.09500 HA.	06/09/1985 09:47:00	05/01/1987	04/01/2029 23:59:59	29/08/1985 17:20:00		

Active Holder(s) :

GREENSTONE RESOURCES (WA) PTY LTD

Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

M 37/76	Live	65.55500 HA.	09/01/1986 09:05:00	21/05/1986	20/05/2028 23:59:59	08/01/1986 17:00:00		

Active Holder(s) :

GREENSTONE RESOURCES (WA) PTY LTD

Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

M 37/90	Live	166.85000 HA.	01/08/1986 15:57:00	05/01/1987	04/01/2029 23:59:59	01/08/1986 14:00:00		

Active Holder(s) :

GREENSTONE RESOURCES (WA) PTY LTD

Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

M 37/179	Live	97.34500 HA.	27/01/1988 11:18:00	17/01/1989	16/01/2031 23:59:59	19/01/1988 14:25:00		

Tenement Id	Status	Area	Lodgement	Commencement	Expiry	Markout	Death Date	Death Reason
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/201	Live	227.50000 HA.	15/07/1988 14:59:00	20/04/1989	19/04/2031 23:59:59	15/07/1988 14:20:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/222	Live	416.25000 HA.	14/03/1989 09:14:00	13/07/1989	12/07/2031 23:59:59	13/03/1989 18:30:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/248	Live	2.23900 HA.	13/07/1989 15:11:00	04/10/1989	03/10/2031 23:59:59	13/07/1989 09:00:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/330	Live	299.35000 HA.	24/01/1991 15:09:00	02/07/1991	01/07/2033 23:59:59	23/01/1991 14:55:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/394	Live	187.75000 HA.	05/04/1993 14:05:00	31/08/1993	30/08/2035 23:59:59	05/04/1993 12:45:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/407	Live	292.05000 HA.	17/06/1993 12:14:00	16/09/1993	15/09/2035 23:59:59	11/06/1993 16:50:00		
Active Holder(s) :								

Tenement Id	Status	Area	Lodgement	Commencement	Expiry	Markout	Death Date	Death Reason
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/410	Live	360.15000 HA.	17/06/1993 14:29:00	24/11/1993	23/11/2035 23:59:59	15/06/1993 16:06:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/416	Live	658.50000 HA.	08/07/1993 11:28:00	21/10/1993	20/10/2035 23:59:59	07/07/1993 16:50:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/429	Live	133.40000 HA.	29/10/1993 14:09:00	23/02/1994	22/02/2036 23:59:59	26/10/1993 16:20:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/449	Live	419.50000 HA.	07/04/1994 15:22:00	05/08/1994	04/08/2036 23:59:59	07/04/1994 11:00:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/451	Live	264.70000 HA.	14/04/1994 08:48:00	16/11/1994	15/11/2036 23:59:59	07/04/1994 14:40:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/457	Live	689.95000 HA.	30/05/1994 08:35:00	07/11/1994	06/11/2036 23:59:59	28/05/1994 11:07:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								

Tenement Id	Status	Area	Lodgement	Commencement	Expiry	Markout	Death Date	Death Reason
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/496	Live	281.55000 HA.	24/10/1994 08:32:00	26/07/1999	25/07/2041 23:59:59	23/10/1994 14:10:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/529	Live	121.30000 HA.	19/04/1995 12:17:00	14/05/2008	13/05/2029 23:59:59	19/04/1995 10:30:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/544	Live	84.02000 HA.	19/06/1995 08:36:00	29/01/2008	28/01/2029 23:59:59	16/06/1995 12:05:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/547	Live	901.35000 HA.	20/06/1995 12:17:00	12/11/1999	11/11/2041 23:59:59	19/06/1995 14:45:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/548	Live	312.80000 HA.	20/06/1995 12:17:00	12/11/1999	11/11/2041 23:59:59	19/06/1995 14:45:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/551	Live	176.90000 HA.	30/06/1995 14:05:00	31/01/2008	30/01/2029 23:59:59	29/06/1995 12:00:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								

Tenement Id	Status	Area	Lodgement	Commencement	Expiry	Markout	Death Date	Death Reason
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/570	Live	514.60000 HA.	01/12/1995 08:30:00	10/01/2008	09/01/2029 23:59:59	30/11/1995 09:40:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/571	Live	688.65000 HA.	01/12/1995 08:30:00	21/09/2000	20/09/2021 23:59:59	30/11/1995 15:00:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/572	Live	936.95000 HA.	01/12/1995 08:30:00	21/09/2000	20/09/2021 23:59:59	30/11/1995 15:00:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/573	Live	853.20000 HA.	01/12/1995 08:30:00	21/09/2000	20/09/2021 23:59:59	30/11/1995 13:10:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/574	Live	628.95000 HA.	01/12/1995 08:30:00	21/09/2000	20/09/2021 23:59:59	30/11/1995 13:10:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/905	Live	42.04500 HA.	20/03/1998 16:07:00	15/05/2008	14/05/2029 23:59:59	20/03/1998 09:00:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								

Tenement Id	Status	Area	Lodgement	Commencement	Expiry	Markout	Death Date	Death Reason
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/1050	Live	189.35000 HA.	23/03/2000 08:42:00	29/01/2008	28/01/2029 23:59:59	22/03/2000 11:55:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/1051	Live	382.25000 HA.	23/03/2000 08:42:00	29/01/2008	28/01/2029 23:59:59	22/03/2000 08:35:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/1081	Live	422.15000 HA.	12/06/2000 09:05:00	18/06/2008	17/06/2029 23:59:59	11/06/2000 13:45:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/1105	Live	9.71300 HA.	18/12/2000 14:37:00	15/05/2001	14/05/2022 23:59:59	17/12/2000 12:05:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
M 37/1165	Live	203.10000 HA.	23/12/2002 08:30:00	18/07/2008	17/07/2029 23:59:59	22/12/2002 09:30:00		
Active Holder(s) :								
GREENSTONE RESOURCES (WA) PTY LTD								
Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								
Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947								

-- End of Report -- **Total Tenements Found: 34**

Government of Western Australia
Department of Mines, Industry Regulation and Safety

eMiTS MINERAL TITLES ONLINE

TENEMENT ENQUIRY REPORT

Holder: Currently held by GREENSTONE RESOURCES (WA) PTY LTD and in that name name only

Tenement Status: Live

Tenement Type: E - Exploration Licence

Tenement Id	Status	Area	Lodgement	Commencement	Expiry	Markout	Death Date	Death Reason
E 37/1385	Live	15.00000 BL.	27/08/2019 15:32:55	24/03/2021	23/03/2026 23:59:59			

Active Holder(s) :

GREENSTONE RESOURCES (WA) PTY LTD

Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

E 37/1409	Live	3.00000 BL.	04/08/2020 11:49:04	12/04/2021	11/04/2026 23:59:59			

Active Holder(s) :

GREENSTONE RESOURCES (WA) PTY LTD

Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

E 37/1410	Live	9.00000 BL.	04/08/2020 11:49:04	23/03/2021	22/03/2026 23:59:59			

Active Holder(s) :

GREENSTONE RESOURCES (WA) PTY LTD

Principal Place of Business Address : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

Designated Tenement Contact (Correspondence Details) : C/- AUSTWIDE MINING TITLE MANAGEMENT PTY LTD, PO BOX 1434, WANGARA, WA, 6947

-- End of Report --

Total Tenements Found: 3

APPENDIX 2: MATTISKE (2019) ASSESSMENT OF FLORA AND VEGETATION VALUES

ASSESSMENT OF FLORA AND VEGETATION VALUES

KING OF THE HILLS MINE EXPANSION

LEONORA, WA

Prepared By

Mattiske Consulting Pty Ltd

Prepared For

Red 5 Limited

May 2020




DOCUMENT STATUS				
DOCUMENT REFERENCE: RED1901/57/2019				
VERSION	TYPE	AUTHOR/S	REVIEWER/S	DATE DISTRIBUTED
V1	Internal review	Nick Watson/Liam Rowles	-	-
V2	Draft for client	Nick Watson/Liam Rowles	E.M. Mattiske	
FINAL	Final report	Liam Rowles	E.M. Mattiske	13/05/2020

`

Mattiske Consulting Pty Ltd

(ACN 063 507 175, ABN 39 063 507 175)

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Kalamunda WA 6926
Phone: +61 8 9257 1625
Email: admin@mattiske.com.au

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TABLES

FIGURES

APPENDICES

LIST OF ABBREVIATIONS

BAM Act:	*Biosecurity and Agriculture Management Act 2007* (WA)
BC Act:	*Biodiversity Conservation Act 2016* (WA)
BOM:	Bureau of Meteorology
DAWE:	Department of Agriculture, Water and the Environment (2020)
DBCA:	Department of Biodiversity, Conservation and Attractions
EP Act:	*Environmental Protection Act 1986* (WA)
EPA:	Environmental Protection Authority
EPBC Act:	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
HRP:	Haul Road Project
IBRA:	Interim Biogeographical Regionalisation for Australia
KOTH:	King of the Hills
MCPL:	Mattiske Consulting Pty Ltd
PCP:	Power Corridor Project
PEC:	Priority ecological community
TEC:	Threatened ecological community
WAH:	Western Australian Herbarium (PERTH)

EXECUTIVE SUMMARY

Mattiske Consulting Pty Ltd (MCPL) was commissioned in February 2020 by Red 5 Ltd to conduct a desktop and Field survey assessment to evaluate the flora and vegetation values of four survey areas within the King of the Hills gold mining area, Eastern Goldfields region, WA. Three of the proposed survey sites are within existing mining tenements operated by Red 5 Ltd, approximately 30 km north of Leonora, Western Australia. A third survey site extends south-west outside of the current tenements. The collation of the data in this report reflects the previously series of field studies which have now been integrated into this one summary.

Desktop

Vegetation

The King of the Hills mining area lies in the Austin Botanical Subdistrict (East Murchison IBRA subregion), which has arid climate with cool winters and hot, dry summers, and rain in both seasons. Geologically, it is situated in an Archaean-aged greenstone belt within the Yilgarn craton, which hosts the gold targeted mine. The topography is dominated by low rounded hills and rocky ridges of granitic rocks and greenstone, with hardpan wash plains and stony plains below the hills. The soils of the area can be broadly defined as red loamy earths, shallow loams and shallow sands.

The vegetation of the King of the Hills mining area is described using botanical districts, land systems, pre-European vegetation and recently mapped vegetation communities. There has been little clearing of the native vegetation within the mining area, except within the pit area and access/haul roads, and hence much of the pre-European vegetation remains. In general, the vegetation can be summarised as being dominated by low open *Acacia* spp. woodlands or tall shrublands over *Eremophila* spp. and *Senna* spp. sparse low shrublands over mixed herbs and grasses on red sandy loam on rocky hills or gentler slopes; with chenopod shrublands in low-lying salt-prone areas or *Eucalyptus camaldulensis* in drainage lines. A total of 24 vegetation communities have previously been mapped in the area.

Potential Flora and Communities

A total of 326 vascular plant taxa could potentially be found within the proposed survey areas, fourteen of which are listed as priority species at State level. No taxa are listed as threatened at Commonwealth or State level. Of the priority flora species, four had a High likelihood of occurrence in King of the Hills mining area, all of which have been recorded in, on the boundary of, or within 5 km of the proposed survey areas. A total of 26 introduced plant taxa that could possibly occur in the mining area were identified, of which five are categorised as significant weeds (both Weeds of National Significance and Declared Pests). Four of the five significant weeds have a High likelihood of occurring within the proposed survey areas. A further five species are of concern due to their High ecological impact and Rapid invasiveness. Searches identified no Threatened Ecological Communities at Commonwealth or State level that could potentially occur in the King of the Hills mining area; there are none listed for the entire Murchison-1 IBRA subregion.

Field survey

Flora

A small number of flora species (67 vascular plant taxa) were recorded within the Power Corridor survey area of the greater King of the Hills mining area in 2020. Relatively low numbers of species were recorded in the Mulga communities that dominated this area. Two taxa were annual species; most of the taxa recorded were shrubs or trees. None of the recorded taxa are listed as threatened species at Commonwealth or State level, however one Priority 1 species, *Frankenia georgei* was found during a search of the Haul road survey area. The population was identified as having over 1000 individuals. No introduced species were recorded within the survey area.

Vegetation

No Threatened Ecological Communities as listed at Commonwealth or State level or Priority Ecological Communities listed at State level were identified as occurring within the Power Corridor survey area, consistent with the desktop study. Five vegetation communities were defined and mapped, using statistical analysis and aerial imagery, three of which are *Acacia* woodlands, one a Chenopod shrubland and another a Eucalypt woodland. The two largest groupings of survey sites corresponded with the A1 (*Acacia* low woodland in drainage lines) and A2 (*Acacia* open low woodland on flats) communities previously defined by Mattiske in 2006. The vegetation condition of the Power Corridor survey area ranged from Good to Very Good and was on average Very Good. There did not appear to be signs of recent fire or heavy cattle activity at any point throughout the survey area. The survey area was substantially disturbed by vehicle tracks as there were a multitude of drill sites and thoroughfares within and intersecting the survey area.

Conclusions and Recommendations

Aside from the Priority 1 species *Frankenia georgei*, the results of the field survey of the flora and vegetation in the Power Corridor survey area demonstrated no specific botanical values associated with potential clearing for mining. An evaluation of the ecological values of the Power Corridor survey area against the Clearing Principles that apply with regard to the assessment of an application to clear native vegetation under the *Environmental Protection Act 1986* indicated that the only Principle that could be potentially be breached by clearing the vegetation in the survey area is that regarding clearing of an environment associated with a watercourse. It is recommended that unnecessary clearing of the vegetation where *Frankenia georgei* is mapped and any adjacent to any watercourses be avoided in order to reduce impacts. Adequate time to apply for and receive a clearing permit for any exploration and ongoing mining activities should be allowed for in future planning.

1. INTRODUCTION

MCPL was commissioned in February 2020 by Red 5 Ltd to conduct a desktop and in field assessment to evaluate the flora and vegetation values within the at the King of the Hills (KOTH) gold mining area, located within the Eastern Goldfields region, 30 km north of Leonora, WA (Figure 1). Red 5 Ltd wishes to infill and extend the mineral resource (Red 5 Ltd 2019).

1.1. Location and Scope of Project

Gold from the KOTH mining area has been produced since 1985. Ore currently comes primarily from both the KOTH and Rainbow open pits, with smaller contributions from the underground operation at KOTH and satellite open pits. After acquiring the mine in 2017, Red 5 Ltd now wishes to take initial steps to expand it through a regional surface drilling program (Red 5 Limited 2019). Four parts of the mining area are currently required to be surveyed; a proposed haul road to the level 2 site previously surveyed in 2019, west of the mining area for a proposed storage facility, a smaller area south of the storage facility for a camp and a power corridor running towards the south west. The Goldfields Highway runs from Leinster in the north to Leonora in the south, with the eastern edge of the active mining area approximately 2.5 km west of the highway. Old Agnew Road runs down the western side of the tenements. Darlot Road runs north-south through the centre of the mining area, immediately to the west of Sullivan Creek. This report describes the potential and already recorded flora and vegetation values of the proposed survey sites and places them within a local and regional context. Recommendations are made as to the survey effort that may be required prior to further exploration and development activities occurring in the project area.

A Level 2 flora and vegetation survey was required over three survey areas. Three of the proposed survey sites, the Haul Road Project (HRP) area the Camp and the TSF6 Project areas are within existing mining tenements operated by Red 5 Ltd, approximately 30 km north of Leonora, Western Australia. The sites are located within the following tenements; M 37/457, L 37/129, M 37/222, M 37/330, M 37/394, M 37/571, M 37/572, E 37/1385, L 37/129, L 37/150, L 37/155, L 37/161, L 37/197, L 37/203, M 37/222, M 37/330, M 37/407, M 37/449, M 37/508, M 37/547, M 37/90, P 37/9157, P 37/9283, P 37/9284, P 37/9285, P 37/9286, P 37/9288, P 37/9289, P 37/9290, L 37/211, M 37/410, M 37/457 and M 37/548. These areas had been previously mapped by Mattiske Consulting (2019), and surveys in March 2020 were to focus specifically on the presence of any threatened of priory flora in the areas. A third survey site, the Power Corridor Project (PCP) area extends south-west outside of the current tenements (1146.86 ha). This site is situated in existing tenements (E 37/1385, L 37/129, L 37/150, L 37/155, L 37/161, L 37/197, L 37/203, M 37/222, M 37/330, M 37/407, M 37/449, M 37/508, M 37/547, M 37/90, P 37/9157, P 37/9283, P 37/9284, P 37/9285, P 37/9286, P 37/9288, P 37/9289, P 37/9290) and extends south-west into pending tenements. A portion of this site has had a Level 1 survey undertaken however the area outside of the existing tenements has not been surveyed previously by MCPL. A Level 2 flora and vegetation survey is required for the Power Corridor Project (PCP) site inclusive of vegetation mapping and targeted threatened and priority species searches. .

N

0 4.25 km

Scale: 1:250,000
MGA94 (Zone 51)

CAD Ref: a2725_f08_01

Date: February 2020 | Rev: A | A4

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King Of The Hill Project
Locality

Figure: **1**

1.2. Environmental Legislation and Guidelines

The following key Commonwealth (federal) legislation relevant to this survey is the:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The following key Western Australian (state) legislation relevant to this survey includes the:

- *Biodiversity Conservation Act 2016* (BC Act);
- *Biosecurity and Agriculture Management Act 2007* (BAM Act) and *Regulations 2013*;
- *Environmental Protection Act 1986* (EP Act); and
- *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*

Furthermore, key Western Australian guidelines relevant to this survey are the:

- Environmental Factor Guideline: Flora and Vegetation (Environmental Protection Authority [EPA] 2016a); and
- Technical Guidance – Flora and vegetation surveys for environmental impact assessment (EPA 2016b).

Definitions of flora and vegetation terminology commonly used throughout this report are provided in Appendix A.

1.3. Objectives

The objective of this survey was to undertake a detailed flora and vegetation assessment of the four survey area located within the broader KOTH mining area, including:

- Perform a desktop survey of the greater KOTH mining area to identify potential environmental values of the project area;
- Undertake a detailed survey of the proposed survey areas, and collect and identify the vascular plant species present;
- Undertake targeted searches for threatened and priority flora;
- Review the conservation status of the vascular plant species recorded by reference to current literature and listings by the Department of Biodiversity, Conservation and Attractions (DBCA) and plant collections held at the Western Australian State Herbarium (WAH), and listed by the Department of Agriculture, Water and the Environment (DAWE) (formerly the Department of the Environment and Energy, DotEE) under the EPBC Act;
- Identify and record the location of any threatened and priority flora located within each survey area;
- Identify and record the locations of any Declared Pest organisms within each survey area;
- Define and map the vegetation communities within the PCP survey area;
- Define and prepare a vegetation map of the vegetation communities within the PCP survey area;
- Provide descriptions of the vegetation communities present within survey areas and evaluate their regional significance; and
- Prepare a report summarising the findings.

2. METHODS

2.1. Desktop Assessment

The NatureMap (Department of Parks and Wildlife 2007-) and *EPBC Act* Protected Matters Search Tool (Department of Agriculture, Water and the Environment (DAWE)(2020a)) databases were used to identify the possible occurrence of flora (including threatened and priority taxa) and threatened and priority ecological communities within the proposed survey areas.

Searches within NatureMap were centred on the point 28° 41' 48'' S, 121° 09' 30'' E. A 20 km radius was deemed to be suitable as it would allow for vegetation from a greater variety of habitats potentially present in the proposed survey areas to be included. The search parameters used for the *EPBC Act* Protected Matters Search Tool search were the same as those for the NatureMap search. The TPFL database of threatened and priority flora and ecological communities and the Western Australian Herbarium (WAH) database (Department of Biodiversity, Conservation and Attractions (DBCA) 2019a) were searched by CAD Resources (Carine, WA). In addition, any flora recorded by Mattiske Consulting Pty Ltd (1999, 2003, 2006 and 2019) in their study areas were included.

In addition, historical documentation and vegetation mapping of the region that provide resource material for the floristics and vegetation of the KOTH mining area was reviewed, for example: Beard's map (1974) and accompanying documentation (1976) of the vegetation of the Murchison region; Beard's (1990) overview of the Austin Botanical District; Pringle et al.'s (1994) description of the rangelands of the northeastern Goldfields; Cowan's (2001) description and overview of biodiversity values for the Murchison-1 IBRA subregion; Tille's (2006) soil-landscape mapping for the Western Australian rangelands and interior; and MCPL (1999, 2003, 2006 and 2019) reports on their flora and vegetation surveys in the KOTH mining area. Nomenclature of flora species was checked against and is consistent with Florabase (WAH 1998-).

2.2. Previous Surveys

MCPL conducted a flora and vegetation survey of 1600 ha likely to be disturbed by long-term pumping of groundwater beneath Sullivan Creek in July 1999 (MCPL 1999) for the owners at the time, Tarmoola Operations Pty Ltd. The area mapped was an approximately 8 km long by 1.5 km wide strip along Sullivan Creek, stretching from 6 km north of the currently active mining area to 1.5 km south. Seven relevé sites were surveyed in detail along with multiple vehicle and foot traverses of the survey area.

In June 2003, MCPL completed a flora and vegetation survey over prospects south of the Tarmoola pit and associated proposed haul roads for the lease holders at the time, Sons of Gwalia Ltd (MCPL 2003). The survey area included the Rainbow, Puzzle and Severn prospects, which are located south of the main Tarmoola pit (Red 5 Ltd 2019). The survey area was centred approximately 1 km south of the current haul road out to the Goldfields Highway from the southern side of the currently active mining area.

MCPL also carried out a flora and vegetation survey of proposed pipeline areas and fringes of the Tarmoola mine site for the then owners, St. Barbara Ltd, in April 2006 (MCPL 2006). The main part of the survey area was centred on main Tarmoola pit with a 1 km wide swath extending southwest for approximately 7 km. A total of 87 quadrats were surveyed, including 9 quadrats at the Gwalia mine approximately 25 km to the south of the KOTH mining area. Additional areas were assessed outside the current lease areas and this data has been utilized in this desktop report for regional context.

In 2019, MCPL completed a level 2 flora survey over the Cerebus-Eclipse and Centauri targets (approximately 627 hectares). The survey area was located to the north–west of the main Tarmoola pit. A total of 16 quadrats were sampled.

2.3. Field Survey

A detailed field assessment of the flora and vegetation of the four survey areas was undertaken by two botanists, from Mattiske, with extensive experience in the Goldfields region. The survey was completed over the 24th - 28th of March 2020. The survey work was carried out in accordance with methods outlined in *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b). All botanists held valid collection licences to collect flora for scientific purposes, issued under the BC Act.

Aerial photographic maps of each survey area were prepared and supplied by CAD Resources. Survey quadrats were selected and search areas identified using aerial photographic maps and other field observations to provide adequate coverage and replication.

A total of 28 survey quadrats (Figure 6), measuring 20 m x 20 m, were selected to sample all vegetation types, with replication, within the PCP survey area. GPS locations of all survey quadrats are provided in Appendix B. The survey quadrats were not pegged. The northwest corner of the quadrat was marked on a GPS unit and a photograph taken looking southeast.

Flora and vegetation were described and sampled systematically at each survey quadrat, and additional opportunistic collections were undertaken wherever previously unrecorded plants were observed. At each quadrat the following floristic and environmental parameters were recorded:

- GPS location (GDA94 datum, zone 51J);
- Local topography;
- Soil type and colour;
- Outcropping rocks and their type;
- Percentage and type of litter cover and percentage bare ground;
- Approximate time since fire;
- Brief description of the vegetation;
- Vegetation condition (based on Trudgen 1988); and
- For each vascular plant species, the average height and the percentage cover (of both alive and dead material) over the survey quadrat.

In addition to vegetation mapping undertaken in the Power Corridor Project area, all survey areas were searched for threatened and priority flora via foot traverse. As well as areas traversed whilst enroute to survey quadrats, pockets of favoured habitat and known records were also targeted during the search to ensure adequate coverage of the survey areas (see Figure 6 for track logs).

All plant specimens collected during the field surveys were dried and processed in accordance with the requirements of the WAH. The plant species were identified based on taxonomic literature and through comparison with pressed specimens. Where appropriate, plant taxonomists with specialist skills were consulted. Nomenclature of the species recorded is in accordance with the WAH (1998-).

2.4. Survey Timing

According to the *Technical guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b), surveys in the Eremaean region should be undertaken in the optimal time for the area, approximately 6 – 8 weeks post wet season (March – June). This survey was performed in March, within the optimal time range, which minimised constraints in terms of species observation and identification.

To assess survey adequacy a species accumulation curve, based on accumulated species versus quadrats surveyed was prepared (*EstimateS* – Colwell 2013). As the number of survey quadrats increases, and correspondingly the size of the area surveyed increases, there should be a diminishing number of new species recorded. At a point, the number of new species recorded becomes essentially asymptotic. The asymptotic value was determined using Michaelis-Menten modelling based on combined data from all five survey areas, and provided an incidence-based coverage estimator of species richness (Chao 2004). When the number of new species being recorded for survey effort expended approaches this asymptotic value, the survey effort can be considered to be adequate.

2.5. Analysis of Quadrat Data

Plymouth Routines in Multivariate Ecological Research v7 (PRIMER) statistical analysis software was used to analyse species-by-quadrat data and discriminate survey quadrats on the basis of their species composition (Clarke and Gorley 2015). To down-weight the relative contributions of quantitatively dominant species, a square root transformation was applied to the data set. Computation of similarity matrices was based on the Bray-Curtis similarity measure. Data were analysed using a series of multivariate analysis routines including Hierarchical Clustering, Similarity Profile and Similarity Percentages. Results were used to inform and support interpretation of aerial photography and delineation of individual plant communities.

2.6. Vegetation Descriptions

Previous mapping within the project area by Mattiske used vegetation community descriptions based on the structural forms of Australian vegetation as outlined in Beard (1990). More recent vegetation community descriptions are based on the National Vegetation Information System (NVIS; Executive Steering Committee for Australian Vegetation Information 2003; Appendix A5). Vegetation communities identified in this report were described at the association level of the NVIS classification framework, consistent with the *Technical guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b). Vegetation communities were described and mapped using a combination of aerial imaging, previous vegetation mapping, statistical analysis and field observations.

In 2012 a taxonomic revision of Mulga species (*Acacia aneura* and its close relatives) in Western Australia was carried out (Maslin & Reid 2012). Several new species, which previously were classified under *A. aneura,* were recognised. These include *A. caesaneura* and *A. incurvaneura*, which were recorded in this survey. When comparison is made here with vegetation communities defined prior to 2012, *Acacia aneura,* as listed in previous surveys, is treated as equivalent to *Acacia ?caesaneura* and *Acacia ?incurvaneura* in this survey.

2.7. Survey Limitations

A general assessment was made of the current survey against a range of factors that may have limited the outcomes and conclusions of this report (Table 1).

Table 1: Potential limitations affecting survey conclusions

Potential survey limitation	Impact on current survey
Availability of contextual information at a regional and local scale	Not a limitation. Previous surveys have been performed in the immediate area surrounding the KOTH mine site by Mattiske (1999, 2003, 2006, 2019). Adequate background information at a broader scale was obtained from sources such as regional biodiversity summaries (Cowan 2001), rangeland land system surveys (Pringle et al. 1994), vegetation mapping (Beard 1974, 1976, 1990) and online flora and vegetation databases. These sources have all provided detailed contextual information for the current project (see desktop report).
Competency/experience of team carrying out survey; experience in the bioregion surveyed	Not a limitation. Botanists had extensive experience working within the Murchison region, WA.
Survey effort and extent of survey	Not a limitation. Generally the survey area was thoroughly covered. Survey quadrats were initially selected from high resolution aerial maps, with additional quadrats selected in situ based on in field observations. Lack of replication within some vegetation communities was unavoidable given their low occurrence within the survey area.
Access restrictions within survey area	Not a limitation. Survey areas had vehicle tracks through the general area, providing adequate access to undertake surveys.
Survey timing, rainfall, season of survey	Potential limitation. Survey timing was considered optimal as it was performed during the recommended months of March-June (EPA 2016b) and rainfall in the months prior to the surveys was above average (BOM 2020). While identification to species level was problematic for some flora the dominant structural components were largely definable and discernible between communities. Of the fourteen priority species potentially found in the area, only three were in flowering season during the survey period, this however did not unduly compromise identification as many of the target species can be recognised in the field by foliage alone.
Disturbances (fire/flood/clearing)	Not a limitation. Field observations suggest the last fire in the area was more than 20 years ago. Evidence of the presence cattle was observed at several sites; however, there did not appear to be any signs of substantial grazing or trampling of vegetation associated with cattle over the survey area. The survey area was considerably disturbed by vehicle tracks, as there were a multitude of drill sites and thoroughfares within and intersecting the survey area. This disturbance is likely to assist the spread of invasive plant species.
Accuracy of data and suitability of statistical analysis	Not a limitation. Measures were taken to improve the robustness of data and analysis (See Methods section); however, the relatively small number of survey sites does result in increased levels of uncertainty.

3. RESULTS

The climate, geology, soils and landforms all influence the vegetation of the area and are described in this section. Flora, including threatened, priority and introduced species are described, along with possible vegetation communities, and placed within a local and regional context.

3.1. Climate

The Austin Botanical District is characterised by an arid climate with cool winters and hot, dry summers. Rain falls in both the warm and cool seasons (Beard 1990).

The nearest Bureau of Meteorology (BOM) weather stations with the most complete long-term and the latest climate data are Leonora Station (ID 12046) and Leonora Aero Station (ID 12241), respectively, both of which are located approximately 25 km southeast of the project area (BOM 2019). Rainfall and air temperature data for the twelve months to January 2020 and averaged over the long-term (1961-1990) are shown in Figure 2. Total rainfall for the 12 months to February 2020 was 134 mm, lower than the long-term average annual rainfall of 244.2 mm. However, over that time period, over half of the total rainfall (73 mm) fell in summer (December - February 2020), just before the survey was undertaken. High rainfall is optimum for growth of annual species and for flowering and fruiting of perennial species, aiding in identification to species level. Winter rainfall promotes the growth of annual species and summer cyclonic rainfall tends to aid the growth of woody plants. However, the effectiveness of rainfall for overall plant growth is higher in winter when evaporative demand is lower due to the lower temperatures. Soil water is therefore available to plants for growth for longer periods of time (Gilligan 1994).

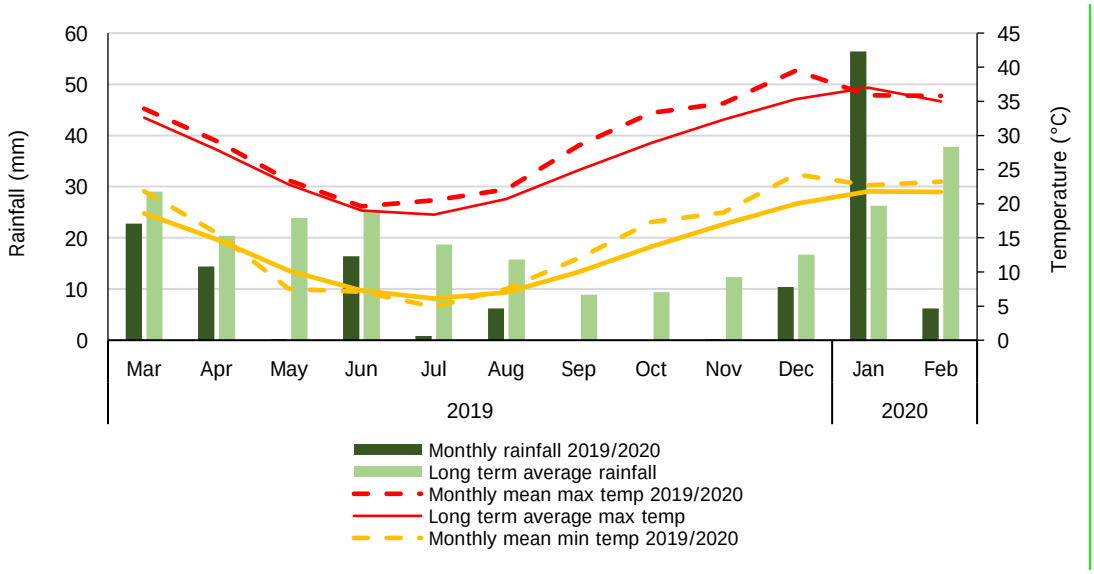


Figure 2: Climatic data for Leonora, WA (BOM 2019-2020)
Long term average rainfall and temperature from the Leonora weather station (ID 12046, years 1961-1990) and monthly rainfall and temperature from the Leonora Aero weather station (ID 12241, Mar 2019 – Feb 2020)

3.2. Desktop

3.2.1. Geology, Soils and Topography

The Eastern Goldfields region is underlain by rocks of the Yilgarn Craton which are mostly Archaean granitic rocks, often intruded by quartz veins and dolerite dykes. Areas of Archaean migmatite and gneiss are associated with Archaean greenstone belts, which contain a mix of metamorphosed mafic-ultramafic and felsic volcanics and metasediments. The Archaean bedrock has been extensively weathered and is often covered by Tertiary and Quaternary alluvial, colluvial and Aeolian deposits (Beard 1990; Tille 2006).

The KOTH gold deposit is situated within the Tarmoola Archaean-aged greenstone belt, which is related to the northwest trending Sons of Gwalia shear zone. The Tarmoola structure is dominated by a granitoid pluton that intrudes a sequence of supracrustal rocks (greenstone). The major ore bodies are related to the contact between the pluton and the greenstone, and the Ursus and Tarmoola Fault Zones, where pervasive hydrothermal alteration has resulted in the deposition of gold (PorterGeo n.d.; Red 5 Ltd 2019).

The northern part of the Eastern Goldfields region is characterised by its internal drainage, with the most obvious features being salt lake systems (associated with a deeper paleodrainage system) and extensive areas of elevated red desert sandplains (Cowan 2001). However, within the greenstone belts, such as at the KOTH mining area, low rounded hills and rocky ridges dominate the topography, along with occasional laterite breakaways and broad stony slopes. Hardpan wash plains and stony plains are often found below the hills, but not the extensive sandplains found elsewhere in the region (Tille 2006). Topography and drainage of the KOTH mining area are shown in Figure 4.

The soils of the area generally comprise: red loamy earths and red-brown hardpan shallow loams with some red shallow loams on the wash plains; red shallow loams with red shallow sandy duplexes on stony plains; red shallow sands on gritty plains over granite; and red shallow loams, stony soils and red shallow sands in the hilly areas (Beard 1976, Tille 2006). Further soil description is given in section 3.3.2.

Soil-landscape zones of Western Australia's rangelands and arid interior were defined by Tille (2006) and describe an area using various physical and biological aspects. The KOTH mining area and surrounds are situated in Tille's (2006) Salinaland Plains Zone within the Murchison Province. The Salinaland Plains Zone soil-landscape zone is described as "sandplains (with hardpan wash plains and some mesas, stony plains and salt lakes) on granitic rocks (and some greenstone) of the Yilgarn Craton. Red sandy earths, red deep sands, red shallow loams and red loamy earths with some red-brown hardpan shallow loams, salt lake soils and red shallow sandy duplexes. Mulga shrublands with spinifex grasslands (and some halophytic shrublands and eucalypt woodlands)" (Tille 2006).

3.2.2. Regional Vegetation

The King of the Hills Project lies within the Austin Botanical District of the Eremaean Botanical Province (Beard 1990). More recently, the vegetation of Western Australia has been assigned to bioregions and subregions under the Interim Biogeographical Regionalisation for Australia (IBRA, v7) (DAWE 2020b), with the project area being situated within the *MUR1 – East Murchison* subregion of the Murchison Bioregion. Vegetation within this subregion is described as being 'dominated by Mulga Woodlands often rich in ephemerals; hummock grasslands, saltbush shrublands and *Tecticornia* shrublands'). There are no Threatened Ecological Communities in the East Murchison subregion (Cowan 2001).

Several studies describe the vegetation of the KOTH mining area (e.g., Beard 1974, Beard 1976, Beard 1990, Pringle et al. 1994, Tille 2006); some of these are summarised below.

3.2.3. Botanical Districts

The Austin Botanical District, in which the survey area is located, is the largest of the Eremaean regions and is predominately Mulga (*Acacia aneura* and its close relatives) low woodlands on red loams over siliceous hardpans on the plains reducing to scrub on the rises and hills (Pringle et al. 1994). This botanical district is also comprised of tree steppe of *Eucalyptus* spp. and *Triodia basedowii* on sand plains (Beard 1990), Mulga and *Eremophila* shrublands which dominate on stony plains, and chenopod communities are more often associated with duplex soils (Pringle et al. 1994).

Acacia aneura grows in the form of a tree with a single erect trunk on the more favourable soils, i.e. red loam soil overlying siliceous hardpan, forming low woodland. On other soils both further up slope or down slope towards the rivers, it takes the form of a shrub. It tends to be absent or sparingly present on sandplains and on heavy alkaline and saline soils. On stony plains and stony pediments in many parts of the region nearly all the mulga is dead, under which conditions the understorey species of *Senna* and *Eremophila* become larger and numerous, as well as some secondary *Acacia* species (Beard 1990).

The structure and component species of mulga low woodland consist of:

- an open low tree or tall shrub layer of more than 3 m, including *Acacia aneura* (most abundant), localised populations of *A. coriacea, A. ligulata, A. ramulosa, A. tetragonophylla, Hakea lorea,* and scattered *Eucalyptus kingsmillii, E. lucasii*;
- a sparse low shrub layer of 1-2 m including *Senna* spp., *Eremophila* spp. and *Ptilotus* spp.; and
- a ground layer of ephemeral herbs which may be a closed one in a favourable season, including *Cephalipterum drummondii*, *Ptilotus* spp., *Rhodanthe* spp., *Swainsona* spp. This layer may not be present in an unfavourable season. There are also sparse perennial and annual grasses including *Aristida* spp., *Eragrostis* spp. and *Eriachne* spp. (Beard 1990).

The KOTH mining area is situated within the Laverton sub-region of the Austin Botanical District. In particular, it is located within the chain of hills running through Leonora. The rockier hills are vegetated with scrubland of *Acacia aneura* and *A. quadrimarginea* over *Eremophila leucophylla* [now *E. forrestii], Ptilotus obovatus* and annual herbs. On the gentler slopes *Acacia aneura* of medium height dominates, over *Cassia nemophila* [now *Senna artemisioides* subsp. x *coriacea*]*, Eremophila compacta, E. dielsiana* [now *E. platycalyx*]*, E. granitica, Stipa variabilis* [now *Austrostipa variabilis*] and annual herbs. Open salty patches on the slopes are vegetated with *Hakea preissii* and *Maireana pyramidata* (Beard 1990).

3.2.4. Land systems

Land system mapping of the north-eastern Goldfields, including the survey area, has been prepared by the Western Australia Department of Agriculture (now the Agriculture and Food division of the Department of Primary Industries and Regional Development) (Pringle et al. 1994). This mapping sought to define the topographic characteristics of the north-eastern Goldfields. Land systems are grouped into land types according to a combination of landforms, soils, vegetation and drainage patterns. Pringle et al. (1994) noted that boundaries between plant communities are often sharp and mostly associated with boundaries between landforms and their soils along the slope of the land. Greater diversity in plant communities is often found higher in the landscape where differential weathering and erosion occurs. Across slope, changes are usually more subtle.

A total of eight land systems are intersected by the survey areas (Table 2; Figure 3). A description of each land system, summarised from Pringle et al. (1994) is presented after Table 2.

Table 2: Extent of land systems intersecting the survey areas at the KOTH mine Data from Tille (2006).

LAND SYSTEM	MAP UNIT	Hectares (Ha) inside survey areas				CURRENT EXTENT (ha)	Percentage (%) impact inside survey areas			
		POWER CORRIDOR	HAUL ROAD	TSF6	CAMP		POWER CORRIDOR	HAUL ROAD	TSF6	CAMP
Brooking	Br	-	-	108.12	-	96709.19	0.001	0.000	0.000	0.000
Gundockerta	Gu	-	63.39	-	-	340558.66	0.000	0.000	0.000	0.000
Jundee	Ju	202.07	-	--	18.23	664962.80	0.000	0.000	0.000	0.000
Monk	Mk	1084.16	-	-	-	998274.96	0.001	0.000	0.000	0.000
Nubev	Nu	-	-	34.42	-	153742.23	0.000	0.000	0.000	0.000
Rainbow	Rb	-	21.75	-	-	258665.87	0.000	0.000	0.000	0.000
Violet	Vi	-	-	166.78	47.90	548625.39	0.000	0.000	0.000	0.000
Wilson	Ws	-	102.29	-	-	48416.18	0.000	0.000	0.000	0.000

Brooking System
Prominent ridges of banded iron formation supporting mulga shrublands and occasional minor halophytic communities.

Gundockerta System
Extensive, gently undulating, calcareous, stony plains, supporting bluebush shrublands.

Jundee System
Hardpan plains with variable gravelly mantles and minor sandy banks supporting weakly groved mulga shrublands.

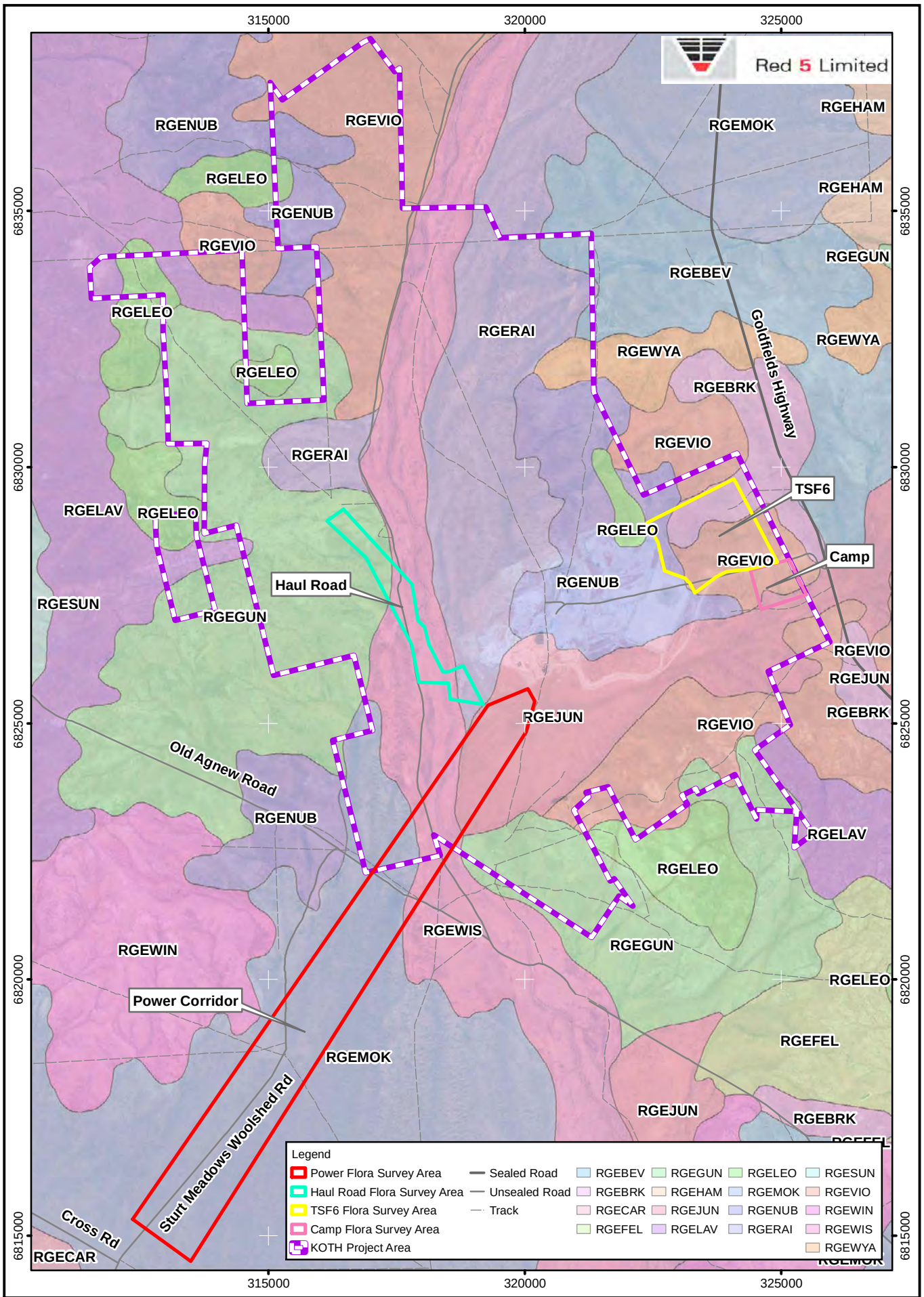
Monk System
Hardpan plains with occasional sandy banks supporting mulga tall shrublands and wanderrie grasses.

Nubev System
Gently undulating stony plains, minor limonitic low rises and drainage floors supporting mulga and halophytic shrublands.

Rainbow System
Hardpan plains supporting mulga shrublands.

Violet System
Gently undulating gravelly plains on greenstone, laterite and hardpan, with low stony rises and minor saline plains; supporting groved mulga and bowgada shrublands and occasionally chenopod shrublands.

Wilson System
Large creeks with extensive distributary fans, supporting mulga and chenopod shrublands.



Source: Image: Landgate, Tracks: MRD, Land Systems: DPIRD

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Scale: 1:100,000
MGA94 (Zone 51)

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Date: April 2020 | Rev: A | A4

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King Of The Hill Project
Land Systems

Figure: **3**

3.2.5. Pre-European Vegetation

Pre-European vegetation (DBCA 2019b, Shepherd et al. 2002) within the King of the Hills mining area (Figure 7) is described in Table 2a. The entire area is covered by *Acacia* spp. low woodland (units 18.16 and 28) and shrubland (unit 39.3).

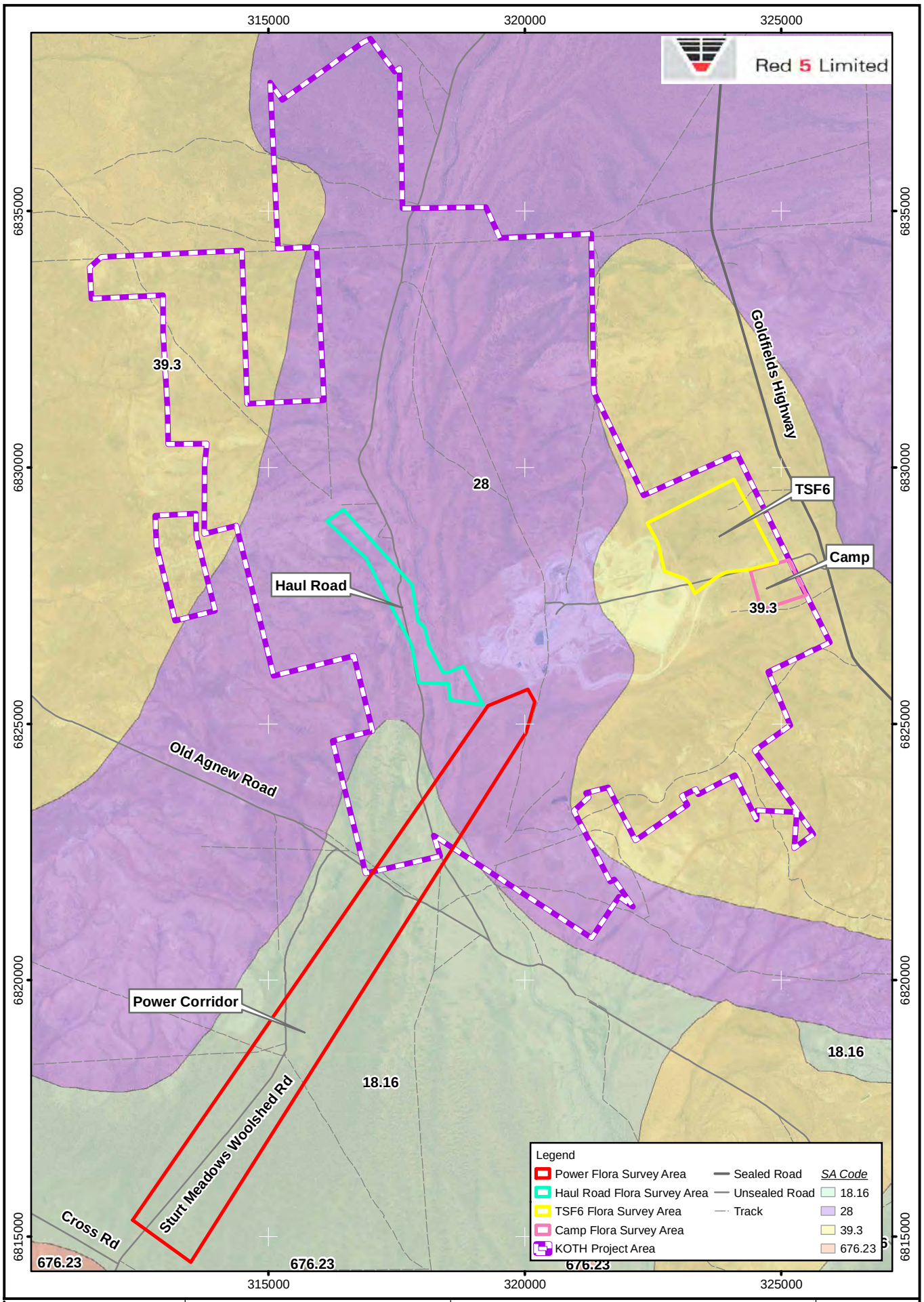
Table 3a: Pre-European vegetation of the KOTH mining area

NUMBER	DESCRIPTION	% REMAINING IN EASTERN MURCHISON IBRA SUBREGION
18.16	Low woodland, open low woodland or sparse woodland of Mulga *(Acacia aneura)* over *Eremophila* sparse shrubland over *Eragrostis* mixed sparse tussock grassland.	99.4
28	Low woodland, open low woodland or sparse woodland of Mulga *(Acacia aneura)* and associated species.	97.4
39.3	Scrub, open scrub or sparse scrub of *Acacia* species over *Ptilotus* sparse forbland.	97.5

The Pre-European vegetation units within each of the survey areas are shown in Table 3b.

Table 3b: Pre-European vegetation units in each survey area

VEGETATION UNIT	HECTARES (HA) INSIDE SURVEY AREAS				CURRENT EXTENT (HA)	PERCENTAGE (%) IMPACT INSIDE SURVEY AREAS			
	POWER CORRIDOR	HAUL ROAD	TSF6	CAMP		POWER CORRIDOR	HAUL ROAD	TSF6	CAMP
18.16	1203.83	-	-	-	2539173.83	0.047	-	-	-
28.00	243.03	187.43	-	-	379144.35	0.064	0.049	-	-
39.30	-	-	309.32	66.13	155400.67	-	-	0.199	-



Source: Image: Landgate, Tracks: MRD, Pre European Veg: DPIRD

N

0 1.75 km

Scale: 1:100,000
MGA94 (Zone 51)

CAD Ref: a2725_f09_06

Date: April 2020 | Rev: A | A4

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King Of The Hill Project
Pre European Vegetation

Figure: **4**

3.2.6. Vegetation Communities

Beard (1974, 1976) mapped the vegetation of the Murchison region at 1:1,000,000 scale. His vegetation units in the vicinity of the KOTH mining area include: Mulga (*Acacia aneura*) shrubland, Mulga open low woodland on denuded greenstone hills and Mulga low woodland (Beard 1974).

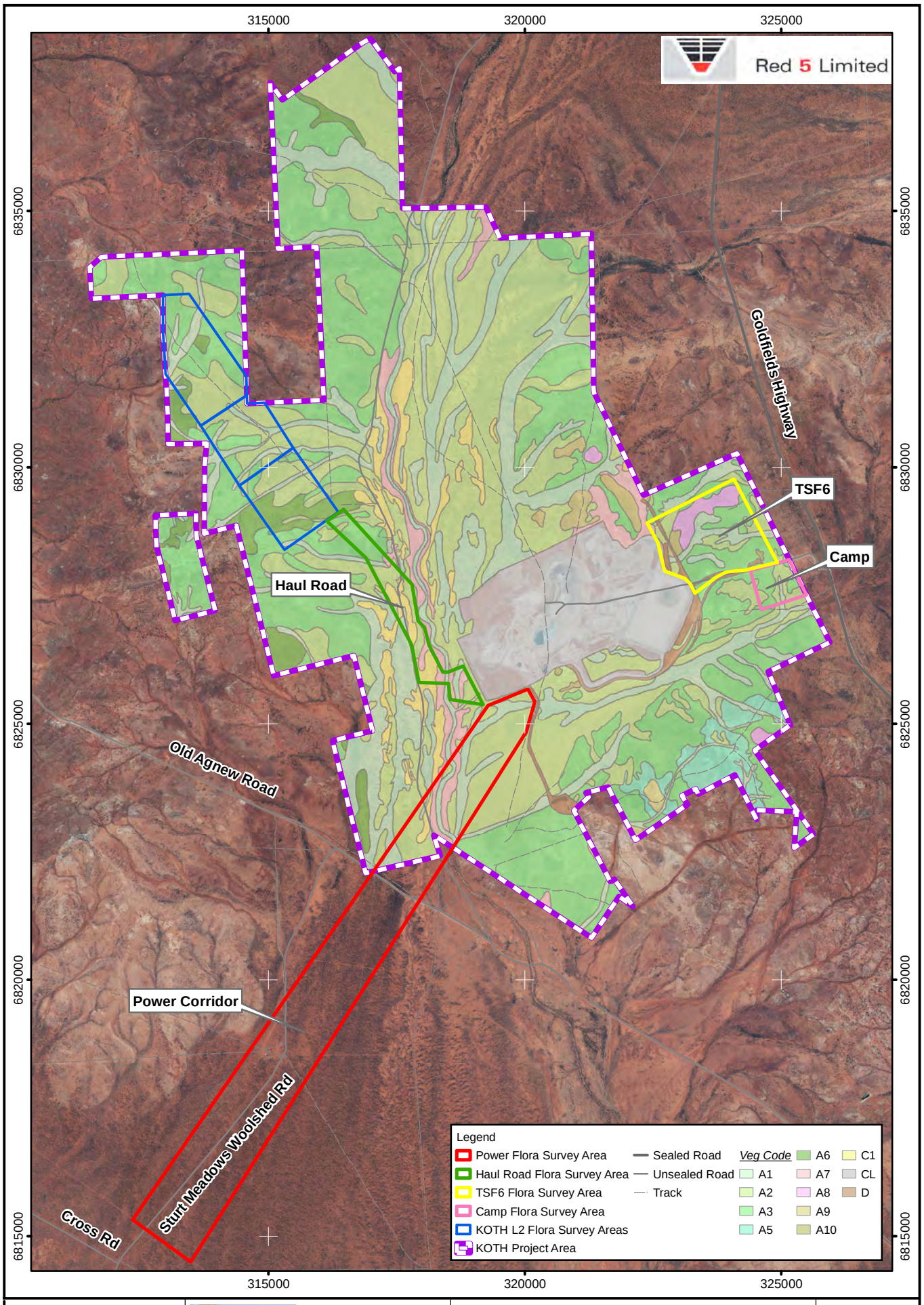
In previous vegetation mapping in and around the KOTH mining area, MCPL (1999, 2003, 2006 and 2019) defined 24 vegetation communities (Figure 5).

In the MCPL (1999) survey, four vegetation communities were mapped as occurring within the survey area; two communities of Acacia shrublands, one of Eucalypt woodlands and one of Chenopod shrublands. No Threatened ecological communities were recorded in the survey area. It was noted that the communities identified were well represented regionally within the conservation estate.

The MCPL (2003) survey, on the southern side of the currently active mining area, mapped five vegetation communities over the survey area; these included four Mulga (*Acacia aneura*) communities (on plains, quartz plains, floodplains and creeklines) and one Grassland community. No Threatened ecological communities were recorded in the survey area. None of the vegetation communities mapped were considered to be of local or regional significance as they were well represented throughout the Botanical District.

Twelve vegetation communities were defined in the survey areas over the currently active mining area by MCPL (2006); ten Low Open Forest or Low Open Woodland communities dominated by *Acacia aneura* varieties; one Open Chenopod Shrubland community; and one Open Woodland of *Eucalyptus camaldulensis* var. *obtusa*. It was noted that the complexity of the communities reflected the inherent complexity of the landform and soils. Three of the mapped vegetation communities (A8, A10 and A11) were considered to be of local significance due to their restricted distribution associated with the local topography; four communities (A3, A7, A8 and C1) were thought to be of interest as they supported the two known priority species. No Threatened ecological communities were recorded in the survey area. Vegetation condition was found to vary from degraded near the mine site to excellent in the less disturbed areas further away from the mine.

In the MCPL (2019) survey, six communities were identified. Three of those communities (A1, A2 and A3) were found to be similar to communities found in past surveys (2003 and 2006). The remaining three communities (A12, A13 and Er1) were unique to the 2019 survey. The newly discovered Acacia communities differed from those previously documented due to understorey species composition. The Er1 community was unique due to the dominance of *Eremophila scoparia* and was a statistical outlier, being observed at a single site. No Threatened ecological communities were recorded in the survey area.



Source: Image: Landgate, Tracks: MRD, Historical Vegetation Mapping: MCPL

N

0 1.75 km

Scale: 1:100,000
MGA94 (Zone 51)

CAD Ref: a2725_f09_07

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King Of The Hill Project
Historical Vegetation Mapping

Figure: **5**

3.2.7. Potential Flora

A total of 326 vascular plant taxa, representative of 133 genera and 51 families (Appendix C), had the potential to occur within the PCP, HRP, Camp and TSF6 survey areas (see section 2.1 for methodology). The most commonly represented families are Fabaceae (47 taxa), Chenopodiaceae (46 taxa) and Poaceae (41 taxa). The most commonly represented genera are *Eremophila* (29 taxa), *Acacia* (28 taxa) and *Maireana* (15 taxa).

In comparison, Mattiske Consulting Pty Ltd in 1999 recorded 77 vascular plant taxa, comprising 44 genera and 23 families, with 4 introduced taxa and no threatened or priority flora recorded. The MCPL (2003) survey, on the southern side of the currently active main mining area, found 67 vascular plant taxa, representative of 46 genera and 30 families, of which 5 were introduced species. Species diversity was lower than expected, due to extensive grazing and also the after-effects of a hailstorm. No threatened flora and no priority flora were recorded. In the 2006 MCPL survey over the currently active mining area, a total of 186 flora taxa, representative of 90 genera and 43 families, were recorded. Ten of these taxa were introduced species. No threatened flora species were found, but two priority flora species were recorded: *Stenanthemum patens* (Priority 1) and *Frankenia georgei* (Priority 3 in 2006; now ranked Priority 1). The MCPL 2019 survey found a total of 45 vascular plant taxa, representative of 19 genera and 14 families. No threatened or priority species were recorded.

3.2.8. Potential Threatened and Priority Flora

No threatened flora species, pursuant to section 179 of the *EPBC Act* and as listed by DAWE (2020c) or pursuant to Part 2, Division 1 and Subdivision 2 of the *BC Act* and as listed by DBCA (2018a) are likely to occur in the KOTH survey areas.

A total of fourteen priority flora species as listed by DBCA (2018b) have the potential to occur within the survey areas (Appendix D). These taxa are:

- Priority 1: *Calandrinia quartzica, Frankenia georgei, Korthalsella leucothrix, Micromyrtus chrysodema* and *Stenanthemum patens*
- Priority 3: *Acacia* sp. Marshall Pool (G. Cockerton 3024), *Calytrix praecipua, Eremophila simulans* subsp. *megacalyx, Micromyrtus serrulata, Phyllanthus baeckeoides, Sauropus* sp. Woolgorong (M. Officer s.n. 10/8/94) and *Thryptomene* sp. Leinster (B.J. Lepschi & L.A. Craven 4362)
- Priority 4: *Grevillea inconspicua* and *Hemigenia exilis*

Three of these taxa were observed by MCPL (2006) within the KOTH mining area: *Frankenia georgei* (P1), *Stenanthemum patens* (P1) and *Sauropus* sp. Woolgorong (M. Officer s.n. 10/8/94) (P3). Of these, both *F. georgei* and *S. patens* were identified by the NatureMap (Department of Parks and Wildlife 2007-) search, along with *Calandrinia quartzica* (P1) and *Grevillea inconspicua* (P4). Searches of the DBCA databases (DBCA 2020a) resulted in thirteen priority taxa (all of those listed above except *Sauropus* sp. Woolgorong (M. Officer s.n. 10/8/94) (P3)).

Frankenia georgei (P1) was recorded in two sites in the MCPL 2006 survey within the boundary of the KOTH mining area, in vegetation communities A7 and A8. *Stenanthemum patens* (P1) was recorded in two sites in the MCPL 2006 survey within the boundary of the KOTH mining area, in vegetation communities A3 and A8. *Sauropus* sp. Woolgorong (M. Officer s.n. 10/8/94) (P3) was recorded in the MCPL (2006) survey in one location, just inside the eastern boundary of the Level 2 survey in the vegetation community A8 (see Appendix B for description). This species was originally recorded as *Sauropus ramosissimus*, which is currently housed under *Sauropus* sp. Woolgorong (M. Officer s.n. 10/8/94) (Barrett & Telford 2015). Additionally, *Grevillea inconspicua* (P4) was recorded in a cluster of locations in 1992 (DBCA 2020a) just outside the northwestern boundary of the KOTH survey area, approximately 6km from the proposed HRP site (Figure 9). No other species have been recorded within 10 km of the KOTH mining area, according to the performed searches (MCPL 1999, 2003, 2006, 2019; Department of Parks and Wildlife 2007-; DBCA 2020a).

The likelihood that these species would occur within the survey areas was determined using the following criteria:

- Known records within a 40 km radius of the centre of the survey area (as described above). More recent, proximal and numerous records were ranked higher.
- Potential presence of suitable habitat and landforms for the species within the survey area (e.g. soil type, bedrock type, topography, drainage lines, vegetation).

The likelihood was ranked Low, Medium or High.

Four species, *Frankenia georgei* (P1), *Stenanthemum patens* (P1), *Sauropus* sp. Woolgorong (M. Officer s.n. 10/8/94) (P3) and *Grevillea inconspicua* (P4) were ranked as having a High likelihood of occurrence in the survey area; all of these taxa have been recorded in or on the boundary of the proposed survey areas and have compatible habitats. Additionally, seven species were assessed as having a Medium likelihood and three species have a Low likelihood of occurrence (Appendix G).

All potential threatened and priority flora are listed in Appendix D, along with their State Conservation Codes (see Appendix A for definitions), a description and an assessment of the likelihood of their occurrence in the Western and Northern survey areas.

3.2.9. Potential Introduced (Weed) Species and Declared Pest (Plant) Organisms

A total of 26 introduced taxa from 13 families and 21 genera may potentially exist in the proposed survey areas, based on NatureMap (Department of Parks and Wildlife 2007-), the *EPBC Act* Protected Matters Search Tool (DAWE 2020a) search results (section 2.1 and Appendix C) and records from MCPL (1999, 2003, 2006, 2019) surveys.

Five of the potential introduced taxa are listed as both Weeds of National Significance (DAWE 2020d) and Declared Pest organisms pursuant to section 22 of the *BAM Act* (Department of Primary Industries and Regional Development 2020a) and have a Prohibited Organism Control category of 'C3 – Restricted' (see Appendix A for definitions). Four (all except the generic *Cylindropuntia sp.*) are also Goldfields Region Priority Alert Weeds (Appendix E). These taxa are all opuntoid cacti in the Cactaceae family:

- *Cylindropuntia fulgida* var. *mamillata*
- *Cylindropuntia imbricata*
- *Cylindropuntia* sp. (in the Murchison IBRA bioregion this includes the above two listed *Cylindropuntia* species and *C. pallida*)
- *Opuntia elata*
- *Opuntia stricta*

The remaining 22 potential introduced taxa are listed as Permitted Organisms pursuant to section 11 of the BAM Act (Department of Primary Industries and Regional Development 2020a)(see Appendix A for definitions).

During the MCPL (1999) survey, four introduced flora species were recorded, in the (2003) survey five introduced flora species were recorded, ten species (including two recorded in 2003) were recorded in the later (MCPL 2006) survey, and four introduced species were recorded in 2019 (including two recorded in 2006).

An assessment of the likelihood that the five potential conservation significant introduced taxa would occur within the survey areas (Appendix E) was determined using the following criteria:

- Known records within a 40 km radius of the centre of the survey area (as described above). More recent, proximal and numerous records were ranked higher.
- Potential presence of suitable habitat and landforms for the species within the survey area (e.g. soil type, bedrock type, topography, drainage lines, vegetation).

The likelihood was ranked Low, Medium or High.

Of the five potential conservation significant introduced taxa, four are ranked as having a High likelihood of occurrence in the proposed survey area; these taxa have all been recorded on the southwestern boundary of the proposed survey area (at Tarmoola Station homestead in 2007). The other taxon, *Opuntia stricta*, is ranked as having a Medium likelihood of occurrence in the survey area; its nearest known location is 25 km to the south in the Gwalia mine area (Appendix E).

Five other of the introduced taxa with the potential to occur in the KOTH mining area have been ranked as having both High Ecological Impact and Rapid Invasiveness by the DBCA's weed prioritisation process (Department of Parks and Wildlife 2014): **Carrichtera annua, *Cenchrus ciliaris, *Cenchrus setiger, *Centaurea melitensis* and **Cynodon dactylon*.

3.2.10. Potential Threatened and Priority Ecological Communities

There are no threatened ecological communities (TECs) listed at Commonwealth level pursuant to sections 181 and 182 of the *EPBC Act* and listed by the DAWE (2020e) or at State level pursuant to Part 2 of the *BC Act* and as listed by DBCA (2018c) and no priority ecological communities (PECs) as listed at State level by DBCA (2020c) that could potentially occur within the KOTH mining area.

There are no TECs listed at either Commonwealth DAWE (2020e) or State DBCA (2018c) level for the for the Murchison-1 IBRA subregion. There are, however, a number of PECs that occur within the subregion. These mostly relate to vegetation complexes on banded iron formation ranges or invertebrate assemblages inhabiting groundwater within calcrete aquifers in paleodrainage associated with salt lakes. The nearest PEC to the proposed survey areas is the 'Mt Forrest-Mt Richardson (Bulga Downs) vegetation complex (banded ironstone formation)' located on the ex-Bulga Downs pastoral lease 90 km to the west of the KOTH mining area. There are several other vegetation complexes associated with banded ironstone formations that are listed as PECs to the west of the KOTH mining area, and at least one to the east ('Mount Linden banded ironstone formation vegetation complex' (P3)). There are also several calcrete groundwater invertebrate assemblage related PECS in the area (DBCA 2020c).

3.2.11. Other Areas of Conservation Significance

There are no DBCA managed lands within the KOTH mining area. Lake Ballard, a nationally important wetland (DAWE 2020f), is located approximately 90 km to the southwest. Approximately 90 km to the west of the KOTH mining area a portion of the Bulga Downs pastoral lease is in the process of being gazetted as part of the National Reserve System (DAWE 2016). Goongarrie National Park is around 140 km to the south. A major watercourse, Sullivan Creek, flows north-south through the middle of the KOTH mining area (Figure 1). The drainage from the western half of the KOTH mining area (including the proposed survey areas) is predominantly to the east into Sullivan Creek, although at the western edge of the Western survey area the drainage is to the west away from the tenements. Sullivan Creek drains into the Lake Raeside system of salt lakes approximately 15 km south of the KOTH mining area and 15 km west of Leonora.

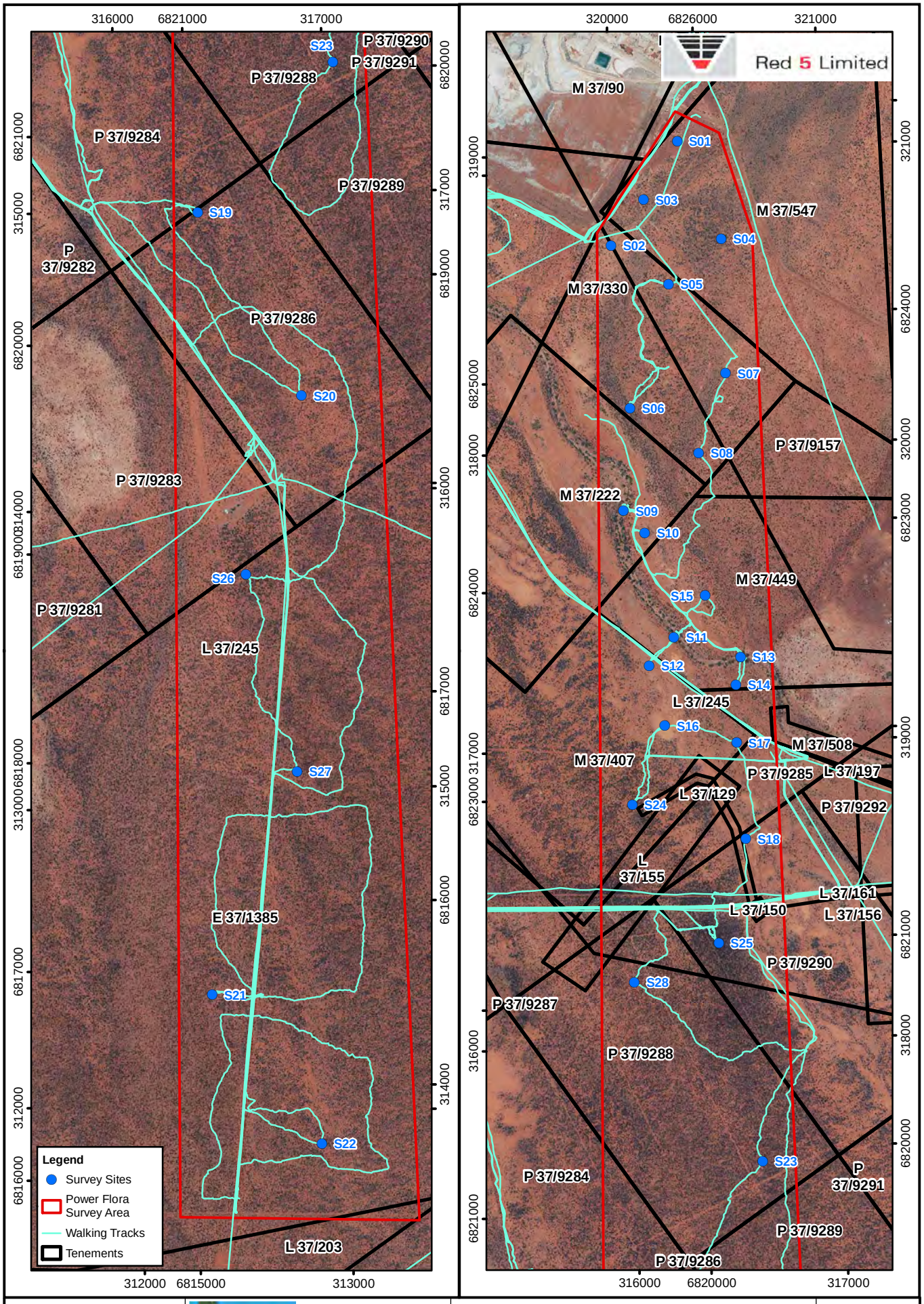
3.2.12. Aboriginal Heritage and Native Title

There are two registered Aboriginal Heritage Sites inside the proposed survey areas covered in this desktop survey. Lake Raeside/Sullivan Creek itself, which runs through the centre of the PCP and HRP areas and one smaller, more specific site within Sullivan Creek inside the PCP area. One other site (15266) is inside the previous KOTH level 1 survey area but outside the proposed PCP area. Three more sites nearby outside the KOTH mining area. None of these sites are protected areas and none are subject to gender restrictions (Department of Planning, Lands and Heritage 2019). These sites are listed in Appendix F (Table F1).

The KOTH mining area is in the centre of the Native Title application *DARLOT WC2018/005* (filed 04/10/2018) which is 47,207 km^2 in area and also includes the town of Leonora.

3.2.13. Other Heritage Places

At least 22 other heritage places are located in the vicinity of the updated mining areas not surveyed last year (Appendix F; Table F2). Of these, 14 are on the boundary of, or inside, the mining area. These comprise natural features, water sources, mythological and ceremonial sites, camps, man-made structures, artefacts/scatter, an old mining settlement and a hunting place. None of these sites are protected areas (Department of Planning, Lands and Heritage 2019).



Source: Image: Landgate (Nov 2014)

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Scale: 1:30,000
MGA94 (Zone 51)

CAD Ref: a2725_f11_02

Date: May 2020 | Rev: A | A4

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King Of The Hill Project
Power Corridor
MCPL Sites and Tracks

Figure: **6**

3.3. Field Survey

3.3.1. Flora

A total of 67 vascular plant taxa, representative of 43 genera and 24 families (Appendix H) were recorded within the Power Corridor survey area. The most commonly represented families were Poaceae (13 taxa), Fabaceae (12 taxa) and Scrophulariaceae (7 taxa). The most commonly represented genera were Eremophila (7 taxa), Senna (6 taxa) and Acacia (5 taxa). Plant species as recorded at each site are listed in Appendix I.

Species richness averaged 12.14 species per 20 m x 20 m quadrat, with a range from 4 to 32 species. Eight taxa were annual species. Over 58 % of the taxa recorded were shrubs or trees. Additionally, 12 taxa were identified to genus level and two to family level only, due to the lack of fertile material available on the plants which enables identification to a species level. Eighteen taxa were singletons, i.e. recorded at one site only.

A species accumulation curve (Colwell 2013) was used to evaluate the sampling adequacy and is presented in Figure 7. The incidence-based coverage estimator of species richness was 83. Based on this value and the total of 67 taxa recorded in this survey, approximately 80.68% of the flora species potentially present within the survey area were recorded.

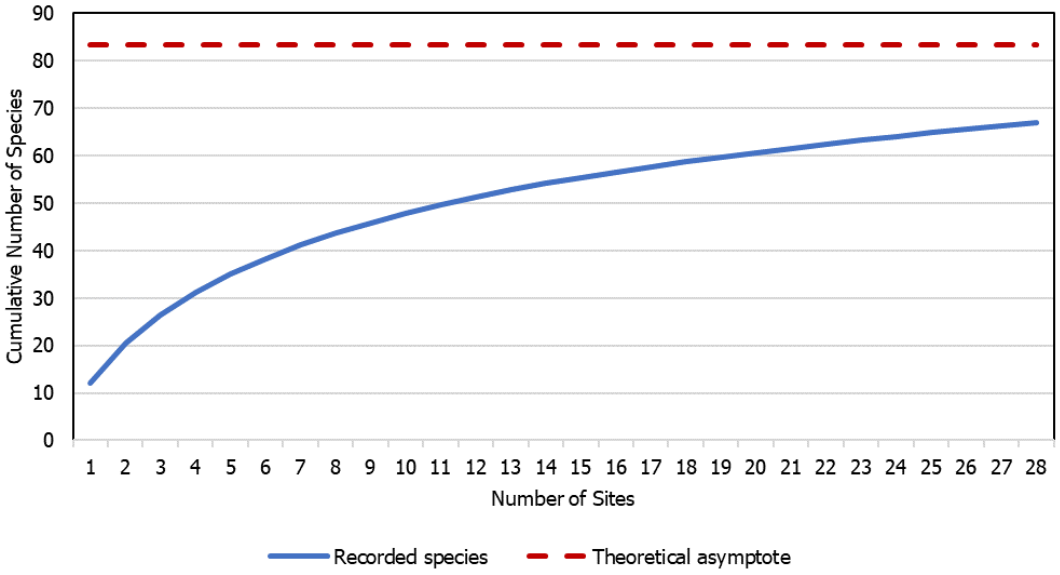


Figure 7: Species Accumulation Curve for the King of the Hills Power Corridor survey area, March 2020

3.3.2. Threatened and Priority Flora

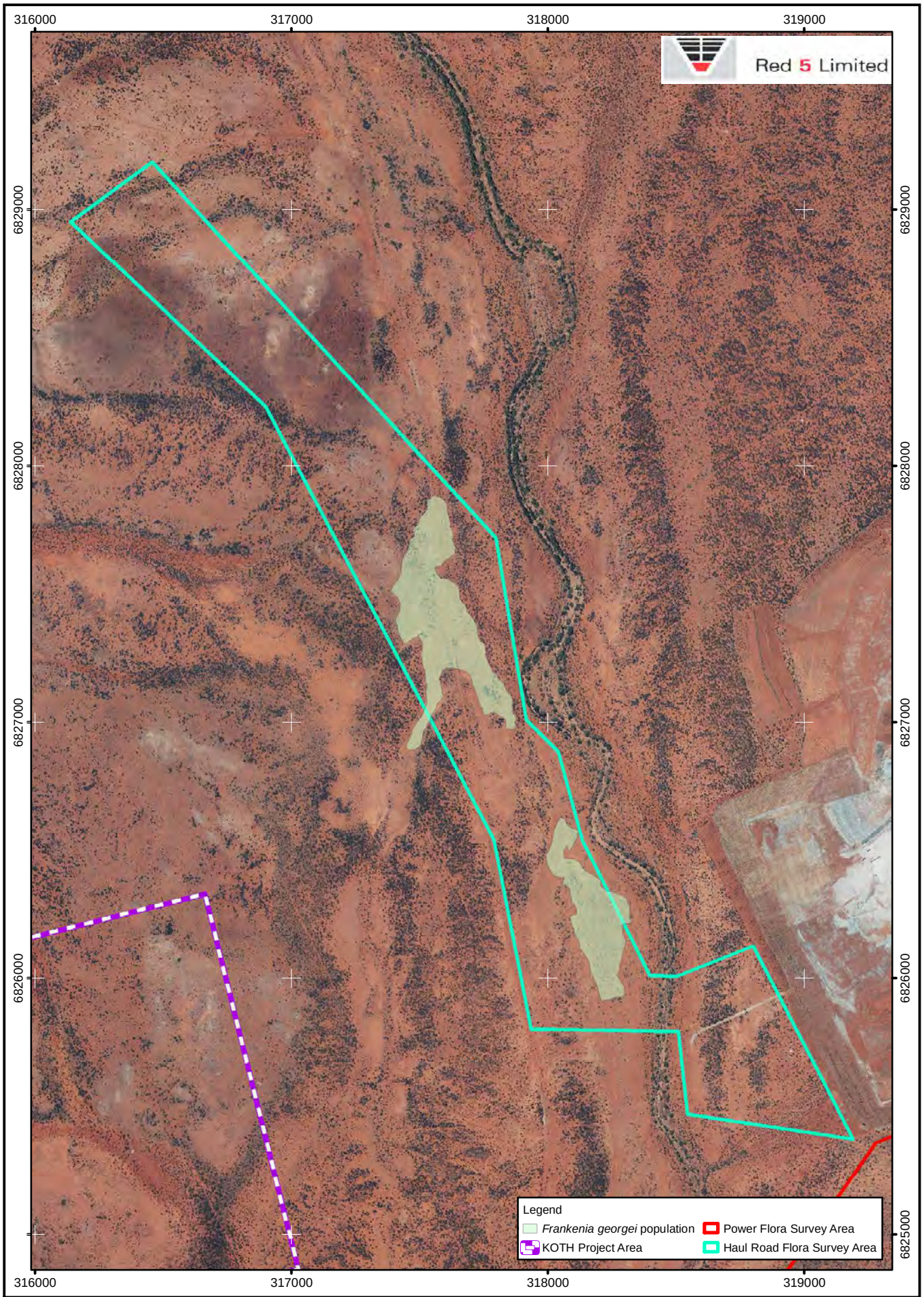
No threatened flora species, pursuant to section 179 of the *EPBC Act* and as listed by DAWE (2020a) were found in the survey areas. One priority flora species pursuant to Part 2, Division 1 and Subdivision 2 of the *BC Act* and as listed by DBCA (2018a, 2018b) was recorded in the Haul road survey area. *Frankenia georgei* (P1) had been previously recorded by Mattiske in 2006, during the 2020 survey the extent of the population was mapped and was found to overlap with part of the middle section of the HRP area (Figure 8). The population stretched across most of the width of the proposed corridor and covered a total area of approximately 0.29 sq. km (Figure 8). The estimated population size was >2000 individual plants. The general vegetation type of the area occupied by the population could be characterised as a low heath-land dominated by *F. georgei* (P1) with occasional small shrubs and no overstorey. The majority of the population of *F. georgei* (P1) was sterile, however a small number of individual plants were in flower.

3.3.3. Introduced (Weed) Species and Declared Pest (Plant) Organisms

No Introduced species or Declared Pest species pursuant to section 22 of the BAM Act 2007 according to the DPIRD (2019) were recorded within the Power Corridor survey area.

3.3.4. Threatened and Priority Ecological Communities

No Threatened Ecological Communities as listed at Commonwealth (DAWE 2020e) or State level (DBCA 2018c) or Priority Ecological Communities listed at State level (DBCA 2019a) were recorded within the Power Corridor survey area.



Source: Image: Landgate, Tracks: MRD, Flora and TEC/PEC: DBCA (07-0819FL)

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0 0.325 km

Scale: 1:20,000
MGA94 (Zone 51)

CAD Ref: a2725_f10_02

Date: April 2020 | Rev: A | A4

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King Of The Hill Project
Threatened & Priority Species
Frankenia georgei Population

Figure: **8**

3.3.5. Vegetation Communities

Statistical analysis (see section 2.3 for methodology) along with comparison with previously defined vegetation communities and examination of aerial photographs resulted in the definition of three associated groups of sites (Pi = 2.33; p = 0.2) (Figure 9). In order to define sites within the *Acacia aneura* groups, the dominant acacias were combined into a super group allowing the differences in understorey to determine similar groupings.

The largest grouping of sites (22 sites) corresponded with vegetation communities A1 and A2 of Mattiske (2006) and generally comprises *Acacia ?caesaneura* and *Acacia quadrimarginea* shrubs over *Eremophila margarethae* and *Maireana planifolia* on flats. These two communities were defined as very similar with the exception that A1 community vegetation is traditionally denser and more associated with drainage lines while A2 presents as more broadly spread over flats. These sites were then separated into the two communities based on landforms observed in the field and aerial photography, resulting in 15 sites categorised as A2 and 7 sites categorised as A1.

The next largest grouping (4 sites) was defined as statistically similar however one site was separated based on the absence of *Eucalyptus camaldulensis* var. *obtusa* and drainage features and classified as A13. This site consists floristically of *Acacia caesaneura* shrubs over *A. craspedocarpa* over Maireana planifolia *Ptilotus obovatus*. The other three sites consisted of *Eucalyptus camaldulensis* var. *obtusa* and *Casuarina obesa* associated drainage lines corresponding with the previously mapped community E1 (Mattiske 2006).

The remaining two sites were delineated as statistically different from all other sites, consisting primarily of Chenopod species such as *Atriplex* spp. and *Maireana* spp. They were also visually distinct on aerial imagery due to the more yellow as opposed to red soil colour and the sparsity of vegetation.

A summary of the vegetation communities defined in this survey is given in Table 2, and further details, with photographs are given in Appendix J.

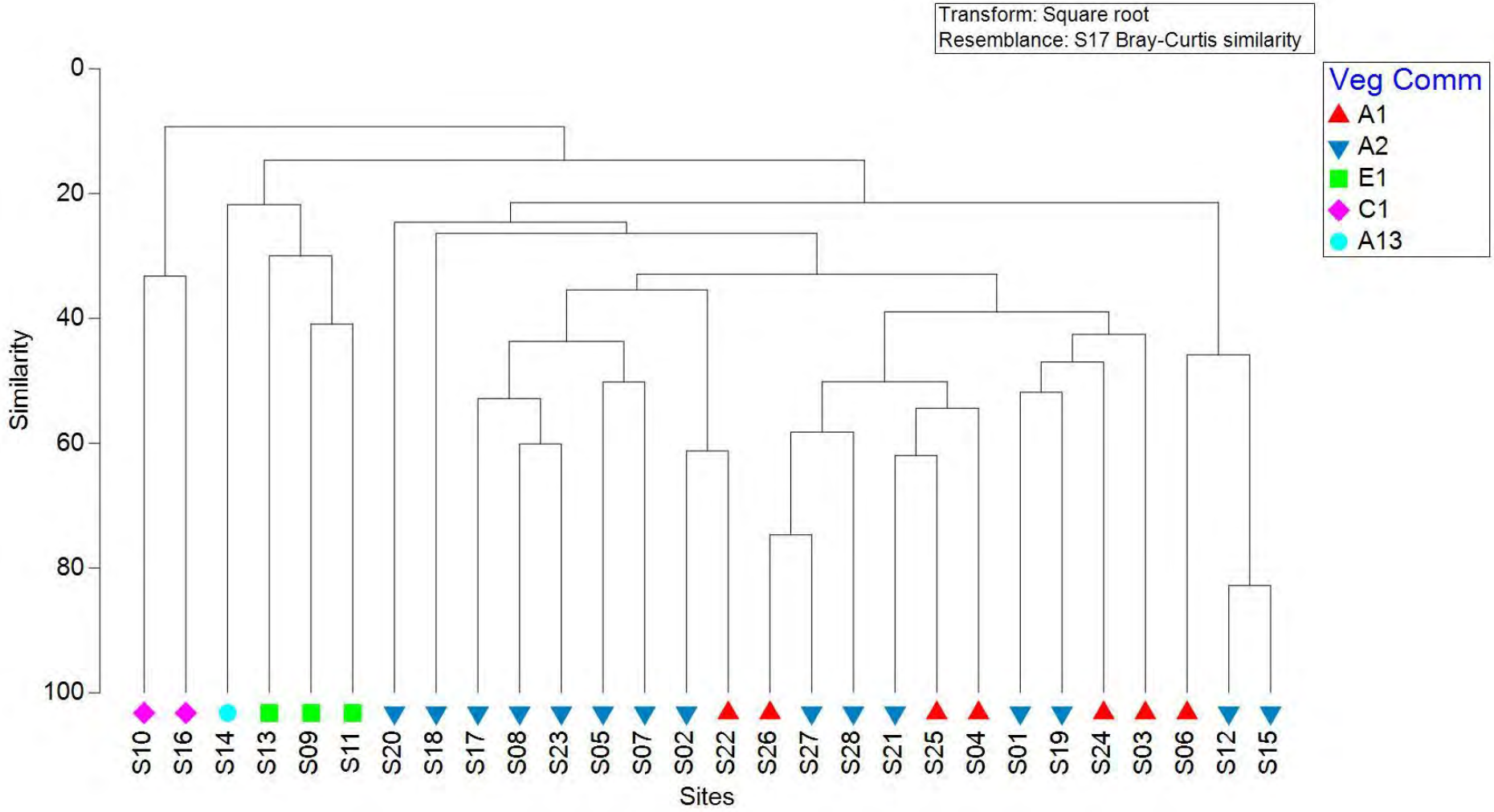

Figure 9: Dendrogram showing results of statistical analysis for vegetation communities in the King of the Hills Power Corridor survey area, March 2020

Table 4: Vegetation communities defined in the King of the Hills Power Corridor survey area, March 2020

Vegetation descriptions for communities A1, A2 and A7 are taken from Mattiske (2006).
Vegetation description for community A13 is taken from Mattiske (2019).
For other communities see Appendix B of the desktop report.

VEGETATION CODE	VEGETATION DESCRIPTION	AREA (ha)	COVER (%)
A1	Low woodland of *Acacia caesaneura* over mid open shrubland of *Acacia quadrimarginea*, *Acacia craspedocarpa* and *Eremophila margarethae* over low isolated clumps of *Ptilotus obovatus*, *Maireana* shrubs and other mixed shrubs on red/orange clay in drainage lines.	397.60	27.50
A2	Low Open Woodland of *Acacia caesaneura, Acacia craspedocarpa - Acacia tetragonophylla* over *Hakea preissii, Eremophila forrestii* subsp. *forrestii, Teucrium teucriiflorum, Ptilotus obovatus, Solanum lasiophyllum* over *Aristida contorta, Enneapogon caerulescens,* annual herbs and grasses on sandy-loams on flats and lower slopes.	941.17	65.05
A7	Low Open Woodland of *Acacia aneura* and other *Acacia* spp. over mixed shrubs over mixed chenopods, annual herbs and grasses on flats and lower slopes with calcrete soils.	16.98	1.17
A13	Low woodland of *Acacia burkittii* over shrubland of *Eremophila margarethae*, *Scaevola spinescens*, *Senna artemisioides* subsp. x *helmsii*, and *Psydrax* spp. mid sparse shrubland on hard red clay flats.	6.00	0.41
C1	Open Chenopod Shrubland with *Atriplex* sp., *Maireana planifolia* and mixed *Sclerolaena* species with occasional emergent *Hakea preissii* and patches of *Acacia aneura* on calcrete soils.	47.30	3.27
E1	Open Woodland of *Eucalyptus camaldulensis* var. *obtusa* with pockets of *Casuarina* and *Acacia caesaneura* over *Grevillea* ?*nematophylla Bossiaea walkeri* over mixed grasses and annual herbs on sandy soils in creeklines.	13.73	0.95
D	Severely disturbed	5.12	0.35
CL	Completely cleared	13.73	1.31

The vegetation mapping for this survey was integrated where possible to previous mapping (Mattiske 2006 and 2019). Mapping for this survey and previous mapping is shown in Figure 10.

3.3.6. Vegetation Condition

The average condition of the vegetation in the survey area is Very Good, with one site rated as Excellent, 27 as Very Good and 7 as Good on the Trudgen (1988) scale (scale categories are Excellent, Very Good, Good, Poor, Degraded or Completely Degraded). Sites were qualified in terms of disturbance by the presence of animal and vehicle tracks and the density of weed species. Field observations suggest that the last fire in the area was more than 20 years ago. Heavy grazing and trampling by cattle were not evident within the survey area; however, there were some signs of their presence. The survey area was substantially disturbed by vehicle tracks as there were a multitude of drill sites and thoroughfares within and intersecting the survey area. This disturbance is likely to assist the spread of invasive plant species. Average vegetation condition based on vegetation community type is displayed in Figure 11.

Source: Image: Landgate, Tracks: MRD, Historical Vegetation Mapping: MCPL

N

0 1.75 km

Scale: 1:100,000
MGA94 (Zone 51)

CAD Ref: a2725_f11_07

Date: May 2020 | Rev: A | A4

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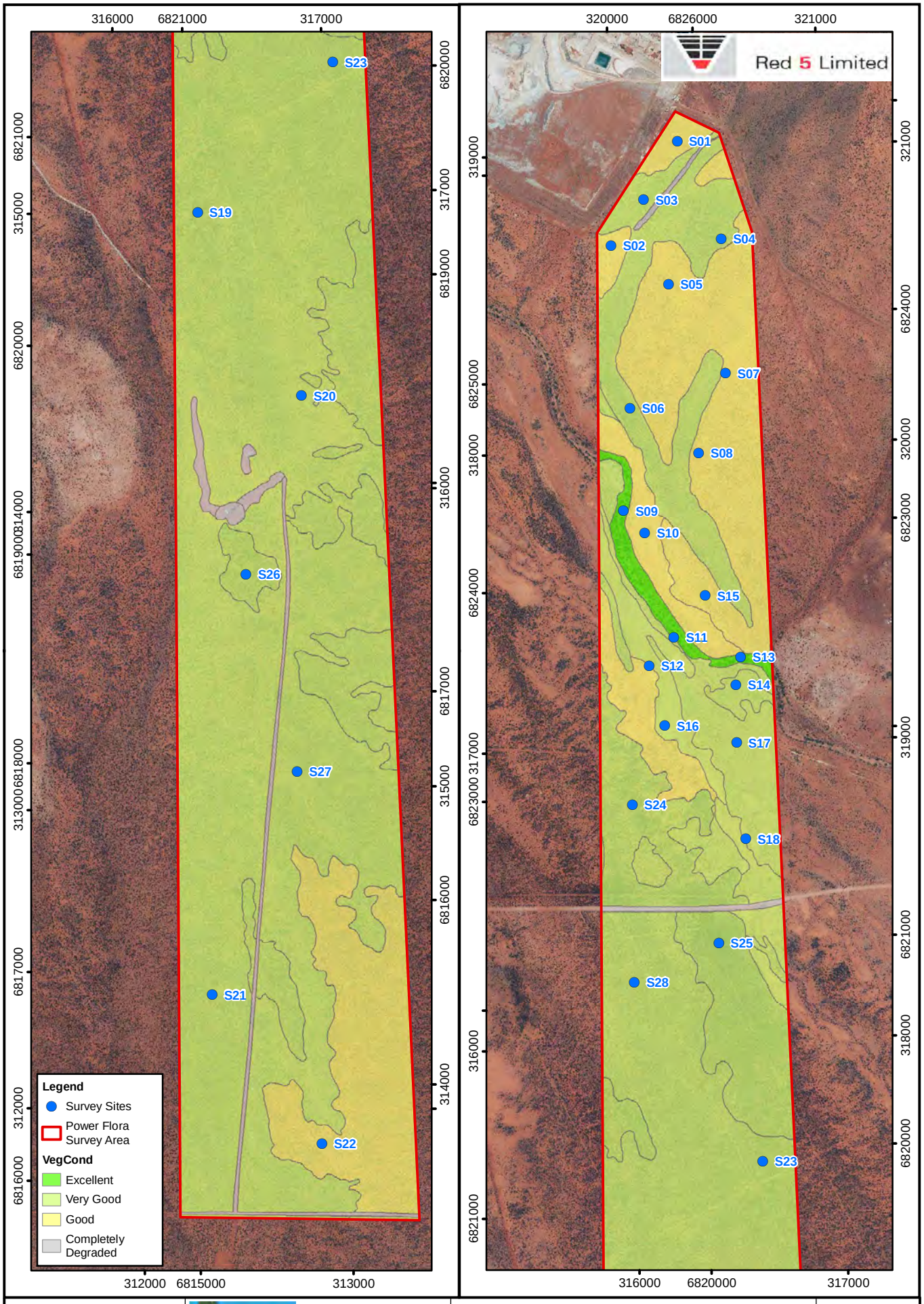
King Of The Hill Project
Vegetation Mapping

Figure: **10**



Source: Image: Landgate (Nov 2014)

0 500 m

Scale: 1:30,000
MGA94 (Zone 51)

CAD Ref: a2725_f11_06

Date: May 2020 | Rev: A | A4

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King Of The Hill Project
Power Corridor
Vegetation Condition

Figure: **11**

4. DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

4.1. Desktop

4.1.1. Flora

A large number of flora species (326 vascular plant taxa) had been recorded or could potentially be found within the proposed survey areas (Appendix C). None of these taxa are listed threatened species at federal or state level, but fourteen are listed as priority species at state level. Four of the priority taxa have a High likelihood of occurring in the two proposed survey areas. These are: *Frankenia georgei* (P1), *Stenanthemum patens* (P1), *Sauropus* sp. Woolgorong (M. Officer s.n. 10/8/94) (P3) and *Grevillea inconspicua* (P4), all of which have been recorded in, on the boundary of, or within 5 km of the proposed survey areas.

4.1.2. Introduced (Weed) Species and Declared Pest (Plant) Organisms

Searches identified 26 introduced plant taxa that could possibly occur in the project area. Five of these, all opuntoid cactus species, are categorised as significant - Weeds of National Significance and Declared Pests, with a Prohibited Organism Control category of 'C3 – Restricted' (Department of Primary Industries and Regional Development, 2020b). Four of these taxa were recorded on the southwestern boundary of the proposed Level 1 survey area, and one 25 km to the south in similar terrain and vegetation. These species were considered likely to be encountered in the proposed survey areas, although any weed control targeting cacti that has occurred in the last 12 years may have reduced this likelihood. Another five of the potential introduced taxa have both High ecological impact and Rapid invasiveness rankings. Given the number of significant and potentially significant weed species that could occur in the proposed survey areas, protocols to ensure weeds are not spread throughout the native vegetation of the area should be developed and followed when carrying out any activities in the KOTH mining area.

4.1.3. Vegetation Communities

The vegetation in and around the KOTH mining area has been described by several authors with slightly different perspectives, including botanical subdistricts, soil-landscape zones, land systems and vegetation communities. In general, the vegetation can be summarised as being dominated by low open *Acacia* spp. woodlands or tall shrublands over *Eremophila* spp. and *Senna* spp. sparse low shrublands over mixed herbs and grasses on red sandy loam on rocky hills or gentler slopes, with chenopod shrublands in low-lying salt-prone areas or *Eucalyptus camaldulensis* in drainage lines. Almost all (>97%) of the pre-European vegetation is still present in the East Murchison IBRA subregion; very little clearing of native vegetation has occurred in the KOTH mining area, except in the active pit area and immediate surrounds and any access or haul roads. 24 vegetation communities have been previously mapped by Mattiske Consulting Pty Ltd (1999, 2003, 2006, 2019; Appendix B; Figures 7.1-7.6) and can be used in any follow up work.

There are no TECs listed at Commonwealth or State level, nor PECs listed at State level, anywhere near the KOTH mining area. The nearest flora-focussed PECs are really restricted vegetation complexes on ranges of banded ironstone formation. Given the geology of the proposed survey area, and its location between known PECs on banded iron formation ranges, it is possible that previously unknown and range-restricted flora species and ecological communities associated with banded iron formations could occur.

Clearing of native vegetation requires a permit under the *EP Act*, unless an exemption applies, as prescribed in either Schedule 6 of the *EP Act* or *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. Several principles apply with regard to the assessment of an application to clear native vegetation by the Department of Water and Environmental Regulation (2019; Appendix A5). Adequate time to apply for and receive a clearing permit for any exploration and ongoing mining activities should be allowed for when planning.

Flora and vegetation surveys should ideally be carried out in the 6-8 weeks after the wet season (i.e. approximately March-June), as this is the primary survey timing recommended for the Eremaean Botanical Province in *Technical guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b). However, eleven of the fourteen potential priority flora species flower between June and December, making identification more difficult. *Technical guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b) does state that supplementary surveys can be conducted in this region after winter rainfall. It should be noted that the low rainfall in the month preceding the proposed survey, with the exception of the January prior, may pose some limitations for the survey, likely reducing the number of annual taxa present and making identification to species level difficult.

4.2. Field survey

4.2.1. Flora

A small number of flora species (67 vascular plant taxa) were recorded within the 38 sites of the 1446.86 ha Power Corridor survey area within the greater KOTH mining area. This was relatively low as a result of the lack of diversity in the dominant Mulga communities. Eight taxa were annual species; while most of the taxa recorded were shrubs or trees.

4.2.2. Threatened and Priority Flora

None of the recorded taxa are listed as threatened species at Commonwealth or State level. One priority flora species pursuant to Part 2, Division 1 and Subdivision 2 of the *BC Act* and as listed by DBCA (2018a, 2018b) was recorded in the Haul road survey area. *Frankenia georgei* (P1) was found during the 2020 survey, the extent of the population was mapped and was found to overlap with part of the middle section of the HRP area. The population stretched across most of the width of the proposed corridor and covered a total area of approximately 0.29 sq. km. The estimated population size was >2000 individual plants. No other threatened or priority flora were found throughout the Power corridor survey area, likely due to the lack of appropriate habitat as many of the potential conservation significant flora are found on salt lakes or rocky slopes of which none were found in the survey area.

4.2.3. Introduced (Weed) Species and Declared Pest (Plant) Organisms

No introduced species were recorded within the survey area; this is probably due to the low rainfall in the nine months leading up to the field survey, given that most of the introduced taxa assessed as having potential to occur in the area in the desktop study were annual species. In the four previous surveys by Mattiske (1999, 2003, 2006, 2019), 16 introduced flora species were recorded, of which 13 are annual herbs and the remainder comprise a short-lived climber, a perennial grass and a perennial herb. If the previous observations can be considered to be representative of the area as a whole, then the climatic conditions preceding this survey (which were not favourable for growth of annual species) could explain why no introduced taxa were recorded in this survey.

4.2.4. Threatened and Priority Ecological Communities

No Threatened Ecological Communities as listed at Commonwealth or State level or Priority Ecological Communities listed at State level were identified as occurring within the Power Corridor survey area. This was consistent with the desktop study, as there were no Threatened or Priority Ecological Communities identified as having the potential to occur within the survey area.

4.2.5. Vegetation Communities

The vegetation in the Power Corridor survey area can be described mostly as *Acacia caesaneura* and/or *Acacia craspedocarpa* low woodlands over *Acacia* spp. and *Eremophila* spp. mid shrublands over *Ptilotus* spp. and *Maireana* spp. low shrublands. The topography was generally flat with occasional drainage lines. Soils comprised red-orange clays, often with quartz pebbles on the surface. These descriptions are largely consistent with the vegetation of the rest of the KOTH mining area and the larger region, as described in the desktop study. However, they tend to correspond best with the Jundee (hardpan plains with variable gravelly mantles and minor sandy banks supporting weakly groved mulga shrublands) or Rainbow (hardpan plains supporting mulga shrublands) Land Systems, rather than the Gundockerta Land System (extensive, gently undulating, calcareous, stony plains, supporting bluebush shrublands) as is currently mapped over the survey area by Tille (2006; desktop report).

In this survey, five vegetation communities were defined and mapped, three of which are *Acacia* woodlands, one a Chenopod shrubland and another a Eucalypt woodland. The two largest groupings of survey sites corresponded with the A2 (*Acacia* low woodland on flats) and A1 (*Acacia* low woodland in drainage lines) communities. Three sites correspond with the previously defined community E1 (Eucalypt woodland in drainage lines). The previously defined community A13 (*Acacia* low woodland on flats) was restricted and had only one site. Community C1 (Chenopod shrubland) was present, following parallel with the watercourse.

4.2.6. Vegetation Condition

The vegetation condition of the Power Corridor Survey area ranged from Good to Very Good and was on average Very Good. They indicated evidence of disturbance and were therefore not considered to be in 'Pristine' or 'Excellent' condition. There did not appear to be signs of recent fire at any point throughout the survey area. Signs of the presence of cattle were observed at several sites; however, evidence of heavy grazing and trampling was not apparent. The survey area was substantially disturbed by vehicle tracks as there were a multitude of drill sites and thoroughfares within and intersecting the survey area.

4.3. Conclusions and Recommendations

Aside from the presence of Priority 1 species *Frankenia georgei*, the results of the field survey of the flora and vegetation in the four survey areas demonstrated no specific botanical values associated with potential clearing for mining. An evaluation of the ecological values of the Power Corridor survey area against the Clearing Principles (Department of Water and Environmental Regulation 2019; Appendix A6) that apply with regard to the assessment of an application to clear native vegetation under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* indicated that the only Principle that could be potentially be breached by clearing the vegetation in the survey area is Principle F (regarding clearing of an environment associated with a watercourse). It is recommended that unnecessary clearing of the vegetation where *Frankenia georgei* is mapped and any adjacent to any watercourses be avoided in order to reduce impacts. Adequate time to apply for and receive a clearing permit for any exploration and ongoing mining activities should be allowed for in future planning.

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6. PERSONNEL

The following Mattiske Consulting Pty Ltd personnel were involved in this project:

NAME	POSITION	PROJECT INVOLVEMENT	FLORA COLLECTION PERMITS
Dr EM Mattiske	Managing Director & Principal Ecologist	Planning, managing, reporting	N/A
L Rowles	Experienced Botanist	Planning, Field work, Plant identification, Data analysis, Reporting	FB62000020-2
K Lambert	Experienced Botanist	Field work, Plant identification, Reporting	FB62000023-2
N Watson	Botanist	Data collation, Reporting	N/A

7. REFERENCES

Barrett, RL & Telford, IRH 2015, *Two new species of Phyllanthus from northern Australia and notes on Phyllanthus, Sauropus and Synostemon (Phyllanthaceae) in Western Australia*, Nuytsia 26, 149-166.

Beard, JS 1974, *Murchison – 1:1,000,000 vegetation series Sheet 6*, University of Western Australia Press, Nedlands, WA.

Beard, JS 1976, *The vegetation of the Murchison Region - 1:1,000,000 vegetation series – explanatory notes to Sheet 6*, University of Western Australia Press, Nedlands, WA.

Beard, JS 1990, *Plant life of Western Australia*, Kangaroo Press, Kenthurst, NSW.

Biodiversity Conservation Act 2016 (WA).

Biosecurity and Agriculture Management Act 2007 (WA).

Biosecurity and Agriculture Management Regulations 2013 (WA).

Bureau of Meteorology 2020, *Climate averages for specific sites*. Available from: http://www.bom.gov.au/climate/data/. 3 March 2020.

Chao, A 2004, 'Species richness estimation', in: *Encyclopaedia of statistical sciences*, eds. N Balakrishnan, CB Read & B Vidakovic, Wiley, New York.

Clarke, KR & Gorley, RN 2015, *PRIMER v7 - User Manual/Tutorial*, PRIMER-e, Devon, United Kingdom.

Colwell, RK 2013, *EstimateS – Statistical estimation of species richness and shared species from samples*, Version 9. Available from: viceroy.colorado.edu/estimates.

Cowan, M 2001, 'Murchison 1 (MUR1 – East Murchsion subregion)'. In: Graham, G 2001b, 'Ord Victoria Plains 2 (OVP2 – South Kimberley Interzone subregion)''. In: McKenzie NL, May, JE & S McKenna (eds), *Bioregional summary of the 2002 biodiversity audit for Western Australia,* pp.466-479, 2002, Western Australian Government Department of Conservation and Land Management, Perth, WA.

Department of Agriculture, Water and the Environment 2020a, Protected Matters Search Tool. Available from: http://www.environment.gov.au/epbc/protected-matters-search-tool. 3 March 2020

Department of Agriculture, Water and the Environment 2020b, Australia's bioregions (IBRA). Available from: http://www.environment.gov.au/topics/land/national-reserve-system/science-maps-and-data/australias-bioregions-ibra 3 March 2020.

Department of Agriculture, Water and the Environment 2020c, EPBC Act list of threatened flora, Commonwealth of Australia. Available from: http://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=flora 3 March 2020.

Department of Agriculture, Water and the Environment 2020d, Weeds of National Significance. Available from: www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/wons.html 3 March 2020.

Department of Agriculture, Water and the Environment 2020e, EPBC Act List of Threatened Ecological Communities. Available from: http://www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl. 3 March 2020.

Department of Agriculture, Water and the Environment 2020f, Directory of important wetlands – search for a nationally important wetland. Available from: http://www.environment.gov.au/cgi-bin/wetlands/search.pl?smode=DOIW 3 March 2020.

Department of Biodiversity, Conservation and Attractions 2018a, *Wildlife conservation (rare flora) notice 2018*, *11 September 2018*, Minister for the Environment under section 2 of the BC Act. Available from: https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants.

Department of Biodiversity, Conservation and Attractions 2018b, *Threatened and Priority Flora List – 05 December 2018*. Available from: https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants.

Department of Biodiversity, Conservation and Attractions 2018c, *List of Threatened Ecological Communities endorsed by the Western Australian Minister for Environment - 28 June 2018.* Available from: https://www.dpaw.wa.gov.au/images/plants-animals/threatened-species/threatened_ecological_communities_endorsed_by_the_minister_for_the_environment_june_2018.pdf.

Department of Biodiversity, Conservation and Attractions 2019a, *Priority Ecological Communities for Western Australia Version 28, 17 January 2019*. Available from: https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Priority%20ecological%20communities%20list%20_Jan%202019.pdf. 3 March 2020

Department of Biodiversity, Conservation and Attractions 2020a, *Threatened flora, fauna and ecological communities database searches*. Available from: https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/database-search-request-information-sheet.pdf, searched 3 March 2020.

Department of Biodiversity, Conservation and Attractions 2020b, *2018 Statewide vegetation statistics incorporating the CAR Reserve Analysis (Full Report) – Current as of March 2019*. Available from: https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics.

Department of Biodiversity, Conservation and Attractions 2020c, *Priority Ecological Communities for Western Australia Version 28, 17 January 2019*. Available from: https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Priority%20ecological%20communities%20list%20_Jan%202019.pdf.

Department of Biodiversity, Conservation and Attractions 2020d, *Conservation codes for Western Australian flora and fauna, 3 January 2019*. Available from: https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Conservation%20code%20definitions.pdf.

Department of Environment and Conservation 2013, *Definitions, categories and criteria for threatened and priority ecological communities*, Government of Western Australia. Available from: http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/wa-s-threatened-ecological-communities. 3 March 2020.

Department of Parks and Wildlife 2007-, *NatureMap - mapping Western Australia's biodiversity*. Available from: http://naturemap.dec.wa.gov.au. 3 March 2020.

Department of Parks and Wildlife 2014, *Ecological impact and invasiveness ratings from the Department of Parks and Wildlife Goldfields region species prioritisation process*. Available from: https://www.dpaw.wa.gov.au/plants-and-animals/plants/weeds/156-how-do-we-manage-weeds. 3 March 2020

Department of Planning, Lands and Heritage 2020, Aboriginal Heritage Inquiry System. Available from: https://maps.daa.wa.gov.au/AHIS/. 3 March 2020.

Department of Primary Industries and Regional Development 2020a, *Western Australian Organism List*. Available from: https://www.agric.wa.gov.au/organisms. 3 March 2020.

Department of Primary Industries and Regional Development 2020b, *Opuntoid cactus – declared pests*. Available from: https://www.agric.wa.gov.au/declared-plants/opuntioid-cacti-declared-pests. 3 March 2020.

Department of Water and Environmental Regulation 2019, *Native vegetation clearing legislation in Western Australia – Environmental Protection Act 1986.* Available from: https://www.der.wa.gov.au/images/documents/your-environment/native-vegetation/Fact_sheets/fs1_legislation.pdf.

Environment Protection and Biodiversity Conservation Act 1999 (Cth)

Environmental Protection (Clearing of Native Vegetation) Regulations 2004

Environmental Protection (Environmentally Sensitive Areas) Notice 2005

Environmental Protection Act 1986 (WA)

Environmental Protection Authority 2016a, *Environmental Factor Guideline: Flora and Vegetation*, Environmental Protection Authority, Western Australia.

Environmental Protection Authority 2016b, *Technical Guidance – Flora and vegetation surveys for environmental impact assessment*, Environmental Protection Authority, Western Australia.

Executive Steering Committee for Australian Vegetation Information (ESCAVI) 2003, *Australian vegetation attribute manual: National vegetation information system, version 6.0*, Department of the Environment and Heritage, Canberra.

Gilligan, SA 1994, 'Climate'. In: Pringle, H.J.R., van Vreeswyk, A.M.E. & Gilligan S.A. (eds) *An inventory and condition survey of rangelands in the north-eastern Goldfields, Western Australia*, Western Australia Department of Agriculture Technical Bulletin no. 87, Perth, WA.

Maslin, BR and Reid, JE 2012, *A taxonomic revision of Mulga (Acacia aneura and its close relatives: Fabaceae) in Western Australia*, Nuytsia, 22(4), 129-267.

Mattiske Consulting Pty Ltd 1999, *Flora and vegetation survey of Sullivan Creek.* Unpublished report prepared for Tarmoola Operations Pty Ltd, July 1999.

Mattiske Consulting Pty Ltd 2003, *Flora and vegetation survey – prospects south of Tarmoola*. Unpublished report prepared for Sons of Gwalia Ltd, July 2003.

Mattiske Consulting Pty Ltd 2006, *Flora and vegetation survey of St. Barbara, Tarmoola mine site*. Unpublished report prepared for St. Barbara Ltd, June 2006.

Mattiske Consulting Pty Ltd 2019, *Assessment of potential flora and vegetation values – King of the Hills mine expansion, Leonora, WA*. Unpublished report prepared for Red 5 Limited, September 2019.

Mattiske Consulting Pty Ltd 2019, *Assessment of flora and vegetation values, King of the Hills Mine Expansion*. Unpublished report prepared for Red 5 Limited, November 2019

PorterGeo n.d., *Tarmoola, Western Australia, WA, Australia*. Available from: http://www.portergeo.com.au/database/mineinfo.asp?mineid=mn727.

Pringle, HJR, Gilligan, SA & van Vreeswyk, AME 1994, 'Land Systems'. In: Pringle, HJR, van Vreeswyk, AME & Gilligan, SA (eds) *An inventory and condition survey of rangelands in the north-eastern Goldfields, Western Australia*. Western Australia Department of Agriculture Technical Bulletin no. 87, Perth, WA.

Red 5 Ltd 2019, *Creating a multi-asset, mid-tier Australian gold producer.* Presented at Diggers & Dealers, 5-7 August 2019. Available from: https://static1.squarespace.com/static/572bf6a61bbee0b55647b98e/t/5d479e106069a60001f9553a/1564974688821/Red+5+Diggers+and+Dealers+presentation+%2805.08.19%29.pdf.

Shepherd, DP, Beeston, GR, & Hopkins AJM 2002, *Native Vegetation in Western Australia – Extent, Type and Status*, Resource Management Technical Report 249, Department of Agriculture, Western Australia, South Perth, WA.

Tille, P 2006, *Soil-landscapes of Western Australia's rangelands and arid interior*, Resource Management Technical Report 313, Department of Agriculture and Food, WA.

Trudgen, ME 1988, *A report on the flora and vegetation of the Port Kennedy area*. Unpublished report prepared for Bowman Bishaw and Associates, West Perth, WA.

Western Australian Herbarium 1998-, *FloraBase - the Western Australian Flora*. Available from: https://florabase.dpaw.wa.gov.au. 3 March 2020.

APPENDIX A1: THREATENED AND PRIORITY FLORA DEFINITIONS

Under section 179 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), threatened flora are categorised as extinct, extinct in the wild, critically endangered, endangered, vulnerable and conservation dependent (Table A1.1).

Table A1.1 Federal definition of threatened flora species

Note: Adapted from section 179 of the EPBC Act.

CODE	CATEGORY	DEFINITION
Ex	Extinct	Species which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
ExW	Extinct in the Wild	Species which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	Critically Endangered	Species which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	Endangered	Species which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.
V	Vulnerable	Species which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	Conservation Dependent	Species which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

The *Biodiversity Conservation Act 2016* (BC Act) provides for (amongst other things) the protection of flora that is facing an extremely high risk of extinction in the wild in the immediate, near or medium-term future in Western Australia under Part 10 (Division 2).

Threatened flora are listed in the *Wildlife Conservation (Rare Flora) Notice 2018* (under Part 2, Division 1, Subdivision 2 of the BC Act; Department of Biodiversity, Conservation and Attractions (DBCA) 2018a) and are categorised under Schedules 1-3. A flora species is defined as threatened if it is facing an extremely high risk of extinction in the wild in the immediate, near or medium-term future, pursuant to sections 20, 21 and 22 of the BC Act (DBCA 2019c). Threatened species are categorised as critically endangered, endangered, and vulnerable (Table A1.2).

Table A1.2 State definition of threatened flora species

Note: Adapted from DBCA (2019c).

CODE	CATEGORY	DEFINITION
CR	Critically endangered	Species considered to be facing an extremely high risk of becoming extinct in the wild (listed under Schedule 1 of the *Wildlife Conservation (Rare Flora) Notice 2018*).
EN	Endangered	Species considered to be facing a very high risk of becoming extinct in the wild (listed under Schedule 2 of the *Wildlife Conservation (Rare Flora) Notice 2018*).
VU	Vulnerable	Species considered to be facing a high risk of becoming extinct in the wild (listed under Schedule 3 of the *Wildlife Conservation (Rare Flora) Notice 2018*).

Priority flora species are defined as "possibly threatened species that do not meet the survey criteria, or are otherwise data deficient" or species that are "adequately known, are rare but not threatened, meet criteria for near threatened or have recently been removed from the threatened species list" for other than taxonomic reasons" (DBCA 2019c). Priority species are not afforded the same level of protection under state or federal legislation as the listed Threatened species, however are considered significant under the Environmental Protection Authority's *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority 2016a). The Department of Biodiversity, Conservation and Attractions categorises priority flora into four categories: Priority 1; Priority 2, Priority 3 and Priority 4 (Table A1.3).

Table A1.3: State definition of priority flora species

Note: Adapted from DBCA (2019c).

CODE	CATEGORY	DEFINITION
P1	Priority 1: Poorly-known species	Known from one or a few locations (< 5) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation; or are otherwise under threat of habitat destruction or degradation. In urgent need of further survey.
P2	Priority 2: Poorly-known species	Known from one or a few locations (< 5). Some occurrences are on lands managed primarily for nature conservation. In urgent need of further survey.
P3	Priority 3: Poorly-known species	Known from several locations and the species does not appear to be under imminent threat; or from few but widespread locations with either a large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. In need of further survey.
P4	Priority 4: Rare, Near Threatened, and other species in need of monitoring	a) Rare - Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands. b) Near Threatened - Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. c) Other - Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

APPENDIX A2: THREATENED AND PRIORITY ECOLOGICAL COMMUNITY DEFINITIONS

Under section 181 of the *EPBC Act*, threatened ecological communities are categorised as critically endangered, endangered and vulnerable (Table A2.1).

Table A2.1 Federal definition of threatened ecological communities

Note: Adapted from section 181 and section 182 of the *EPBC Act*.

CATEGORY	DEFINITION
Critically Endangered	If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
Vulnerable	If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

Threatened ecological communities are listed in the *List of Threatened Ecological Communities endorsed by the Western Australian Minister for Environment (28 June 2018)* (under Part 2, Division 2, Subdivision 1 of the BC Act; DBCA 2018c). An ecological community is defined as threatened if it is facing an extremely high risk of collapse in the immediate, near or medium-term future, pursuant to sections 28, 29 and 30 of the BC Act. Threatened ecological communities are categorised as critically endangered, endangered, and vulnerable (Table A2.2).

Currently there is no Western Australian legislation covering the conservation of state listed threatened ecological communities (TECs), however, a non-statutory process is in place, whereby the DBCA (and former equivalent departments) have been identifying and informally listing TECs since 1994. Some of these threatened ecological communities are also endorsed by the Federal Minister as threatened, and some of these are also listed under the *EPBC Act* and therefore afforded legislative protection at the Commonwealth level.

Table A2.2 State definition of threatened ecological communities

Note: Adapted from Department of Environment and Conservation (2013).

CODE	CATEGORY	DEFINITION
CR	Critically Endangered	An ecological community will be listed as CR when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future, meeting any one or more of the following criteria: 1. The estimated geographic range and distribution has been reduced by at least 90% and is either continuing to decline with total destruction imminent, or is unlikely to be substantially rehabilitated in the immediate future due to modification; 2. The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; or 3. The ecological community is highly modified with potential of being rehabilitated in the immediate future.
EN	Endangered	An ecological community will be listed as EN when it has been adequately surveyed and is not CR, but is facing a very high risk of total destruction in the near future. The ecological community must meet any one or more of the following criteria: 1. The estimated geographic range and distribution has been reduced by at least 70% and is either continuing to decline with total destruction imminent in the short term future, or is unlikely to be substantially rehabilitated in the short term future due to modification; 2. The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; or 3. The ecological community is highly modified with potential of being rehabilitated in the short term future.
VU	Vulnerable	An ecological community will be listed as VU when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet any one or more of the following criteria: 1. The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated; 2. The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution; or 3. The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.

Priority ecological communities are defined as possible threatened ecological communities that do not meet the stringent survey criteria for the assessment of threatened ecological communities, and are listed by the DBCA (2019a) in the *Priority Ecological Communities for Western Australia – Version 28 (17 January 2019)*. Similarly to priority flora, priority ecological communities are not afforded legislative protection, however are considered significant under the Environmental Protection Authority's (2016a) *Environmental Factor Guideline: Flora and Vegetation*. The Department of Biodiversity, Conservation and Attractions categorises priority ecological communities into five categories: Priority 1; Priority 2, Priority 3, Priority 4 and Priority 5 (Table A2.3).

Table A2.3 State definition of priority ecological communities

Note: Adapted from Department of Environment and Conservation (2013).

CODE	CATEGORY	DEFINITION
P1	Priority 1 (Poorly known ecological communities)	Ecological communities that are known from very few, restricted occurrences (generally ≤ 5 occurrences or a total area of ≤ 100 ha). Most of these occurrences are not actively managed for conservation (e.g. located within agricultural or pastoral lands, urban areas, or active mineral leases) and for which immediate threats exist.
P2	Priority 2 (Poorly known ecological communities)	Communities that are known from few small occurrences (generally ≤ 10 occurrences or a total area of ≤ 200 ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation.
P3	Priority 3 (Poorly known ecological communities)	1. Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation; 2. Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat; or 3. Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing and inappropriate fire regimes.
P4	Priority 4 (Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring)	1. Rare – Communities known from few occurrences that are considered to have been adequately surveyed, sufficient knowledge is available, and are considered not to be currently threatened. 2. Near Threatened – Communities considered to have been adequately surveyed and do not qualify for Conservation Dependent, but are close to qualifying for Vulnerable. 3. Communities that have been removed from the list of threatened communities during the past five years.
P5	Priority 5 (Conservation Dependent ecological communities)	Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

APPENDIX A3: CATEGORIES AND CONTROL MEASURES OF DECLARED PEST (PLANT) ORGANISMS IN WESTERN AUSTRALIA

Section 22 of Western Australia's *Biosecurity and Agriculture Management Act 2007* (BAM Act) makes provision for a plant taxon to be listed as a declared pest organism in respect to parts of, or the entire State. According to the BAM Act, a declared pest is defined as a prohibited organism (section 12), or an organism for which a declaration under section 22 (2) of the Act is in force.

Under the *Biosecurity and Agriculture Management Regulations 2013* (WA), declared pest plants are placed in one of three control categories, C1 (exclusion), C2 (eradication) or C3 (management), which determines the measures of control which apply to the declared pest (Table A4.1). The current listing of declared pest organisms and their control category is through the Western Australian Organism List (Department of Primary Industries and Regional Development 2019).

Table A3.1 Categories and control measures of declared pest (plant) organisms

Note: Adapted from *Biosecurity and Agriculture Management Regulations 2013*.

CONTROL CATEGORY	CONTROL MEASURES
C1 (Exclusion) '(a) Category 1 (C1) — Exclusion: if in the opinion of the Minister introduction of the declared pest into an area or part of an area for which it is declared should be prevented.' Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.	In relation to a category 1 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C2 (Eradication) '(b) Category 2 (C2) — Eradication: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is feasible.' Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.	In relation to a category 2 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C3 (Management) '(c) Category 3 (C3) — Management: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is not feasible but that it is necessary to: (i) alleviate the harmful impact of the declared pest in the area; or (ii) reduce the number or distribution of the declared pest in the area; or (iii) prevent or contain the spread of the declared pest in the area.' Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.	In relation to a category 3 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to: (a) alleviate the harmful impact of the declared pest in the area for which it is declared; or (b) reduce the number or distribution of the declared pest in the area for which it is declared; or (c) prevent or contain the spread of the declared pest in the area for which it is declared.

APPENDIX A4: OTHER DEFINITIONS

Environmentally sensitive areas

Environmentally sensitive areas are declared by the State Minister under section 51B of the *Environmental Protection Act 1986* (EP Act) and are listed in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*, gazetted 8 April 2005. Specific environmentally sensitive areas relevant to this report include: a defined wetland and the area within 50 metres of the wetland; the area covered by vegetation within 50 metres of rare flora; the area covered by a threatened ecological community; a Bush Forever site – further areas and information are described in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*.

Conservation significant flora

Under the *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority 2016a), flora may be considered significant for a range of reasons, including, but not limited to the following:

- being identified as threatened or priority species;
- locally endemic or associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- new species or anomalous features that indicate a potential new species;
- representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- unusual species, including restricted subspecies, varieties or naturally occurring hybrids; or
- relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

Conservation significant vegetation

Under the *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority 2016a), vegetation may be considered significant for a range of reasons, including, but not limited to the following:

- being identified as threatened or priority ecological communities;
- restricted distribution;
- degree of historical impact from threatening processes;
- a role as a refuge; or
- providing an important function required to maintain ecological integrity of a significant ecosystem.

APPENDIX A5: NVIS STRUCTURAL FORMATION TERMINOLOGY

Note: Adapted from Environmental Steering Committee for Australian Vegetation Information (2003).

COVER CHARACTERISTICS							
Foliage cover*	70-100	30-70	10-30	<10	≈0	0-5	unknown
Crown cover**	>80	50-80	20-50	0.25-20	<0.25	0-5	unknown
% cover***	>80	50-80	20-50	0.25-20	<0.25	0-5	unknown
Cover code	d	c	i	r	bi	bc	unknown

GROWTH FORM	HEIGHT RANGES (m)	STRUCTURAL FORMATION CLASSES						
tree, palm	<10, 10-30, >30	closed forest	open forest	woodland	open woodland	isolated trees	isolated clumps of trees	trees
tree mallee	<3, <10, 10-30	closed mallee forest	open mallee forest	mallee woodland	open mallee woodland	isolated mallee trees	isolated clumps of mallee trees	mallee trees
shrub, cycad, grass-tree, tree-fern	<1, 1-2, >2	closed shrubland	shrubland	open shrubland	sparse shrubland	isolated shrubs	isolated clumps of shrubs	shrubs
mallee shrub	<3, <10, 10-30	closed mallee shrubland	mallee shrubland	open mallee shrubland	sparse mallee shrubland	isolated mallee shrubs	isolated clumps of mallee shrubs	mallee shrubs
heath shrub	<1, 1-2, >2	closed heathland	heathland	open heathland	sparse heathland	isolated heath shrubs	isolated clumps of heath shrubs	heath shrubs
chenopod shrub	<1, 1-2, >2	closed chenopod shrubland	chenopod shrubland	open chenopod shrubland	sparse chenopod shrubland	isolated chenopod shrubs	isolated clumps of chenopod shrubs	chenopod shrubs
samphire shrub	<0.5, >0.5	closed samphire shrubland	samphire shrubland	open samphire shrubland	spare samphire shrubland	isolated samphire shrubs	isolated clumps of samphire shrubs	samphire shrubs
hummock grass	<2, >2	closed hummock grassland	hummock grassland	open hummock grassland	sparse hummock grassland	isolated hummock grasses	isolated clumps of hummock grasses	hummock grasses
tussock grass	<0.5, >0.5	closed tussock grassland	tussock grassland	open tussock grassland	sparse tussock grassland	isolated tussock grassland	isolated clumps of tussock grasses	tussock grasses
other grass	<0.5, >0.5	closed grassland	grassland	open grassland	sparse grassland	isolated grasses	isolated clumps of grasses	other grasses
sedge	<0.5, >0.5	closed sedgeland	sedgeland	open sedgeland	sparse sedgeland	isolated sedges	isolated clumps of sedges	sedges
rush	<0.5, >0.5	closed rushland	rushland	open rushland	sparse rushland	isolated rushes	isolated clumps of rushes	rushes
forb	<0.5, >0.5	closed forbland	forbland	open forbland	sparse forbland	isolated forbs	isolated clumps of forbs	forbs
fern	<1, 1-2, >2	closed fernland	fernland	open fernland	sparse fernland	isolated ferns	isolated clumps of ferns	ferns
bryophyte	<0.5	closed bryophytelan d	bryophytelan d	open bryophytela nd	sparse bryophyteland	isolated bryophytes	isolated clumps of bryophytes	bryophytes
lichen	<0.5	closed lichenland	lichenland	open lichenland	sparse lichenland	isolated lichens	isolated clumps of lichens	lichens
vine	<10, 10-30, >30	closed vineland	vineland	open vineland	sparse vineland	isolated vines	isolated clumps of vines	vines
aquatic	0-0.5, <1	closed aquatic bed	aquatic bed	open aquatic bed	sparse aquatics	isolated aquatics	isolated clumps of aquatics	aquatics
seagrass	0-0.5, <1	closed seagrass bed	seagrass bed	open seagrass bed	sparse seagrasses	isolated seagrasses	isolated clumps of seagrasses	seagrasses

APPENDIX A6: CLEARING PRINCIPLES

Note: Adapted from Schedule 5 of the EP Act (Department of Water and Regulation 2019).

PRINCIPLE	ASSESSMENT
A	*Native vegetation should not be cleared if it comprises a high level of biological diversity.*
B	*Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.*
C	*Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.*
D	*Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of a threatened ecological community.*
E	*Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.*
F	*Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.*
G	*Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.*
H	*Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.*
I	*Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface and underground water.*
J	*Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.*

APPENDIX B: LOCATION OF SURVEY QUADRATS IN THE KING OF THE HILLS POWER CORRIDOR SURVEY AREA, MARCH 2020

Datum GDA94, UTM Zone 51J

SITE NAME	EASTING (m)	NORTHING (m)
S01	319970	6825528
S02	319303	6825252
S03	319613	6825360
S04	319854	6824912
S05	319448	6824871
S06	318848	6824406
S07	319424	6824253
S08	319025	6823960
S09	318473	6823936
S10	318501	6823758
S11	318290	6823161
S12	318075	6823108
S13	318544	6822844
S14	318428	6822724
S15	318579	6823255
S16	317949	6822767
S17	318236	6822445
S18	317957	6821953
S19	315805	6820083
S20	315687	6818856
S21	313249	6816284
S22	313276	6815202
S23	316957	6820350
S24	317529	6822498
S25	317479	6821545
S26	314822	6818185
S27	314404	6817068
S28	316943	6821640

APPENDIX C: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR IN THE KING OF THE HILLS MINING AREA

* denotes introduced species (WAH 1998-); SCC is State Conservation Code (see Appendix A for definitions); MCPL (1999, 2003 NatureMap (Department of Parks and Wildlife 2007-), DBCA (TPFL and WAH databases)(2020a) and EPBC (DAWE 2020a) are

FAMILY	SPECIES	SCC	EPBC	DBCA	Nature Map	MCPL 1999	MCPL 2003	MCPL 2006	MCPL 2019
AIZOACEAE	*Gunniopsis quadrifida*				x				
AMARANTHACEAE	*Amaranthus mitchellii*							x	
	Gomphrena sp. Belele (D.W. Goodall 3215)				x				
	Ptilotus aervoides						x		
	Ptilotus calostachyus							x	
	Ptilotus exaltatus					x	x	x	x
	Ptilotus gaudichaudii						x	x	
	Ptilotus helipteroides				x		x	x	
	Ptilotus obovatus				x	x	x	x	x
	Ptilotus polystachyus							x	
	Ptilotus roei				x			x	
	Ptilotus schwartzii						x		
ANACARDIACEAE	* *Schinus molle*							x	
APOCYNACEAE	*Marsdenia australis*					x	x	x	x
ARALIACEAE	*Trachymene ornata*				x				
ASPARAGACEAE	* *Agave americana*				x				
ASTERACEAE	*Asteridea athrixioides*				x				
	Brachyscome sp.					x			x
	* *Centaurea melitensis*						x		
	Cephalipterum drummondii				x				
	Chrysocephalum puteale							x	
	Cratystylis subspinescens					x			x
	* *Flaveria trinervia*							x	
	Gnephosis arachnoidea				x			x	
	Gnephosis macrocephala				x				
	Gnephosis tenuissima				x				
	Helipterum craspedioides						x		
	* *Hypochaeris glabra*					x			x
	* *Hypochaeris radicata*							x	
	Olearia stuartii				x			x	
	Pluchea dentex				x			x	
	Podolepis capillaris				x	x		x	x
	Podolepis gardneri				x				
	Podolepis kendallii				x			x	
	Podolepis lessonii						x		
	Rhodanthe battii						x		
	Rhodanthe charsleyae				x	x			x
	Rhodanthe humboldtiana				x				
	Rhodanthe manglesii				x				
	Rhodanthe sp.					x			x
	Schoenia cassiniana					x			x
	Senecio glossanthus					x			x
	Senecio magnificus							x	

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NatureMap (Department of Parks and Wildlife 2007-), DBCA (TPFL and WAH databases)(2020a) and EPBC (DAWE 2020a) are

FAMILY	SPECIES	SCC	EPBC	DBCA	Nature Map	MCPL 1999	MCPL 2003	MCPL 2006	MCPL 2019
ASTERACEAE	*Senecio* sp.					x			x
(continued)	* *Sonchus oleraceus*				x	x		x	x
	Trichanthodium skirrophorum				x				
	Triptilodiscus pygmaeus				x				
	Vittadinia sulcata				x			x	
	Vittadinia sp.					x			x
	Asteraceae sp.					x		x	x
BORAGINACEAE	*Heliotropium inexplicitum*							x	
BRASSICACEAE	* *Carrichtera annua*		x					x	
	Lepidium oxytrichum				x				
CACTACEAE	* *Cylindropuntia fulgida* var. *mamillata*		x		x				
	* *Cylindropuntia imbricata*		x		x				
	* *Opuntia elata*		x		x				
	* *Opuntia stricta*		x					x	
CAMPANULACEAE	*Isotoma petraea*							x	
	Wahlenbergia sp.				x				
CASUARINACEAE	*Casuarina obesa*				x				
	Casuarina pauper					x		x	x
CELASTRACEAE	*Stackhousia* sp.						x		
CHENOPODIACEAE	*Atriplex acutibractea* subsp. *karoniensis*					x			x
	Atriplex amnicola							x	
	Atriplex bunburyana				x			x	
	Atriplex lindleyi subsp. i*nflata*					x			x
	Atriplex nummularia							x	
	Atriplex nummularia subsp. *spathulata*				x				
	Atriplex semilunaris				x			x	
	Atriplex vesicaria							x	
	* *Chenopodium murale*				x		x		
	Dissocarpus paradoxus							x	
	Dysphania kalpari				x			x	
	Dysphania melanocarpa							x	
	Dysphania rhadinostachya							x	
	Enchylaena tomentosa				x				
	Enchylaena tomentosa var. *tomentosa*				x		x	x	
	Maireana appressa							x	
	Maireana carnosa							x	
	Maireana convexa							x	
	Maireana georgei				x	x		x	x
	Maireana glomerifolia							x	
	Maireana lobiflora					x			x
	Maireana planifolia					x		x	x
	Maireana pyramidata				x	x		x	x

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NatureMap (Department of Parks and Wildlife 2007-), DBCA (TPFL and WAH databases)(2020a) and EPBC (DAWE 2020a) are

FAMILY	SPECIES	SCC	EPBC	DBCA	Nature Map	MCPL 1999	MCPL 2003	MCPL 2006	MCPL 2019
CHENOPODIACEAE (continued)	*Maireana radiata*							x	
	Maireana sedifolia							x	
	Maireana suaedifolia							x	
	Maireana tomentosa subsp. *tomentosa*				x	x			x
	Maireana trichoptera				x				
	Maireana triptera				x	x		x	x
	Maireana villosa							x	
	Rhagodia drummondii						x	x	
	Rhagodia eremaea							x	
	Salsola australis				x	x	x	x	x
	Sclerolaena cuneata					x		x	x
	Sclerolaena densiflora				x				
	Sclerolaena deserticola				x				
	Sclerolaena diacantha							x	
	Sclerolaena drummondii						x		
	Sclerolaena eriacantha							x	
	Sclerolaena eurotioides					x			x
	Sclerolaena fusiformis					x			x
	Sclerolaena lanicuspis							x	
	Sclerolaena patenticuspis							x	
	Tecticornia calyptrata							x	
	Tecticornia indica subsp. *bidens*							x	
	Threlkeldia diffusa				x				
CONVOLVULACEAE	*Convolvulus remotus*				x			x	
	* *Cuscuta epithymum*							x	
	* *Cuscuta planiflora*				x				
	Duperreya sericea					x	x	x	x
CUCURBITACEAE	* *Citrullus amarus*						x		
	* *Cucumis myriocarpus*						x	x	
CYPERACEAE	*Bulbostylis barbata*							x	
	Bulbostylis turbinata							x	
	Fimbristylis depauperata							x	
EUPHORBIACEAE	*Euphorbia australis*							x	
	Euphorbia australis var. *subtomentosa*				x				
	Euphorbia boophthona							x	
FABACEAE	*Acacia aneura*				x	x	x	x	x
	Acacia aptaneura				x				
	Acacia ayersiana					x		x	x
	Acacia burkittii				x	x	x		x
	Acacia caesaneura				x				
	Acacia citrinoviridis							x	
	Acacia craspedocarpa				x	x	x	x	x
	Acacia effusifolia				x				
	Acacia fuscaneura							x	

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NatureMap (Department of Parks and Wildlife 2007-), DBCA (TPFL and WAH databases)(2020a) and EPBC (DAWE 2020a) are

FAMILY	SPECIES	SCC	EPBC	DBCA	Nature Map	MCPL 1999	MCPL 2003	MCPL 2006	MCPL 2019
FABACEAE	*Acacia incurvaneura*				x			x	
(continued)	*Acacia kalgoorliensis*					x			x
	Acacia ligulata				x				
	Acacia macraneura				x				
	Acacia nigripilosa subsp. *nigripilosa*							x	
	Acacia oswaldii							x	
	Acacia paraneura				x			x	
	Acacia pteraneura				x			x	
	Acacia quadrimarginea				x			x	
	Acacia ramulosa				x	x			x
	Acacia ramulosa var. *linophylla*							x	
	Acacia ramulosa var. *ramulosa*				x		x	x	
	Acacia resinimarginea					x			x
	Acacia rhodophloia							x	
	Acacia ?salicina							x	
	Acacia sibirica							x	
	Acacia tetragonophylla				x	x	x	x	x
	Acacia victoriae subsp. *victoriae*				x				
	Acacia xiphophylla							x	
	Bossiaea walkeri				x	x		x	x
	Glycine canescens							x	
	Indigofera georgei				x	x		x	x
	Senna artemisioides subsp. *filifolia*				x	x	x	x	x
	Senna artemisioides subsp. *helmsii*				x		x	x	
	Senna artemisioides subsp. *oligophylla*				x				
	Senna artemisioides subsp. *x artemisioides*				x	x		x	x
	Senna artemisioides subsp. *x sturtii*					x		x	x
	Senna cardiosperma							x	
	Senna charlesiana							x	
	Senna glaucifolia							x	
	Senna glutinosa subsp. *chatelainiana*						x	x	
	Senna glutinosa subsp. *x luerssenii*							x	
	Senna manicula				x			x	
	Senna pleurocarpa var. *angustifolia*					x			x
	Swainsona beasleyana				x				
	Swainsona formosa				x				
	Swainsona kingii							x	
	Swainsona sp.						x		
FRANKENIACEAE	*Frankenia georgei*	P1			x			x	
	Frankenia laxiflora					x			x
	Frankenia pauciflora var. *pauciflora*				x			x	
GERANIACEAE	* *Erodium aureum*							x	
	Erodium cygnorum				x				
GOODENIACEAE	*Scaevola spinescens*				x	x	x	x	x
	Velleia rosea							x	

APPENDIX C: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR IN THE KING OF THE HILLS MINING AREA

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FAMILY	SPECIES	SCC	EPBC	DBCA	Nature Map	MCPL 1999	MCPL 2003	MCPL 2006	MCPL 2019
HALORAGACEAE	*Haloragis odontocarpa* forma *rugosa*					x			x
HEMEROCALLIDACEAE	*Dianella revoluta* var. *divaricata*					x	x	x	x
	Prostanthera albiflora							x	
LAMIACEAE	*Lachnostachys eriobotrya*				x				
	Prostanthera althoferi subsp. *althoferi*				x				
	Teucrium teucriiflorum				x		x	x	
LORANTHACEAE	*Amyema fitzgeraldii*				x				
	Amyema preissii					x			x
	Lysiana casuarinae				x			x	
	Lysiana murrayi						x		
MALVACEAE	*Abutilon* aff. *fraseri*							x	
	Abutilon cryptopetalum							x	
	Abutilon oxycarpum					x	x	x	x
	Brachychiton gregorii						x	x	
	Hibiscus burtonii							x	
	Hibiscus coatesii							x	
	Hibiscus sp. Gardneri (A.L. Payne PRP 1435)				x				
	Lawrencia squamata				x				
	Seringia velutina							x	
	Sida calyxhymenia					x		x	x
	Sida excedentifolia							x	
	Sida sp. dark green fruits (S. van Leeuwen 2260)				x			x	
	Sida sp.						x		
MONTIACEAE	*Calandrinia pleiopetala*				x				
	Calandrinia quartzitica	P1			x				
	Calandrinia sp.						x	x	
MYRTACEAE	*Calytrix birdii*							x	
	Eucalyptus camaldulensis					x		x	x
	Eucalyptus camaldulensis subsp. *arida*				x				
	Eucalyptus camaldulensis subsp. *obtusa*				x			x	
	Eucalyptus lucasii				x				
	Melaleuca interioris				x				
NYCTAGINACEAE	*Boerhavia coccinea*							x	
OXALIDACEAE	*Oxalis perennans*							x	
PHYLLANTHACEAE	*Sauropus* sp. Woolgorong (M. Officer s.n. 10	P3						x	
PITTOSPORACEAE	*Pittosporum angustifolium*					x	x	x	x
PLANTAGINACEAE	*Plantago debilis*						x		

APPENDIX C: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR IN THE KING OF THE HILLS MINING AREA

* denotes introduced species (WAH 1998-); SCC is State Conservation Code (see Appendix A for definitions); MCPL (1999, 2003 NatureMap (Department of Parks and Wildlife 2007-), DBCA (TPFL and WAH databases)(2020a) and EPBC (DAWE 2020a) are

FAMILY	SPECIES	SCC	EPBC	DBCA	Nature Map	MCPL 1999	MCPL 2003	MCPL 2006	MCPL 2019
POACEAE	*Aristida contorta*				x	x	x	x	x
	Aristida holathera var. *holathera*							x	
	Austrostipa elegantissima						x		
	Austrostipa nitida					x		x	x
	Austrostipa scabra				x	x			x
	Austrostipa sp.					x			x
	* *Cenchrus ciliaris*		x		x			x	
	* *Cenchrus setiger*							x	
	Cymbopogon ambiguus					x		x	x
	Cymbopogon obtectus				x		x	x	
	* *Cynodon dactylon*							x	
	Dactyloctenium radulans							x	
	Dichanthium sericeum subsp. *humilius*							x	
	Digitaria ammophila				x				
	Enneapogon caerulescens				x	x	x	x	x
	Enneapogon cylindricus				x				
	Enneapogon polyphyllus				x			x	
	Eragrostis cumingii							x	
	Eragrostis dielsii					x			x
	Eragrostis eriopoda						x	x	
	Eragrostis falcata				x				
	Eragrostis kennedyae					x			x
	Eragrostis lanipes				x				
	Eragrostis leptocarpa							x	
	Eragrostis setifolia				x				
	Eragrostis sp.						x		
	Eriachne flaccida				x			x	
	Eriachne helmsii							x	
	Eriachne pulchella								
	Eriachne pulchella subsp. *dominii*							x	
	Eriachne pulchella subsp. *pulchella*				x				
	Iseilema eremaeum							x	
	Iseilema fragile							x	
	Monachather paradoxus				x			x	
	Paspalidium basicladum				x			x	
	* *Polypogon monspeliensis*				x				
	* *Rostraria cristata*				x				
	Rytidosperma caespitosum				x				
	Themeda triandra							x	
	Tragus australianus				x				
	Tripogonella loliiformis				x				
POLYGONACEAE	*Duma florulenta*				x				
	* *Rumex vesicarius*					x	x	x	x
PORTULACACEAE	*Portulaca oleracea*							x	
PRIMULACEAE	* *Lysimachia arvensis*					x		x	x
	Samolus repens				x				

APPENDIX C: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR IN THE KING OF THE HILLS MINING AREA

* denotes introduced species (WAH 1998-); SCC is State Conservation Code (see Appendix A for definitions); MCPL (1999, 2003
NatureMap (Department of Parks and Wildlife 2007-), DBCA (TPFL and WAH databases)(2020a) and EPBC (DAWE 2020a) are

FAMILY	SPECIES	SCC	EPBC	DBCA	Nature Map	MCPL 1999	MCPL 2003	MCPL 2006	MCPL 2019
PROTEACEAE	*Grevillea acuaria*				x				
	Grevillea berryana					x		x	x
	Grevillea extorris				x				
	Grevillea inconspicua	P4			x				
	Grevillea nematophylla subsp. *supraplana*				x			x	
	Grevillea sarissa				x			x	
	Grevillea sarissa subsp. *sarissa*				x				
	Hakea lorea subsp. *lorea*				x	x			x
	Hakea preissii					x	x	x	x
	Hakea recurva subsp. *recurva*					x		x	x
PTERIDACEAE	*Cheilanthes austrotenuifolia*							x	
	Cheilanthes lasiophylla				x				
	Cheilanthes sieberi							x	
	Cheilanthes sp.						x		
RHAMNACEAE	*Stenanthemum patens*	P1			x			x	
RUBIACEAE	*Psydrax latifolia*								
	Psydrax rigidula				x				
	Psydrax suaveolens						x	x	
RUTACEAE	*Boronia purdieana* subsp. *purdieana*				x				
SANTALACEAE	*Anthobolus leptomerioides*				x				
	Exocarpos aphyllus				x	x	x	x	x
	Santalum lanceolatum					x		x	x
	Santalum spicatum						x	x	
SAPINDACEAE	*Dodonaea lobulata*							x	
	Dodonaea rigida						x	x	
	Dodonaea viscosa subsp. *mucronata*							x	
SCROPHULARIACEAE	*Eremophila alternifolia*				x			x	
	Eremophila clarkei				x				
	Eremophila eriocalyx				x				
	Eremophila foliosissima				x			x	
	Eremophila forrestii subsp. *forrestii*							x	
	Eremophila galeata				x			x	
	Eremophila georgei				x			x	
	Eremophila gilesii					x			x
	Eremophila gilesii subsp. *variabilis*				x			x	
	Eremophila glabra							x	
	Eremophila glandulifera				x				
	Eremophila granitica				x	x	x	x	x
	Eremophila homoplastica				x				
	Eremophila hygrophana				x				
	Eremophila latrobei					x		x	x
	Eremophila latrobei subsp. *latrobei*				x			x	

APPENDIX C: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR IN THE KING OF THE HILLS MINING AREA

* denotes introduced species (WAH 1998-); SCC is State Conservation Code (see Appendix A for definitions); MCPL (1999, 2003 NatureMap (Department of Parks and Wildlife 2007-), DBCA (TPFL and WAH databases)(2020a) and EPBC (DAWE 2020a) are

FAMILY	SPECIES	SCC	EPBC	DBCA	Nature Map	MCPL 1999	MCPL 2003	MCPL 2006	MCPL 2019
SCROPHULARIACEAE (continued)	*Eremophila longifolia*				x	x			x
	Eremophila maculata							x	
	Eremophila maculata subsp. *brevifolia*					x			x
	Eremophila margarethae				x	x	x	x	x
	Eremophila metallicorum				x			x	
	Eremophila miniata				x			x	
	Eremophila oldfieldii subsp. *angustifolia*				x		x	x	
	Eremophila platycalyx					x	x	x	x
	Eremophila platycalyx subsp. Leonora (J. Mc				x				
	Eremophila ramiflora				x		x		
	Eremophila scoparia						x	x	
	Eremophila serrulata				x		x	x	
	Eremophila youngii subsp. *youngii*				x			x	
	Myoporum montanum							x	
SOLANACEAE	*Nicotiana occidentalis*							x	
	Nicotiana occidentalis subsp. *obliqua*							x	
	Nicotiana rosulata subsp. *rosulata*						x		
	Solanum ferocissimum				x				
	Solanum lasiophyllum				x	x	x	x	x
	Solanum nigrum							x	
	Solanum orbiculatum subsp. *orbiculatum*							x	
	Solanum sp.							x	
STYLIDIACEAE	*Stylidium ?inaequipetalum*							x	
THYMELAEACEAE	*Pimelea microcephala*					x	x	x	x
VIOLACEAE	*Hybanthus floribundus* subsp. *curvifolius*				x				
ZYGOPHYLLACEAE	*Roepera ovata*						x		
	* *Tribulus terrestris*							x	

APPENDIX D: CONSERVATION SIGNIFICANT PLANT SPECIES POTENTIALLY OCCURRING WITHIN THE KING OF THE HILLS MINING AREA

Note: SCC denotes State Conservation Code and FCC denotes Federal Conservation Code (*EPBC Act*) (refer to Appendix A for definitions). IBRA Distribution: COO– Coolgardie; GAS – Gascoyne; GID – Gibson desert; GVD – Great Victoria Desert; LSD – Little Sandy Desert; MUR – Murchison; YAL - Yalgoo. Ranking of Likelihood of occurrence in survey area is on a Low, Medium or High scale (see Section 3.4.1 for ranking criteria). Information from Florabase (WAH 1998-) , DBCA TPFL and WAH databases (DBCA 2020a), Atlas of Living Australia (National Collaborative Research Infrastructure Strategy 2019).

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Calandrinia quartzitica	Montiaceae	P1	x	Description: Semi-erect to erect perennial herb, to 0.5 m Habit: Edge of salt lakes Flower colour: White to mid-pink Flowering period: Mid Sep to mid Oct, likely longer Soils: Clayey sand, silty sand or loam strewn with quartzite pieces IBRA Distribution: MUR Florabase records: 9	Medium: Little potentially suitable habitat (no salt lakes in the proposed survey area). Nearest location is ~4km SW of the PCP area on the edge of a salt lake in low chenopod shrublands.
Frankenia georgei	Frankeniaceae	P1	x	Description: Small shrub Habit: Rocky slopes Flower colour: Pink Flowering period: December Soils: Clay-loam IBRA Distribution: MUR, COO Florabase records: 6	High: Survey area contains suitable habitat (rocky hillslopes). Recorded at 2 locations in KOTH by MCPL (2006). Recorded in HRP area.
Korthalsella leucothrix	Santalaceae	P1	x	Description: Aerial, parasitic shrub Habit: Parasite on *Acacia* shrubs and trees Flower colour: White Flowering period: August Soils: Exclusively hosted by *Acacia* spp. IBRA Distribution: GID, MUR, YAL Florabase records: 14	Medium: Survey area contains suitable habitat (*Acacia* woodland/shrubland). Nearest population is ~75 km NW of the survey area (1993) in *Acacia* woodland.
Micromyrtus chrysodema	Myrtaceae	P1	x	Description: Densely branched shrub Habit: Red sands/ Sandplains Flower colour: White Flowering period: March to April Soils: Red loamy sand, red sands IBRA Distribution: MUR Florabase records: 1	Low: Little potentially suitable habitat (hardpan wash plains but few sandplains). Only one Florabase population, which is ~60 km N of the survey area in *Acacia* scrubland (2004).
Stenanthemum patens	Rhamnaceae	P1	x	Description: Shrub Habit: Rocky hillside Flower colour: White Flowering period: April to October Soils: Dry red sand/loam IBRA Distribution: MUR Florabase records: 10	High: Survey area contains suitable habitat (rocky hillslopes). One recorded under 2km NW from TSF6 site.

APPENDIX D: CONSERVATION SIGNIFICANT PLANT SPECIES POTENTIALLY OCCURRING WITHIN THE KING OF THE HILLS MINING AREA

Note: SCC denotes State Conservation Code and FCC denotes Federal Conservation Code (*EPBC Act*) (refer to Appendix A for definitions). IBRA Distribution: COO– Coolgardie; GAS – Gascoyne; GID – Gibson desert; GVD – Great Victoria Desert; LSD – Little Sandy Desert; MUR – Murchison; YAL - Yalgoo. Ranking of Likelihood of occurrence in survey area is on a Low, Medium or High scale (see Section 3.4.1 for ranking criteria). Information from Florabase (WAH 1998-) , DBCA TPFL and WAH databases (DBCA 2020a), Atlas of Living Australia (National Collaborative Research Infrastructure Strategy 2019).

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Acacia sp. Marshall Pool (G. Cockerton 3024)	Fabaceae	P3	x	Description: Large shrub to 1-3 m Habit: Rocky hills and ridges Flower colour: Yellow Flowering period: May Soils: Dry brown clayey sand IBRA Distribution: MUR Florabase records: 10	Medium: Survey area contains suitable habitat (rocky hills and ridges). Nearest locations are ~20 km SE of the survey area on a serpentinite hill (1970) and ~40 km SE of the survey area on a low rocky hill in *Acacia* shrubland (2016).
Calytrix praecipua	Myrtaceae	P3	x	Description: Shrub to 0.7 m Habit: Breakaways, outcrops. Flower colour: Pink-white Flowering period: Jun to Jul or Sep to Nov Soils: Skeletal sandy soils over granite or laterite IBRA Distribution: GAS, GVD, LSD, MUR Florabase records: 28	Medium: Survey area contains suitable habitat (rocky breakaways, outcrops). Nearest locations are ~50 km SE of the survey area on a breakaway platform (1988) and ~60 km N of the survey area on a breakaway plateau (1989).
Eremophila simulans subsp. *megacalyx*	Scrophulariaceae	P3	x	Description: Shrub to 2 m Habit: Rocky surface, sandy slope Flower colour: Violet Flowering period: August to September Soils: Sandy soils IBRA Distribution: MUR Florabase records: 11	Low: Survey area contains suitable habitat. Nearest location is ~15 km E of the survey area but is very old (1961). All other records ~400 km to W.
Micromyrtus serrulata	Myrtaceae	P3	x	Description: Erect or spreading shrub to 1.5 m Habit: Granite outcrops, slopes and flats over granite. Flower colour: White Flowering period: June to November Soils: Brownish sandy and clayey soils over granite IBRA Distribution: COO, MUR Florabase records: 19	Medium: Survey area contains suitable habitat (granite bedrock, slopes and flats). Nearest location is ~50 km SW of the survey area on an exposed breakaway platform (1988).
Phyllanthus baeckeoides	Phyllanthaceae	P3	x	Description: Shrub to 1.5 m Habit: Granite outcrops. Flower colour: white-yellow/green-yellow Flowering period: July to September Soils: Red lateritic & sandy clay soils IBRA Distribution: MUR, GVD Florabase records: 31	Low: Survey area contains suitable habitat (granite bedrock). Nearest locations are all >100 km from the survey area.

APPENDIX D: CONSERVATION SIGNIFICANT PLANT SPECIES POTENTIALLY OCCURRING WITHIN THE KING OF THE HILLS MINING AREA

Note: SCC denotes State Conservation Code and FCC denotes Federal Conservation Code (*EPBC Act*) (refer to Appendix A for definitions). IBRA Distribution: COO– Coolgardie; GAS – Gascoyne; GID – Gibson desert; GVD – Great Victoria Desert; LSD – Little Sandy Desert; MUR – Murchison; YAL - Yalgoo. Ranking of Likelihood of occurrence in survey area is on a Low, Medium or High scale (see Section 3.4.1 for ranking criteria). Information from Florabase (WAH 1998-) , DBCA TPFL and WAH databases (DBCA 2020a), Atlas of Living Australia (National Collaborative Research Infrastructure Strategy 2019).

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Sauropus sp. Woolgorong (M. Officer s.n. 10/8/94)	Phyllanthaceae	P3	x	Description: Shrub to 1 m Habit: Plains or rocky slopes/outcrops Flower colour: Yellow Flowering period: June to October Soils: Red sandy loam/loamy sand over ironstone IBRA Distribution: GAS, MUR, YAL Florabase records: 23	High: Survey area contains suitable habitat (rocky slopes with ironstone). Recorded in MCPL (2006) as *Sauropus ramosissimus* in one location, just inside eastern boundary of Level 1 survey.
Thryptomene sp. Leinster (B.J. Lepschi & L.A. Craven 4362)	Myrtaceae	P3	x	Description: Shrub to 2 m Habit: Breakaways, rocky hillsides Flower colour: Pink Flowering period: September to October Soils: Red sand/loam over ironstone IBRA Distribution: GAS, MUR Florabase records: 24	Medium: Survey area contains suitable habitat (rocky breakaways and slopes). Nearest location is ~60 km N of the survey area on a rocky plateau (2004).
Grevillea inconspicua	Proteaceae	P4	x	Description: Intricately branched, spreading shrub Habit: Along drainage lines on rocky outcrops, creeklines Flower colour: Pink/white-pink Flowering period: June to August Soils: Loam, gravel IBRA Distribution: MUR Florabase records: 61	High: Survey area contains suitable habitat (drainage lines amongst rocky outcrops). Cluster of records (TPFL database) found ~6km NW of HRP area.
Hemigenia exilis	Lamiaceae	P4	x	Description: Erect, multi-stemmed shrub Habit: Breakaways, slopes Flower colour: blue-purple/white Flowering period: April or September to November Soils: Laterite IBRA Distribution: MUR Florabase records: 42	Medium: Survey area contains suitable habitat (rocky breakaways and slopes). Nearest location is ~25 km N of the survey area in Acacia shrubland on a plain.

APPENDIX E: INTRODUCED PLANT SPECIES POTENTIALLY OCCURRING WITHIN THE KING OF THE HILLS MINING AREA

Note: FCS denotes Federal Conservation Status (DAWE 2019d); WoNS is Weed of National Significance. SCS denotes State Conservation Status (Department of Primary Industries and Regional Development 2019a) (refer to Appendix A for definitions). IBRA Distribution: AVW – Avon Wheatbelt; CAR – Carnarvon; COO– Coolgardie; DAL – Dampierland; GAS – Gascoyne; GES – Geraldton Sandplains; GID – Gibson desert; MAL – Mallee; MUR – Murchison; PIL – Pilbara; SWA – Swan Coastal Plain; YAL - Yalgoo. Ranking of Likelihood of occurrence in survey area is on a Low, Medium or High scale (see Section 3.4.2 for ranking criteria). Ecological Impact and Invasiveness rankings from Department of Parks and Wildlife 2014. Description and habitat from Florabase (WAH 1998-), Department of Primary Industries and Regional Development (2020a, 2020b), DAWE (2020d,g).

Species	Common Name	Family	FCS/SCS	Ecological Impact	Invasiveness	Description and Habitat	Likelihood of Occurrence
Cylindropuntia fulgida var. *mamillata*	Coral cactus	Cactaceae	WoNS/ Declared Pest (C3 Restricted)	H	R	Description: Erect shrub to 0.8 m Habit: Flats, drainage lines Flower colour: Deep red Flowering period: Rarely flowers Soils: Loose surface gravel, alkaline sands, limestone, clay/loam. IBRA Distribution: CAR, COO, DAL, GAS, MUR, PIL Florabase records: 13	High: Survey area contains suitable habitat (Chenopod and *Acacia* shrubland on flats and drainage lines). Three records (2007) from Tarmoola Station; all at the homestead, on the SW boundary of the Level 1 survey area in the creek floodplain.
Cylindropuntia imbricata	Devil's rope	Cactaceae	WoNS/ Declared Pest (C3 Restricted), Goldfields Region Priority Alert Weed	-	-	Description: Spreading or erect shrub to 3 m Habit: Drainage lines, disturbed areas Flower colour: Red, purple Flowering period: September to April Soils: Sandy clay-loam IBRA Distribution: AVW, COO, MUR, PIL Florabase records: 9	High: Survey area contains suitable habitat (Chenopod and *Acacia* shrubland in drainage lines and disturbed areas). Two records (2007) from Tarmoola Station; both at the homestead, on the SW boundary of the Level 1 survey area in the creek floodplain.
Cylindropuntia sp.	Prickly pears	Cactaceae	WoNS/ Declared Pest (C3 Restricted), Goldfields Region Priority Alert Weed	-	-	Description: Shrub Habit: Disturbed areas, flats, drainage lines Flower colour: Pink/purple/red Flowering period: Rare/year round Soils: Red sandy clay/loam or disturbed soils IBRA Distribution: AVW, CAR, COO, DAL, GAS, MUR, PIL Florabase records: 25 *N.B: based on the three Cylindropuntia spp. known to occur in the Murchsion IBRA bioregion: Cylindropuntia fulgida var. mamillata, C. imbricata, C. pallida (WAH 1998-).*	High: Survey area contains suitable habitat (see above). Several records from edge of proposed Level 1 survey area (see above).

APPENDIX E: INTRODUCED PLANT SPECIES POTENTIALLY OCCURRING WITHIN THE KING OF THE HILLS MINING AREA

Note: FCS denotes Federal Conservation Status (DAWE 2019d); WoNS is Weed of National Significance. SCS denotes State Conservation Status (Department of Primary Industries and Regional Development 2019a) (refer to Appendix A for definitions). IBRA Distribution: AVW – Avon Wheatbelt; CAR – Carnarvon; COO– Coolgardie; DAL – Dampierland; GAS – Gascoyne; GES – Geraldton Sandplains; GID – Gibson desert; MAL – Mallee; MUR – Murchison; PIL – Pilbara; SWA – Swan Coastal Plain; YAL - Yalgoo. Ranking of Likelihood of occurrence in survey area is on a Low, Medium or High scale (see Section 3.4.2 for ranking criteria). Ecological Impact and Invasiveness rankings from Department of Parks and Wildlife 2014. Description and habitat from Florabase (WAH 1998-), Department of Primary Industries and Regional Development (2020a, 2020b), DAWE (2020d,g).

Species	Common Name	Family	FCS/SCS	Ecological Impact	Invasiveness	Description and Habitat	Likelihood of Occurrence
Opuntia elata	Riverina pear	Cactaceae	WoNS/ Declared Pest (C3 Restricted), Goldfields Region Priority Alert Weed	-	-	Description: Shrub with erect branches to 2 m Habit: Disturbed ground, riverbeds Flower colour: Orange Flowering period: October to February Soils: Sandy clay/loam IBRA Distribution: AVW, COO, MUR, PIL Florabase records: 8	High: Survey area contains suitable habitat (Chenopod and *Acacia* shrubland in drainage lines and disturbed areas). One record (2007) from Tarmoola Station at the homestead, on the SW boundary of the Level 1 survey area in the creek floodplain.
Opuntia stricta	Common prickly pear	Cactaceae	WoNS/ Declared Pest (C3 Restricted), Goldfields Region Priority Alert Weed	-	-	Description: Spreading to erect shrub to 2 m Habit: Disturbed areas, flats, drainage lines Flower colour: Yellow Flowering period: September to April Soils: Brown sandy loam IBRA Distribution: COO, GES, MAL, MUR, PIL, SWA Florabase records: 18	Medium: Survey area contains suitable habitat (Eucalypt woodland over Chenopod and *Acacia* shrubland in drainage lines and disturbed areas). MCPL (2006) recorded this in 3 locations near the Gwalia mine ~25 km south of the proposed Level 1 survey area.

APPENDIX F: ABORIGINAL HERITAGE SITES AND OTHER HERITAGE PLACES WITHIN THE VICINITY OF THE KING OF THE HILLS MINING AREA

Table F1: Aboriginal Heritage Sites in the vicinity of the KOTH mining area (Department of Planning, Lands and Heritage 2020). Note: PCP = Power Corridor Project, HRP = Haul Road Project.

SITE ID	SITE NAME	LOCATION (* indicates inside KOTH mining area)	SITE TYPE
1741	Lake Raeside/Sullivan Creek	*Sullivan Creek – inside proposed PCP and HRP areas.	Mythological
2708	Lake Reyside (Raeside)	1km S of proposed PCP area.	Mythological
15266	Sullivan Creek 01	*Sullivan Creek – N of proposed PCP area. (318491 mE/6825031 mN)	Artefacts/Scatter
15779	Sullivan Creek 02	*Sullivan Creek – inside proposed PCP area. (318508 mE/ 6823846 mN)	Artefacts/Scatter
2563	Leonora-Leinster 02	Between active area and Goldfields Highway (325337 mE/6825458 mN), 3km S of TSF6.	Artefacts/Scatter, Quarry
15628	Carolina Quarry, White Well	Immediately west of western boundary of M37/570, N of TSF6 (324652 mE/ 6832000 mN)	Artefacts/Scatter, Quarry

APPENDIX F: ABORIGINAL HERITAGE SITES AND OTHER HERITAGE PLACES WITHIN THE VICINITY OF THE KING OF THE HILLS MINING AREA

Table 2: Other Heritage Places in the vicinity of the KOTH mining area (Department of Planning, Lands and Heritage 2020). Note: PCP = Power Corridor Project, HRP = Haul Road Project.

SITE ID	SITE NAME	LOCATION (* indicates inside KOTH mining area)	SITE TYPE
2500	Leonora-Leinster 25	*1.5 km NW of TSF6. (321437 mE/ 6830458 mN)	Artefacts/Scatter
2564	Leonora-Leinster 03	W of TSF6 on Goldfields Hwy. (325237 mE/ 6829708 mN)	Artefacts/Scatter
2606	Kents Bore West	SE of TSF6 on Goldfields Hwy. (326132 mE/ 6827527 mN)	Artefacts/Scatter
15780	Sullivan Creek 03	*Immediately bordering PCP and HRP areas. (318702 mE/ 6825198 mN)	Artefacts/Scatter
20684	Kurrajong	1.5 NW of PCP area. (315017 mE/ 6823459 mN)	Historical, Other: Early mining settlement
20685	Diorite Range	3.5km NW of PCP area. (309615 mE/ 6823091 mN)	Artefact/Scatter, Mythological, Natural Feature
20808	Claypan (SOL07)	3km S of PCP area. (314936 mE/ 6811157 mN)	Mythological, Natural Feature
21828	Tarmoola Hills	*0.5km W of TSF6 (321412 mE/ 6829263 mN)	Mythological
22412	Leighters White Quartz Hill	*1km SE of PCP area. (319836 mE/ 6822663 mN)	Camp, Natural Feature
22413	Leighters Drilling Area	*1km SE of PCP area. (320615 mE/ 6823314 mN)	Natural Feature
22420	Wanangari Pool	*0.5km E of PCP area. (321756 mE/ 6825470 mN)	Camp, Hunting Place, Natural Feature, Water Source
22427	Mt Davis Range	2.5km SE of TSF6. (327176 mE/ 6824477 mN)	Natural Feature
22437	Wonder North Laterite Hill	*Inside HRP area. (316902 mE/ 6828355 mN)	Natural Feature
22438	Wonder North Swamp 1	*0.5km E of HRP area. (317067 mE/ 6828971 mN)	Natural Feature, Water Source
22439	Wonder North Mottled Rock	*2km N of HRP area. (316879 mE/ 6830769 mN)	Natural Feature
22443	Cork Tree Well	*2km NE of HRP area. (317938 mE/ 6830332 mN)	Man-Made Structure, Camp
22444	Wonder North Swamp 2	*1.5km W of TSF6. (320900 mE/ 6828986 mN)	Natural Feature, Water Source
22695	Tarmoola Artefact Scatter 2	*2km NW of TSF6. (320824 mE/ 6830728 mN)	Artefacts/Scatter
24099	Sullivan Creek 3	2.5km SE of PCP area. (319982 mE/ 6821044 mN)	Artefacts/Scatter
24100	Sullivan Creek 4	*Immediately bordering NW of PCP area. (318315 mE/ 6824060 mN)	Artefacts/Scatter
24101	Sullivan Creek 5	*1km N of HRP area. (317264 mE/ 6829806 mN)	Artefacts/Scatter
24390	Sullivan Gnamma	1km NW of PCP area. (313558 mE/ 6819177 mN)	Man-Made Structure, Water Source

APPENDIX G: VEGETATION COMMUNITIES PREVIOUSLY MAPPED IN THE KING OF THE HILLS SURVEY AREAS

Previous mapping from MCPL (1999, 2003, 2006, 2019). Species names have been updated to reflect the current names (WAH 1998-).

NAME	YEAR	DESCRIPTION	UPPER STRATUM	MIDDLE STRATUM	LOWER STRATUM
Aa-Aa	1999	Shrubland of *Acacia aneura* and *Acacia ayersiana* over dense herbs of Rhodanthe charsleyae and grass, Aristida contorta in sandy loam with scattered quartz rocks on the surface.	*Acacia aneura* *Acacia ayersiana*	*Acacia craspedocarpa* *Senna artemisioides* subsp. *filifolia* *Senna artemisioides* subsp. x *sturtii* *Hakea recurva*	*Sclerolaena eurotioides* *Sclerolaena fusiformis* *Maireana lobiflora* *Rhodanthe charsleyae*
Ab-Aa		Open Shrubland of *Acacia burkittii* and *Acacia aneura* over mixed low shrubs on outcropping rock above Sullivan Creek.	*Acacia burkittii* *Acacia aneura*	*Bossiaea walkeri* *Scaevola spinescens* *Acacia tetragonophylla*	*Ptilotus obovatus* *Cymbopogon ambiguus* *Enneapogon caerulescens*
Ec-Cp		Woodland to Open Woodland of *Eucalyptus camaldulensis* and *Casuarina pauper* along the sandy banks of Sullivan Creek.	*Eucalyptus camaldulensis* *Casuarina pauper*	*Eremophila longifolia* *Pittosporum angustifolium* *Pimelea microcephala*	*Senecio glossanthus* *Austrostipa* sp. *Indigofera georgei*
Mg-Mt-Mp		Shrubland of mixed Chenopods including *Maireana georgei, Maireana triptera* and *Maireana pyramidata*, with emergent *Acacia aneura* and *Acacia burkittii* on silty flats.	*Acacia aneura* *Acacia burkittii*	*Maireana georgei* *Maireana triptera* *Maireana pyramidata*	*Sclerolaena eurotioides* *Ptilotus obovatus* *Atriplex lindleyi* subsp. *inflata*
A1	2003	Low Open Woodland of *Acacia aneura* over mixed shrubs and scattered annual species on sandy-loam soils with patchy laterised pebbles and/or quartz on the surface.	*Acacia aneura* *Acacia ramulosa* var. *ramulosa* *Acacia tetragonophylla* *Eremophila* ?*platycalyx*	*Acacia craspedocarpa* *Eremophila ramiflora*	*Eragrostis eriopoda* *Eremophila* ?*margarethae* *Ptilotus obovatus* *Rhodanthe battii*
A2		Low Woodland to Low Open Woodland of *Acacia aneura* over mixed shrubs and scattered annual species on sandy-loam soils with sparse laterised pebbles and/or quartz on the surface.	*Acacia aneura* var. *aneura* *Acacia ramulosa* var. *ramulosa* *Acacia tetragonophylla* *Eremophila* ?*platycalyx*	*Eremophila granitica* *Eremophila serrulata*	*Aristida contorta* *Calandrinia* sp. *Ptilotus obovatus* *Rhodanthe battii*
A3		Scrub of *Acacia aneura* over mixed shrubs and scattered annual species on loamy sands to sandy-loam soils with sparse laterised pebbles and/or quartz on the surface associated with creek-lines.	*Acacia aneura* *Acacia craspedocarpa* *Acacia tetragonophylla* *Eremophila oldfieldii* subsp. *angustifolia* *Santalum spicatum*	*Eremophila granitica* *Senna artemisioides* subsp. *filifolia*	*Abutilon* ?*oxycarpum* *Ptilotus aervoides* *Rhodanthe battii* *Scaevola spinescens* *Solanum lasiophyllum*
A4		Open Scrub *Acacia aneura* over mixed shrubs and scattered annual species on sandy-loam soils with sparse quartz pebbles and occasional outcropping on the surface.	*Acacia aneura* *Acacia tetragonophylla* *Eremophila oldfieldii* subsp. *angustifolia*	*Acacia craspedocarpa* *Eremophila granitica* *Eremophila* ?*platycalyx*	*Enchylaena tomentosa* var. *tomentosa* *Enneapogon caerulescens* *Ptilotus obovatus* *Solanum lasiophyllum*
G1		Low Open Grassland of *Aristida contorta* with scattered shrubs on sandy-loam soils with sparse laterised pebbles on the surface.	*Hakea preissii* *Rhagodia* ?*drummondii*	-	*Aristida contorta* *Enneapogon caerulescens* *Eragrostis eriopoda*
A1	2006	Low Open Forest of *Acacia aneura* and other *Acacia* spp. over *Eremophila* spp. and mixed shrubs over	*Acacia aneura* *Acacia fuscaneura* *Acacia craspedocarpa*	*Eremophila youngii* subsp. *youngii* *Eremophila forrestii* subsp. *forrestii*	*Aristida contorta* *Enneapogon caerulescens*

APPENDIX G: VEGETATION COMMUNITIES PREVIOUSLY MAPPED IN THE KING OF THE HILLS SURVEY AREAS

Previous mapping from MCPL (1999, 2003, 2006, 2019). Species names have been updated to reflect the current names (WAH 1998-).

NAME	YEAR	DESCRIPTION	UPPER STRATUM	MIDDLE STRATUM	LOWER STRATUM
		annual herbs and grasses on sandy-loams on flats and flowlines.	*Acacia tetragonophylla*	*Rhagodia drummondii* *Ptilotus obovatus* *Solanum lasiophyllum*	
A2		Low Open Woodland of *Acacia aneura* and other *Acacia* spp. over mixed shrubs over low chenopod shrubs, annual herbs and grasses on sandy-loams on flats and lower slopes.	*Acacia aneura* *Acacia fuscaneura* *Acacia craspedocarpa* *Acacia tetragonophylla*	*Hakea preissii* *Eremophila forrestii* subsp. *forrestii* *Teucrium teucriiflorum* *Ptilotus calostachyus* *Ptilotus obovatus* *Solanum lasiophyllum*	*Maireana suaedifolia* *Aristida contorta* *Enneapogon caerulescens*
A3		Low Open Woodland of *Acacia aneura* and other *Acacia* spp. over mixed shrubs over mixed chenopods, annual herbs and grasses on flats and lower slopes with pebbles and quartz on surface.	*Acacia aneura* *Acacia ayersiana* *Acacia tetragonophylla*	*Hakea preissii* *Eremophila galeata* *Ptilotus obovatus* *Solanum lasiophyllum*	-
A5		Low Open Woodland of *Acacia aneura* and other *Acacia* spp. and patches of *Casuarina pauper* over Senna and chenopod species over annual herbs and grasses on ridges and slopes, with sandy-loams with mixed volcanic rocks on surface.	*Acacia aneura* *Acacia fuscaneura* *Acacia ramulosa* var. *ramulosa* *Acacia nigripilosa subsp. nigripilosa* *Casuarina pauper*	-	-
A6		Low Open Woodland of *Acacia fuscaneura* and *A. aneura* over mixed shrubs over mixed chenopods, annual herbs and grasses on lower slopes with calcrete soils and quartz on surface.	*Acacia fuscaneura* *Acacia aneura*	*Ptilotus obovatus* *Solanum lasiophyllum* *Eremophila galeata* *Brachychiton gregorii*	-
A7		Low Open Woodland of *Acacia aneura* and other *Acacia* spp. over mixed shrubs over mixed chenopods, annual herbs and grasses on flats and lower slopes with calcrete soils.	*Acacia aneura* *Acacia ayersiana* *Acacia tetragonophylla*	*Ptilotus obovatus* *Solanum lasiophyllum* *Eremophila galeata*	-
A8		Low Open Woodland of *Acacia aneura* and other *Acacia* spp. over mixed shrubs on rockier volcanic hills and slopes or on erosional slopes.	*Acacia aneura* *Acacia quadrimarginea* *Acacia rhodophloia* *Acacia ramulosa* var. *ramulosa* *Acacia nigripilosa subsp. nigripilosa*	*Eremophila* spp. *Dodonaea lobulata* *Prostanthera albiflora*	-
A9		Low Open Woodland of *Acacia aneura* and *Hakea preissii* over mixed chenopods and *Eremophila* spp. on sandy-loam soils with pebbles and quartz.	*Acacia aneura* *Hakea preissii*	*Eremophila* spp.	
A10		Low Open Woodland of *Acacia aneura* and *Acacia ramulosa* var. *ramulosa* over *Eremophila youngii*	*Acacia aneura* *Acacia ramulosa* var. *ramulosa*	*Eremophila youngii* subsp. *youngii*	*Cheilanthes austrotenuifolia*

APPENDIX G: VEGETATION COMMUNITIES PREVIOUSLY MAPPED IN THE KING OF THE HILLS SURVEY AREAS

Previous mapping from MCPL (1999, 2003, 2006, 2019). Species names have been updated to reflect the current names (WAH 1998-).

NAME	YEAR	DESCRIPTION	UPPER STRATUM	MIDDLE STRATUM	LOWER STRATUM
		subsp. *youngii* over *Cheilanthes austrotenuifolia,* annual herbs and grasses on quartz ridge.			
A11		Low Open Woodland of *Acacia aneura* and *Acacia tetragonophylla* over *Dodonaea rigida* and *Scaevola spinescens* over annual herbs and grasses on ironstone outcropping ridge.	*Acacia aneura* *Acacia tetragonophylla*	*Dodonaea rigida* *Scaevola spinescens*	-
C1		Open chenopod Shrubland with *Atriplex nummularia, Maireana pyramidata* and mixed *Sclerolaena* spp. with occasional emergent *Hakea preissii* and patches of *Acacia aneura* on calcrete soils.	*Hakea preissii* *Acacia aneura*	*Atriplex nummularia* *Maireana pyramidata* *Sclerolaena* spp.	-
E1		Open Woodland of *Eucalyptus camaldulensis* subsp. *obtusa* with pockets of *Casuarina* and *Acacia citrinoviridis* over *Bossiaea walkeri* over mixed grasses and annual herbs on sandy soils in creeklines.	*Eucalyptus camaldulensis* subsp. *obtusa* *Casuarina* spp. *Acacia citrinoviridis*	*Bossiaea walkeri*	-
A1	2019	Low Open Woodland of *Acacia aneura* over mixed shrubs and scattered annual species on sandy-loam soils with patchy laterised pebbles and/or quartz on the surface.	*Acacia aneura* *Acacia ramulosa* var. *ramulosa* *Acacia tetragonophylla* *Eremophila ?platycalyx*	*Acacia craspedocarpa* *Eremophila ramiflora*	*Eragrostis eriopoda* *Eremophila ?margarethae* *Ptilotus obovatus* *Rhodanthe battii*
A2		Low Open Woodland of *Acacia aneura* and other *Acacia* spp. over mixed shrubs over low chenopod shrubs, annual herbs and grasses on sandy-loams on flats and lower slopes.	*Acacia aneura* *Acacia fuscaneura* *Acacia craspedocarpa* *Acacia tetragonophylla*	*Hakea preissii* *Eremophila forrestii* subsp. *forrestii* *Teucrium teucriiflorum* *Ptilotus calostachyus* *Ptilotus obovatus* *Solanum lasiophyllum*	*Maireana suaedifolia* *Aristida contorta* *Enneapogon caerulescens*
A3		Scrub of *Acacia aneura* over mixed shrubs and scattered annual species on loamy sands to sandy-loam soils with sparse laterised pebbles and/or quartz on the surface associated with creek-lines.	*Acacia aneura* *Acacia craspedocarpa* *Acacia tetragonophylla* *Eremophila oldfieldii* subsp. *angustifolia* *Santalum spicatum*	*Eremophila granitica* *Senna artemisioides* subsp. *filifolia*	*Abutilon ?oxycarpum* *Ptilotus aervoides* *Rhodanthe battii* *Scaevola spinescens* *Solanum lasiophyllum*
A12		Low open woodland of Acacia ?incurvaneura over Eremophila ?platycalyx, E. latrobei ?subsp. glabra and Acacia spp. mid sparse shrubland over Maireana convexa, Ptilotus spp. and mixed low isolated shrubs on orange clay with quartz pebbles on flats.	*Acacia ?incurvaneura*	*Eremophila ?platycalyx* *Eremophila latrobei ?subsp. glabra* *Acacia spp.*	*Maireana convexa* *Ptilotus spp.*

APPENDIX G: VEGETATION COMMUNITIES PREVIOUSLY MAPPED IN THE KING OF THE HILLS SURVEY AREAS

Previous mapping from MCPL (1999, 2003, 2006, 2019). Species names have been updated to reflect the current names (WAH 1998-).

NAME	YEAR	DESCRIPTION	UPPER STRATUM	MIDDLE STRATUM	LOWER STRATUM
A13		Low woodland of Acacia ?incurvaneura over Acacia spp. tall open shrubland over Eremophila ?platycalyx, Scaevola spinescens, Senna artemisioides subsp. x artemisioides, Eremophila latrobei subsp. glabra and Psydrax spp. mid sparse shrubland on hard red clay flats.	*Acacia ?incurvaneura*	*Eremophila ?platycalyx* *Scaevola spinescens* *Senna artemisioides subsp. x artemisioides* *Eremophila latrobei subsp. glabra*	-
Er1		Mid sparse shrubland of Eremophila scoparia, Hakea preissii, Acacia oswaldii and Senna artemisioides subsp. x sturtii over Maireana spp. and Ptilotus spp. low isolated shrubs on gentle slopes with rock outcropping and angular black pebbles over hard red clay.	-	*Eremophila scoparia* *Hakea preissii* *Acacia oswaldii* *Senna artemisioides subsp. x sturtii*	*Maireana spp.* *Ptilotus spp.*

APPENDIX H: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN THE KING OF THE HILLS POWER CORRIDOR, MARCH 2020

* denotes introduced species (WAH 1998-); SCC is State Conservation Code (see Appendix A for definitions); 1999, 2003, 2006, 2019 are records from previous Mattiske Consulting Pty Ltd surveys in the vicinity.

FAMILY	SPECIES	SCC	1999	2003	2006	2019	2020
AMARANTHACEAE	*Amaranthus mitchellii*				x		
	Ptilotus aervoides			x			
	Ptilotus calostachyus				x		
	Ptilotus exaltatus		x	x	x	x	x
	Ptilotus gaudichaudii			x	x		
	Ptilotus helipteroides			x	x		
	Ptilotus obovatus		x	x	x	x	x
	Ptilotus polystachyus				x		
	Ptilotus roei				x		
	Ptilotus schwartzii			x		x	
	Ptilotus sp.						x
ANACARDIACEAE	* *Schinus molle*				x		
APOCYNACEAE	*Marsdenia australis*		x	x	x		x
	Apocynaceae sp.					x	
ASTERACEAE	* *Centaurea melitensis*			x			
	* *Flaveria trinervia*				x		
	* *Hypochaeris glabra*		x				
	* *Hypochaeris radicata*				x		
	* *Sonchus oleraceus*		x		x		
	Brachyscome ciliaris				x		
	Brachyscome sp.		x				
	Chrysocephalum puteale				x		
	Cratystylis subspinescens		x				
	Gnephosis arachnoidea				x		
	Helipterum craspedioides			x			
	Leiocarpa semicalva						x
	Olearia stuartii				x		
	Pluchea dentex				x		x
	Podolepis capillaris		x		x		
	Podolepis kendallii				x		
	Podolepis lessonii			x			
	Rhodanthe battii			x			
	Rhodanthe charsleyae		x				
	Rhodanthe sp.		x				
	Schoenia cassiniana		x				
	Senecio glossanthus		x				
	Senecio magnificus				x		
	Senecio sp.		x				
	Vittadinia sulcata				x		
	Vittadinia sp.		x				
	Asteraceae sp.		x		x		
BORAGINACEAE	*Heliotropium inexplicitum*				x		
BRASSICACEAE	* *Carrichtera annua*				x		
CACTACEAE	* *Opuntia stricta*				x		
CAMPANULACEAE	*Isotoma petraea*				x		
CASUARINACEAE	*Casuarina obesa*						x
	Casuarina pauper		x		x		
CELASTRACEAE	*Stackhousia* sp.			x			

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FAMILY	SPECIES	SCC	1999	2003	2006	2019	2020
CHENOPODIACEAE	* *Chenopodium murale*			x			
	Atriplex acutibractea subsp. *karoniensis*		x				
	Atriplex amnicola				x		
	Atriplex bunburyana				x		
	Atriplex lindleyi subsp. *inflata*		x				
	Atriplex nummularia				x		
	Atriplex semilunaris				x		
	Atriplex vesicaria				x		
	Atriplex sp.						x
	Dissocarpus paradoxus				x		
	Dysphania kalpari				x		
	Dysphania melanocarpum				x		
	Dysphania rhadinostachya				x		
	Enchylaena tomentosa var. *tomentosa*			x	x		
	Maireana appressa				x		
	Maireana carnosa				x	x	
	Maireana convexa				x	x	
	Maireana georgei		x		x		
	Maireana glomerifolia				x		
	Maireana lobiflora		x				
	Maireana planifolia		x		x		x
	Maireana pyramidata		x		x	x	
	Maireana radiata				x		
	Maireana sedifolia				x		
	Maireana suaedifolia				x		
	Maireana thesioides					x	
	Maireana tomentosa subsp. *tomentosa*		x				
	Maireana triptera		x		x	x	x
	Maireana villosa				x		
	Maireana sp.					x	x
	Rhagodia drummondii			x	x		
	Rhagodia ?drummondii					x	
	Rhagodia eremaea				x		x
	Salsola australis		x	x	x		
	Sclerolaena cuneata		x		x	x	
	Sclerolaena diacantha				x		
	Sclerolaena ?diacantha					x	
	Sclerolaena drummondii			x			
	Sclerolaena eriacantha				x	x	
	Sclerolaena eurotoides		x				
	Sclerolaena fusiformis		x				
	Sclerolaena lanicuspis				x		
	Sclerolaena patenticuspis				x		
	Sclerolaena sp.						x
	Tecticornia calyptrata				x		
	Tecticornia indica subsp. *bidens*				x		
CONVOLVULACEAE	* *Cuscuta epithymum*				x		
	Convolvulus remotus				x		
	Duperreya sericea		x	x	x		
	Duperreya commixta						x
CUCURBITACEAE	* *Citrillus amarus*			x			
	* *Cucumis myriocarpus*			x	x		
CYPERACEAE	*Bulbostylis barbata*				x		
	Bulbostylis turbinata				x		
	Fimbristylis depauperata				x		

APPENDIX H: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN THE KING OF THE HILLS POWER CORRIDOR, MARCH 2020

* denotes introduced species (WAH 1998-); SCC is State Conservation Code (see Appendix A for definitions); 1999, 2003, 2006, 2019 are records from previous Mattiske Consulting Pty Ltd surveys in the vicinity.

FAMILY	SPECIES	SCC	1999	2003	2006	2019	2020
EUPHORBIACEAE	*Euphorbia australis*				x		
	Euphorbia boophthona				x		
FABACEAE	*Acacia aneura*		x	x	x		
	Acacia ayersiana		x		x		
	Acacia burkittii		x	x			x
	Acacia caesaneura						x
	Acacia ?caesaneura					x	
	Acacia citrinoviridis				x		
	Acacia craspedocarpa		x	x	x	x	x
	Acacia effusifolia						x
	Acacia fuscaneura				x		
	Acacia incurvaneura				x		
	Acacia ?incurvaneura					x	
	Acacia kalgoorliensis		x				
	Acacia nigripilosa subsp. *nigripilosa*				x		
	Acacia oswaldii				x	x	
	Acacia paraneura				x		
	Acacia pteraneura				x		x
	Acacia quadrimarginea				x		x
	Acacia ramulosa		x				
	Acacia ramulosa var. *linophylla*				x		
	Acacia ramulosa var. *ramulosa*			x	x		
	Acacia resinimarginea		x				
	Acacia rhodophloia				x		
	Acacia ?salicina				x		
	Acacia sibirica				x		
	Acacia tetragonophylla		x	x	x	x	x
	Acacia xiphophylla				x		
	Acacia sp.					x	x
	Bossiaea walkeri		x		x		x
	Glycine canescens				x		
	Indigofera georgei		x		x		
	Senna artemisioides subsp. *filifolia*		x	x	x		
	Senna artemisioides subsp. *helmsii*			x	x		x
	Senna artemisioides subsp. x *artemisioides*		x		x	x	x
	Senna artemisioides subsp. x *sturtii*		x		x		
	Senna ?artemisioides subsp. x *sturtii*					x	
	Senna cardiosperma				x		
	Senna charlesiana				x		
	Senna glaucifolia				x		
	Senna glutinosa subsp. *chatelainiana*			x	x		
	Senna glutinosa subsp. x *luerssenii*				x		
	Senna manicula				x		
	Senna pleurocarpa var. *angustifolia*		x				
	Senna sp.					x	x
	Swainsona kingii				x		
	Swainsona sp.			x			
FRANKENIACEAE	*Frankenia georgei*	P1			x		
	Frankenia laxiflora		x				
	Frankenia pauciflora var. *pauciflora*				x		
GERANIACEAE	* *Erodium aureum*				x		

APPENDIX H: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN THE KING OF THE HILLS POWER CORRIDOR, MARCH 2020

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FAMILY	SPECIES	SCC	1999	2003	2006	2019	2020
GOODENIACEAE	*Goodenia havilandii*			x	x		
	Scaevola spinescens		x	x	x	x	x
	Velleia rosea				x		
HALORAGACEAE	*Haloragis odontocarpa* forma *rugosa*		x				
HEMEROCALLIDACEAE	*Dianella revoluta* var. *divaricata*		x	x	x		x
	Prostanthera albiflora				x		
LAMIACEAE	*Hemigenia ?brachyphylla*						x
	Teucrium teucriiflorum			x	x	x	x
LORANTHACEAE	*Amyema preissii*		x				
	Lysiana casuarinae				x		
	Lysiana murrayi			x			
MALVACEAE	*Abutilon cryptopetalum*				x		
	Abutilon aff. *fraseri*				x		
	Abutilon oxycarpum		x	x	x		
	Abutilon sp.						x
	Brachychiton gregorii			x	x	x	
	Hibiscus burtonii				x		
	Hibiscus coatesii				x		
	Seringia velutina				x		
	Sida calyxhymenia		x		x		
	Sida excedentifolia				x		
	Sida sp. dark green fruits (S. van Leeuwen 2260)				x		
	Sida sp.			x		x	x
	Malvaceae sp.						x
MONTIACEAE	*Calandrinia* sp.			x	x		x
MYRTACEAE	*Calytrix birdii*				x		
	Eucalyptus camaldulensis		x		x		
	Eucalyptus camaldulensis subsp. *obtusa*				x		x
NYCTAGINACEAE	*Boerhavia coccinea*				x		x
OXALIDACEAE	*Oxalis perennans*				x		
	Oxalis sp.						x
PHYLLANTHACEAE	*Sauropus* sp. Woolgorong (M. Officer s.n. 10/8/9	P3			x		
PITTOSPORACEAE	*Pittosporum angustifolium*		x	x	x		
PLANTAGINACEAE	*Plantago debilis*			x			
POACEAE	* *Cenchrus ciliaris*				x		
	* *Cenchrus setiger*				x		
	* *Cynodon dactylon*				x		
	Aristida contorta		x	x	x		x
	Aristida holathera var. *holathera*				x		
	Austrostipa elegantissima			x			
	Austrostipa nitida		x		x		
	Austrostipa scabra		x				
	Austrostipa sp.		x				
	Cymbopogon ambiguus		x		x		x

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FAMILY	SPECIES	SCC	1999	2003	2006	2019	2020
POACEAE	*Cymbopogon obtectus*			x	x		
(continued)	*Dactyloctenium radulans*				x		x
	Dichanthium sericeum subsp. *humilius*				x		
	Enneapogon caerulescens		x	x	x		x
	Enneapogon polyphyllus				x		x
	Enteropogon ramosus						x
	Eragrostis cumingii				x		
	Eragrostis dielsii		x				
	Eragrostis eriopoda			x	x	x	x
	Eragrostis kennedyae		x				
	Eragrostis leptocarpa				x		
	Eragrostis sp.			x			
	Eriachne flaccida				x		
	Eriachne helmsii				x		
	Eriachne ovata						x
	Eriachne pulchella					x	
	Eriachne pulchella subsp. *dominii*				x		
	Eriachne pulchella subsp. *pulchella*						x
	Iseilema eremaeum				x		
	Iseilema fragile				x		
	Monachather paradoxus				x		x
	Paspalidium basicladum				x		x
	Themeda triandra				x		x
	Poaceae sp.						x
POLYGONACEAE	* *Rumex vesicarius*		x	x	x		
PORTULACACEAE	*Portulaca oleracea*				x		x
PRIMULACEAE	* *Lysimachia arvensis*		x		x		
PROTEACEAE	*Grevillea berryana*		x		x	x	
	Grevillea nematophylla subsp. *supraplana*				x		x
	Grevillea sarissa				x		
	Hakea lorea subsp. *lorea*		x				
	Hakea preissii		x	x	x	x	x
	Hakea recurva subsp. *recurva*		x		x		
PTERIDACEAE	*Cheilanthes austrotenuifolia*				x		
	Cheilanthes sieberi				x		x
	Cheilanthes sp.			x			
	Stenanthemum patens	P1			x		
RUBIACEAE	*Psydrax latifolia*					x	
	Psydrax rigidula					x	
	Psydrax suaveolens			x	x	x	x
SANTALACEAE	*Exocarpos aphyllus*		x	x	x		
	Santalum lanceolatum		x		x		x
	Santalum spicatum			x	x		x
	Santalum sp.					x	
SAPINDACEAE	*Dodonaea lobulata*				x		
	Dodonaea rigida			x	x	x	
	Dodonaea viscosa subsp. *mucronata*				x		

APPENDIX H: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN THE KING OF THE HILLS POWER CORRIDOR, MARCH 2020

* denotes introduced species (WAH 1998-); SCC is State Conservation Code (see Appendix A for definitions); 1999, 2003, 2006, 2019 are records from previous Mattiske Consulting Pty Ltd surveys in the vicinity.

FAMILY	SPECIES	SCC	1999	2003	2006	2019	2020
SCROPHULARIACEAE	*Eremophila alternifolia*				x		x
	Eremophila ?clarkei					x	
	Eremophila foliosissima				x		
	Eremophila forrestii subsp. *forrestii*				x		x
	Eremophila galeata				x		
	Eremophila georgei				x		
	Eremophila gilesii		x				
	Eremophila gilesii subsp. *variabilis*				x		
	Eremophila glabra				x		
	Eremophila granitica		x	x	x		
	Eremophila latrobei		x		x		x
	Eremophila latrobei ?subsp. *glabra*					x	
	Eremophila latrobei subsp. *latrobei*				x		
	Eremophila longifolia		x				
	Eremophila maculata				x		
	Eremophila maculata subsp. *brevifolia*		x				
	Eremophila margarethae		x	x	x		x
	Eremophila metallicorum				x		
	Eremophila ?metallicorum					x	
	Eremophila miniata				x		
	Eremophila oldfieldii subsp. *angustifolia*			x	x	x	x
	Eremophila ?oldfieldii subsp. *oldfieldii*						x
	Eremophila platycalyx		x	x	x		
	Eremophila ?platycalyx					x	
	Eremophila ramiflora			x			
	Eremophila scoparia			x	x	x	
	Eremophila serrulata			x	x		
	Eremophila youngii subsp. *youngii*				x	x	
	Eremophila sp.					x	x
	Myoporum montanum				x		
SOLANACEAE	*Nicotiana occidentalis*				x		
	Nicotiana occidentalis subsp. *obliqua*				x		
	Nicotiana rosulata subsp. *rosulata*			x			
	Nicotiana sp.						x
	Solanum lasiophyllum		x	x	x	x	x
	Solanum nigrum				x		
	Solanum orbiculatum subsp. *orbiculatum*				x		
	Solanum sp.				x	x	
STYLIDIACEAE	*Stylidium ?inaequipetalum*				x		
THYMELAEACEAE	*Pimelea microcephala*		x	x	x		
ZYGOPHYLLACEAE	*Tribulus astrocarpus*						x
	* *Tribulus terrestris*				x		
	Roepera ovata			x			

APPENDIX I: VASCULAR PLANT SPECIES RECORDED BY SITE IN THE KING OF THE HILLS POWER CORRIDOR SURVEY AREA, MARCH 2020

NB: None of the species recorded in 2020 were introduced species or threatened or priority species as listed by DotEE (2019a) or DBCA (2018a, b).

	SPECIES	S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	S28
AMARANTHACEAE	*Ptilotus exaltatus*			x				x						x		x	x		x										
	Ptilotus obovatus	x		x	x	x	x	x	x		x	x						x	x						x				x
	Ptilotus sp.												x																
APOCYNACEAE	*Marsdenia australis*	x				x			x																				
ASTERACEAE	*Leiocarpa semicalva*									x																			
	Pluchea dentex									x																			
CASUARINACEAE	*Casuarina obesa*									x		x		x															
CHENOPODIACEAE	*Atriplex* sp.										x																		
	Maireana planifolia	x	x	x	x	x	x						x	x		x	x	x				x			x		x		x
	Maireana triptera			x				x									x	x	x										
	Maireana sp.								x		x																		
	Rhagodia eremaea										x						x												
	Sclerolaena sp.																x												
CONVOLVULACEAE	*Duperreya commixta*								x	x				x	x	x									x		x		
FABACEAE	*Acacia burkittii*								x	x		x			x														
	Acacia caesaneura	x	x		x		x		x		x	x						x				x	x	x	x	x	x	x	x
	Acacia craspedocarpa			x		x	x	x	x				x			x		x						x					
	Acacia effusifolia																			x							x		x
	Acacia pteraneura	x	x		x	x		x	x			x						x		x	x			x	x	x	x	x	x
	Acacia quadrimarginea	x		x	x									x					x	x	x	x		x	x	x	x	x	x
	Acacia tetragonophylla	x	x	x	x	x	x	x	x					x				x	x	x		x	x	x	x	x			x
	Acacia sp.			x																									
	Bossiaea walkeri									x																			
	Senna artemisioides subsp. *artemisioides*				x				x			x		x															
	Senna artemisioides subsp. *helmsii*														x		x	x	x										
	Senna sp.		x							x	x				x		x	x							x				
GOODENIACEAE	*Scaevola spinescens*									x				x	x														
HEMEROCALLIDACEAE	*Dianella revoluta* var. *divaricata*											x	x		x					x			x		x	x			
LAMIACEAE	*Hemigenia ?brachyphylla*							x																					
	Teucrium teucriiflorum	x							x											x				x		x			x

APPENDIX I: VASCULAR PLANT SPECIES RECORDED BY SITE IN THE KING OF THE HILLS POWER CORRIDOR SURVEY AREA, MARCH 2020

NB: None of the species recorded in 2020 were introduced species or threatened or priority species as listed by DotEE (2019a) or DBCA (2018a, b).

	SPECIES	S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	S28
MALVACEAE	*Abutilon* sp.	x			x		x	x						x															
	Sida sp.	x			x			x							x					x				x	x				
	Malvaceae sp.																x												
MONTIACEAE	*Calandrinia* sp.	x																											
MYRTACEAE	*Eucalyptus camaldulensis* subsp. *obtusa*									x		x																	
NYCTAGINACEAE	*Boerhavia coccinea*	x			x			x			x		x																
OXALIDACEAE	*Oxalis* sp.																									x			
POACEAE	*Aristida contorta*	x		x	x	x	x	x	x						x			x	x	x			x	x	x	x			
	Cymbopogon ambiguus							x						x															
	Dactyloctenium radulans																x												
	Enneapogon caerulescens	x					x	x		x				x	x														
	Enneapogon polyphyllus							x				x					x	x	x										
	Enteropogon ramosus										x																		
	Eragrostis eriopoda																						x					x	x
	Eriachne ovata	x																											
	Eriachne pulchella subsp. *pulchella*	x					x	x	x						x	x		x					x		x				
	Monachather paradoxus					x																							
	Paspalidium basicladum	x		x	x		x						x													x	x	x	x
	Themeda triandra									x				x												x			
	Poaceae sp.		x		x																					x			
PORTULACACEAE	*Portulaca oleracea*	x	x	x			x				x				x				x							x			
PROTEACEAE	*Grevillea* ?*nematophylla*									x					x														
	Hakea preissii										x								x										
PTERIDACEAE	*Cheilanthes sieberi*	x			x	x			x																x	x	x		
RUBIACEAE	*Psydrax suaveolens*																										x		
SANTALACEAE	*Santalum lanceolatum*	x			x				x									x							x				
	Santalum spicatum			x																									

APPENDIX I: VASCULAR PLANT SPECIES RECORDED BY SITE IN THE KING OF THE HILLS POWER CORRIDOR SURVEY AREA, MARCH 2020

NB: None of the species recorded in 2020 were introduced species or threatened or priority species as listed by DotEE (2019a) or DBCA (2018a, b).

	SPECIES	S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	S28
SCROPHULARIACEAE	*Eremophila alternifolia*									x		x			x														
	Eremophila forrestii subsp. *forrestii*																			x		x					x	x	
	Eremophila latrobei				x															x			x						
	Eremophila margarethae	x	x	x		x		x	x			x	x		x	x		x	x	x	x	x			x		x		
	Eremophila oldfieldii subsp. angustifolia																x												
	Eremophila ?oldfieldii subsp. oldfieldii									x																			
	Eremophila sp.		x	x	x	x			x						x	x		x	x	x	x			x		x	x		x
SOLANACEAE	*Nicotiana* sp.																									x			
	Solanum lasiophyllum	x	x					x	x		x						x	x	x				x					x	x
ZYGOPHYLLACEAE	*Tribulus astrocarpus*						x		x									x											

APPENDIX J: SUMMARY OF VEGETATION COMMUNITIES DEFINED IN THE POWER CORRIDOR SURVEY AREA WITHIN THE KING OF THE HILLS MINING AREA, MARCH 2020

VEGETATION COMMUNITY DESCRIPTION

Vegetation map code: A1

Structural:

Low woodland of *Acacia caesaneura* over mid open shrubland of *Acacia quadrimarginea*, *Acacia craspedocarpa* and *Eremophila margarethae* over low isolated clumps of *Ptilotus obovatus*, *Maireana* shrubs and other mixed shrubs on red/orange clay in drainage lines.

Associated species:

Acacia ?*incurvaneura, Eremophila* ?*metallicorum, Maireana planifolia, Aristida contorta, Eriachne pulchella*

Soils and Landforms: Red-orange clay in microchannels and on flats at the edge of channels.

Outcropping: Not present.

Condition: Good to Very Good.

Area: 397.60 ha

Proportion of survey area: 27.48 %

Number of Quadrats: 7

Species richness: 13.43 ± 1.03 (s.e.)

REPRESENTATIVE PHOTOGRAPH

S22

APPENDIX J: SUMMARY OF VEGETATION COMMUNITIES DEFINED IN THE POWER CORRIDOR SURVEY AREA WITHIN THE KING OF THE HILLS MINING AREA, MARCH 2020

VEGETATION COMMUNITY DESCRIPTION

Vegetation map code: A2

Structural

Low Open Woodland of *Acacia caesaneura*, *Acacia craspedocarpa, Acacia tetragonophylla* over *Hakea preissii*, *Eremophila forrestii* subsp. *forrestii*, *Ptilotus obovatus*, *Maireana planifolia* over *Aristida contorta* and annual herbs and grasses on sandy-loams on flats and lower slopes.

Associated species

Teucrium teucriiflorum, Maireana triptera, Solanum lasiophyllum, Enneapogon caerulescens, Paspalidium basicladum

Soils and Landforms: Orange clay with quartz and other pebbles on flats.

Outcropping: Not present.

Condition: Very Good – Excellent.

Area: 941.17 ha

Proportion of survey area: 65.05 %

Number of Quadrats: 15

Species richness: 11.80 ± 1.39 (s.e.)

REPRESENTATIVE PHOTOGRAPH

S12

APPENDIX J: SUMMARY OF VEGETATION COMMUNITIES DEFINED IN THE POWER CORRIDOR SURVEY AREA WITHIN THE KING OF THE HILLS MINING AREA, MARCH 2020

VEGETATION COMMUNITY DESCRIPTION

Vegetation map code: A13

Structural

Low woodland of *Acacia burkittii* over shrubland of *Eremophila margarethae*, *Scaevola spinescens*, *Senna artemisioides* subsp. x *helmsii* and *Psydrax* spp. mid sparse shrubland on hard red clay flats.

Associated species

Acacia ?*incurvaneura, Acacia* sp.*, Acacia tetragonophylla, Eremophila latrobei* ?subsp. *glabra, Eremophila* ?*platycalyx, Eremophila* sp.*, Psydrax latifolia, Psydrax rigidula, Psydrax suaveolens, Senna artemisioides* subsp. x *artemisioides, Sida* sp.

Soils and Landforms: Orange sandy clay on flats.

Outcropping: Numerous, Lateritic

Condition: Very Good.

Area: 6.00 ha

Proportion of survey area: 0.41 %

Number of Quadrats: 1

Species richness: 15

REPRESENTATIVE PHOTOGRAPH

S14

APPENDIX J: SUMMARY OF VEGETATION COMMUNITIES DEFINED IN THE POWER CORRIDOR SURVEY AREA WITHIN THE KING OF THE HILLS MINING AREA, MARCH 2020

VEGETATION COMMUNITY DESCRIPTION
Vegetation map code: C1
Structural
Open Chenopod Shrubland with *Atriplex* sp., *Maireana planifolia* and mixed *Sclerolaena* species with occasional emergent *Hakea preissii* and patches of *Acacia aneura* on calcrete soils.
Associated species
Acacia caesaneura, Rhagodia eremea, Solanum lasiophyllum, Enteropogon ramosus, Enneapogon polyphyllus
Soils and Landforms: Red to orange clayey sand.
Outcropping: Not present.
Condition: Good to Very Good.
Area: 47.3 ha — Proportion of survey area: 3.27 %
Number of Quadrats: 2 — Species richness: 11.50 ± 0.50 (s.e.)
REPRESENTATIVE PHOTOGRAPH

S16

APPENDIX J: SUMMARY OF VEGETATION COMMUNITIES DEFINED IN THE POWER CORRIDOR SURVEY AREA WITHIN THE KING OF THE HILLS MINING AREA, MARCH 2020

VEGETATION COMMUNITY DESCRIPTION

Vegetation map code: E1

Structural

Open Woodland of *Eucalyptus camaldulensis* var. *obtusa* with pockets of *Casuarina* and *Acacia caesaneura* over *Grevillea* ?*nematophylla Bossiaea walkeri* over mixed grasses and annual herbs on sandy soils in creek lines.

Associated species

Acacia pteraneura, Acacia quadrimarginea, Acacia burkittii, Senna artemisioides subsp. *artemisioides, Scaevola spinescens, Enneapogon caerulescens*

Soils and Landforms: Red to orange sandy clay with gravel, in creek lines

Outcropping: Not present

Condition: Very good to Excellent.

Area: 13.73 ha

Proportion of survey area: 0.95 %

Number of Quadrats: 3

Species richness: 12.33 ± 0.88 (s.e.)

REPRESENTATIVE PHOTOGRAPH

S11

APPENDIX 3: TERRESTRIAL ECOSYSTEMS (2020) LEVEL 2 VERTEBRATE FAUNA ASSESSMENT

Level 2 Vertebrate Fauna Assessment

King of the Hills Project

Prepared for: Red 5

Version 1. May, 2020

RECORD OF DISTRIBUTION

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EXECUTIVE SUMMARY

Red 5 is proposing further mining operations on its tenements at the King of the Hills mine site, which is approximately 30km north, northwest of Leonora, Western Australia. Access to the King of the Hills operations is via the Goldfields Highway. This is a large project area (15,450ha) and the expansion program is likely to have multiple mining proposals prepared and submitted over a number of years. This vertebrate fauna assessment will be used to support future mining proposals and native vegetation clearing permits.

There are two broad fauna habitats in the project area:

- open mulga woodland over mixed shrubs and scattered grasses or bare ground; and
- woodland of large eucalypts over mixed shrubs and scattered grasses along the ephemeral creekline that runs north-south through the project area.

The quality of fauna habitat varies from highly degraded to good; the more degraded areas include the active mining area, historical and recent exploration and areas with higher intensity cattle grazing. There are numerous access tracks in the project area, but most are narrow and only wheel tracks on a sand-clay substrate. There is widespread evidence of feral fauna (i.e. wild dogs, cats and goats) in the project area.

There are no conservation significant vertebrate fauna in the project area that would be significantly impacted by vegetation clearing, development and additional mining activity, so there are no recommendations for a referral under the *Environment Protection and Biodiversity Conservation Act 1999*.

There are approximately 23 small trappable vertebrate species in the ephemeral creekline and 35 in the mulga woodland habitat. Avifauna species richness and abundance will vary seasonally and from year-to-year, and for the combined two survey periods, 72 species were recorded in the project area and this included 8 waterbirds in a disused mining pit. In addition to the small terrestrial reptiles, mammals and amphibians, there were two species of macropods [i.e. *Osphranter rufus* (Red Kangaroo) and *Osphranter robustus* (Euro)] which were recorded in the camera trap survey and while moving around site. *Canis lupus* (wild dogs / dingo) and *Felis catus* (feral cat) were relatively abundant across the project area, with a high number of dogs nearer the mining operations. There is at least one herd of *Capra hircus* (goats) that were mostly seen around the mining operations.

Species richness, abundance and diversity of the small trappable vertebrate fauna, particularly in the mulga woodland habitat, was lower than at other surveyed sites in the Goldfields, possibly due to the previous drought conditions and the abundance of feral predators, with the consequence that the project area has low ecological functional value and biodiversity value. The north-south ephemeral creekline (Sullivan Creek) in the project area provides a movement pathway for some avifauna and over a period of many years, small terrestrial mammals, reptiles and amphibians. Excluding Sullivan Creek, fauna habitats present in the project area are abundant in adjacent areas, so it is highly probable that the fauna assemblage in the project area is similar to the many square kilometres of similar habitat in adjacent areas and the bioregion.

Potential impacts on vertebrate fauna in the project area include death/injury of fauna during vegetation clearing, development and mining operations, habitat fragmentation, cumulative loss of habitat, introduction of weeds and feral and pest fauna, impacts with vehicles, and anthropogenic activity such as noise, vibrations and artificial light negatively impacting of native fauna in adjacent areas. Overall, the potential impact of vegetation clearing, development and mining operations will be low. The abundance of wild dogs, feral cats and goats in the project area and surrounds is probably having a greater impact on the native vertebrate fauna and habitat than the proposed vegetation clearing, development and future mining operations. A significant reduction in these feral and pest species is likely to offset much of the potential impacts associated with development.

The following recommendations are provided to mitigate potential impacts:

(1) An induction program that includes a component on managing vertebrate fauna is mandatory for staff and contractors working in the project area;
(2) The impact of dust on adjacent vegetation and fauna habitat is managed against appropriate KPIs and in accordance with the clients' Construction Environmental Management Plan;
(3) Management of the mine sites' waste management facility is reviewed and altered so that putrescible waste is not available to feral and pest animals and birds;
(4) A feral predator (i.e. feral cat and wild dog) reduction program is implemented, their numbers regularly monitored (e.g. biannually) and the population periodically reduced;
(5) The goats in the project area are removed;
(6) Where practical, vegetation clearing, and mining activity should avoid impacting on the ephemeral creekline habitat that runs north-south through the central portions of the project area and the linkages within this habitat type are maintained; and
(7) A Vertebrate Fauna Management is prepared and implemented.

1. INTRODUCTION

1.1 BACKGROUND

Red 5 is proposing further mining operations on its tenements at the King of the Hills mine site and has requested a vertebrate fauna risk assessment to support the preparation of environmental approval applications. This is a large project area that is likely to have multiple mining proposals and native vegetation clearing permit applications submitted over a number of years. The total assessed area is an odd shaped polygon of approximately 15,450ha, however, the anticipated disturbance footprint(s) will be considerably smaller.

1.2 PROJECT OBJECTIVES AND SCOPE OF WORKS

Terrestrial Ecosystems was commissioned by Red 5 to undertake a Level 2 vertebrate fauna risk assessment for its tenements at the King of the Hills operations which is approximately 30km north northwest of Leonora, Western Australia with the access road running off the Goldfields Highway (Figure 1). The purpose of this vertebrate fauna risk assessment was to provide information to the proponent and eventually the environmental regulators on the potential impacts on the vertebrate fauna assemblage in the project area to enable a series of proposed developments and vegetation clearing permits to be adequately assessed. The methodology broadly follows that described in the Environmental Protection Authority (2016b) Technical Guidance Terrestrial Fauna Surveys.

This Level 2 fauna risk assessment involved a desktop review and site survey. The objectives were to:

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

To achieve these objectives, Terrestrial Ecosystems:

- reviewed Terrestrial Ecosystems' database [includes Atlas of Living Australia and Department of Biodiversity, Conservation and Attractions (DBCA) records in NatureMap] to identify potential vertebrate fauna within the area;
- searched the DBCA's NatureMap for Threatened and Priority Species;
- searched the Commonwealth Governments database of fauna of national environmental significance to identify species potentially occurring within the area that are protected under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* or international migratory bird agreements (JAMBA/CAMBA);
- undertook multiple site surveys and assessments;
- reviewed previous fauna surveys conducted in and near the project area;
- undertook an assessment of the potential risks to the fauna associated with clearing additional areas of native vegetation;
- discussed the likelihood of *EPBC Act 1999* and *Biodiversity Conservation (BC) Act 2016* listed species being present in the project area; and

- provided management recommendations to avoid, mitigate and minimise potential impacts on the fauna in the project area.

2. EXISTING ENVIRONMENT

2.1 LOCATION OF PROJECT AREA

The project area is in the Murchison 1 (MUR1 - East Murchison subregion) IBRA bioregion (Figure 1). Cowan (2003) described the subregion as mostly dominated by mulga woodlands that are often rich in ephemerals; hummock grasslands, salt bush shrub lands and haloscarcia shrub lands. Cowan (2003) recorded no threatened ecological communities in the vicinity of the project area. Threatening processes for conservation significant fauna were listed by Cowan (2003) as foxes and feral cats.

2.2 LAND USE HISTORY

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

The project area has an existing operational mine and is spread across two pastoral leases - Tarmoola and Sturt Meadows stations. There are multiple station and exploration tracks in the project area.

2.3 CLIMATE

The project area is characterised as semi-arid. Leonora, 30km to the south, southeast, has an annual rainfall of approximately 235mm, although this varies considerably from year-to-year. The highest mean maximum and minimum temperatures in Leonora are in January with an average of 37°C and 21.8°C, respectively (Bureau of Meteorology, 2020). The lowest mean daily maximum and minimum temperatures occur in July (Chart 1). Average monthly rainfall is heaviest in January - March.

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

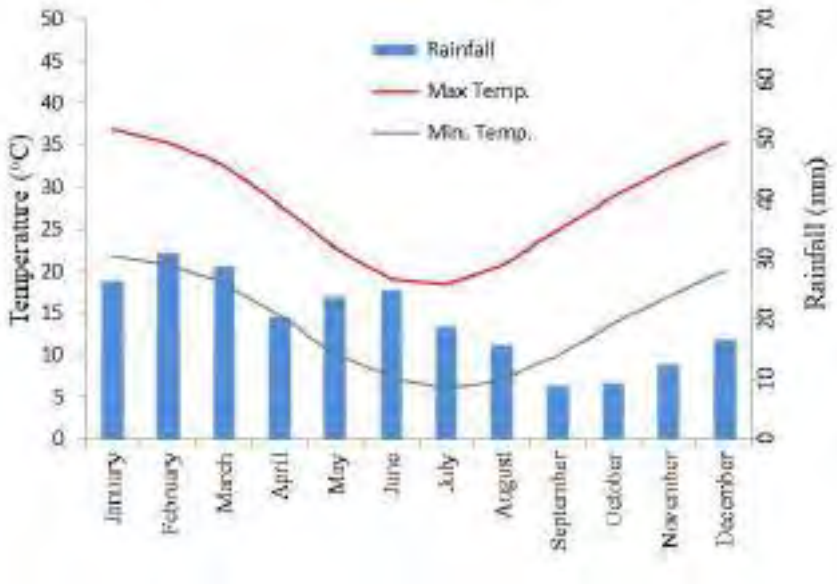


Chart 1. Climatic averages for Leonora

2.4 REGIONAL BIOLOGICAL FAUNA CONTEXT OF PROJECT AREA

The frogs, reptiles, mammals and birds in the vicinity of the project area have been surveyed for other environmental assessments and research purposes and are therefore known. Fauna surveys and assessments undertaken in the vicinity of the project area that have been reviewed for this assessment include:

- Bamford Consulting Ecologists (2007) *Fauna Assessment and Targeted Mulgara Search of the Fish Deposit, Laverton Gold Project*.
- Bell, D. T., Bell, R. C. and Loneragan, W. A. (2007) Winter bird assemblages across an arid gradient in south-west Western Australia. *Journal of the Royal Society of Western Australia* 90, 219-227.
- Biota Environmental Sciences (2004) *Cosmos Nickel Mine Extension Fauna Survey*. Unpublished report for Sir Samuel Mines NL and URS, Perth.
- Biota Environmental Sciences (2007) *Bannockburn Fauna Habitat and Assemblage Survey*. Unpublished report for Jubilee Mines NL, Perth.
- Coffey Environments (2007) *Level 1 Fauna Assessment, Leinster Nickel Operations*, Perth.
- Coffey Environments (2008) *Level 2 Fauna Assessment for the Duketon Gold Project*. Unpublished report for Regis Resources, Perth.
- Craig, M. D. and Chapman, A. (2003) Effects of short-term drought on the avifauna of Wanjarri Nature Reserve: What do they tell us about drought refugia. *Journal of the Royal Society of Western Australia* 86: 133-137.
- Dell, J. and How, R. A. (1988) Vertebrate fauna. In: The biological survey of the Eastern Goldfields of Western Australia, Part 5, Edjudina - Menzies Study Area. *Records of the Western Australian Museum*, Supplement No 31, 38-77.
- Dell, J., How, R. A. and Milewski, A. V. (1992) The biological survey of the Eastern Goldfields, Part 6, Youanmi-Leonora Study Area. *Records of the Western Australian Museum*, Supplement No 40, 131.
- Donarto Environmental Services (2005a) *Leinster Nickel Operations Tailing Storage Facility and Water Storage Areas: Wildlife Interactions and Assessment of Risks*, Perth.
- Dunlop, J. N. (1990) The small vertebrate ground fauna of Mulga habitats near Wiluna, Western Australia. *Mulga Research Centre Journal*, 10, 19-27.
- ENV Australia (2008) *Agnew Prospects Fauna Assessment*. Unpublished report for Agnew Gold Mining Company Pty Limited, Perth.
- Halpern Glick Maunsell (1999) *Rosemont Gold Project Biological Assessment Survey - Phases 1 & 2*. Unpublished report for Johnson's Well Mining NL, Perth.
- Hall, N.J, McKenzie, N.L. and Keighery, B.J. (1994) The Biological Survey of the Eastern Goldfields of Western Australia Part 10. Sandstone-Sir Samuel and Laverton-Leonora Study Areas. *Records of the Western Australian Museum*. Supplement No. 47.
- Harewood, G. (2011) *Terrestrial Fauna Survey (Level 1) of the West Laverton Area (P38/3717, P38/3718, P38/3491, P38/3492, P38/3314, P38/3490, P38/3315, M38/0046, M38/0049, M38/0040, M38/0358, M38/0048, M38/0101, M38/0364, M38/0342, M38/0345, L38/0179, L38/0177, L38/0178, L38/0153, L38/0092, E38/1930, E38/2347, E38/2084 & E38/1966)*. Unpublished report for Crescent Gold Limited.
- Hart, Simpson and Associates (2000) Anaconda Nickel Ltd, *Cawse Expansion Project Fauna Survey*. Unpublished report for Anaconda Nickel Ltd, Perth.
- How, R. A. and Dell, J. (1992) Vertebrate fauna. In: The Biological Survey of the Eastern Goldfields of Western Australia Part 7. Duketon - Sir Samuel Study Area. *Records of the Western Australian Museum*; Supplement 40, 90-109.
- MBS Environmental (2004) *Vegetation and Habitat Assessment of the Euro, Sickle and Admiral Hill Project Areas, Laverton*. Unpublished report for Crescent Gold Limited.
- McKenzie, N. L., Rolfe, J. K. and Youngson, W. K. (1992) Vertebrate fauna. In: The Biological Survey of the Eastern Goldfields of Western Australia; Part 8; Kurnalpi - Kalgoorlie Study Area. *Records of the Western Australian Museum*, Supplement No 41, 37-65.

- McKenzie, N. L., Rolfe, J. K. and Youngson, W. K. (1994) Vertebrate fauna. In: The Biological Survey of the Eastern Goldfields of Western Australia Part 10, Sandstone-Sir Samuel and Laverton-Leonora Study Areas. *Records of the Western Australian Museum*, Supplement No 47, pp. 51-85.
- Minesite Rehabilitation Services Pty Ltd (1997) *Tarmoola Gold Mine Flora and Fauna Survey*, Unpublished report for Mt Edon Gold Mines (Aust) Ltd, Kalgoorlie
- Moriarty; T. K. (1972) Birds of Wanjarri; WA (27°; 25'S; 120° 40'E) *The Emu*, 72, 1-7.
- Murphy, D. (1994) *Vertebrate fauna species of the North-eastern Goldfields*. Report to Western Mining's Leinster Nickel and Mount Keith Operations, Perth.
- Ninox Wildlife Consulting (1998) *A Vertebrate Fauna Survey of the Murrin Expansion Project*. Unpublished report for Anaconda Nickel Ltd, Perth.
- Ninox Wildlife Consulting (2005) *Vertebrate Fauna Habitat Assessment of the Proposed Expansions to the Cosmos Nickel Mine, near Leinster, Western Australia*. Unpublished report for URS Australia Pty Ltd, Perth.
- Ninox Wildlife Consulting (2006) *A Vertebrate Fauna Assessment of the Tarmoola Area*, Unpublished report for St Barbara Ltd, Perth.
- Onus, M. L., Rolfe, J.K., and Algar, D. (2011) *Assessment of feral cat abundance and control options at Barrick, Granny Smith*. Perth.
- Terrestrial Ecosystems (2010) *Level 2 Fauna Risk Assessment for the Garden Well Project Area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2011a) *Investigation of Short-Range Endemic Invertebrates for the Granny Deeps Project Area*. Unpublished report for Granny Smith Mining Pty Ltd, Perth.
- Terrestrial Ecosystems (2011b) *Level 2 Fauna Risk Assessment for Granny Deeps Project Area*. Unpublished report for Barrick Gold Corporation, Perth.
- Terrestrial Ecosystems (2011c) *Targeted Survey for Long-tailed Dunnarts for the Granny Deeps Project Area*. Perth.
- Terrestrial Ecosystems (2012g) *Level 1 Vertebrate Fauna Risk Assessment for the Proposed Exploration Areas around the Granny Open Pit Project Area*. Unpublished report for Granny Smith Mining Pty Ltd, Perth.
- Terrestrial Ecosystems (2012a) *Level 1 Fauna Risk Assessment for the Anchor Project*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2012b) *Level 1 Fauna Risk Assessment for the Moolart Well to Garden Well Access Road on M38/354, M38/302, M38/303 and L38/216*. Perth.
- Terrestrial Ecosystems (2012c) *Level 1 Fauna Risk Assessment for the Petra Project*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2012d) *Level 1 Fauna Risk Assessment for the Reichelt Project*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2012e) *Level 1 Fauna Risk Assessment for the Rosemont Project Area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2012f) *Level 1 Fauna Risk Assessment for the Russell Find Project*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2012h) *Level 1 Vertebrate Fauna Risk Assessment for the Proposed Mining Areas around the Granny Open Pit Project Area*. Unpublished report for Granny Smith Mining Pty Ltd, Perth.
- Terrestrial Ecosystems (2013) *Level 1 Fauna Risk Assessment for Two Waste Dumps either side of the proposed Rosemont Project Area (G38/29, G38/30, G38/31, G38/32) and a Slurry Pipeline from the Rosemont mine to the Garden Well processing plant (L38/219)*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2014) *Level 1 Fauna Risk Assessment for a proposed power station site, Perth*. Unpublished report for Granny Smith Mining Pty Ltd, Perth.
- Terrestrial Ecosystems (2015a) *Fauna risk assessment of the proposed borrow pit expansion*. Unpublished report for Granny Smith Mining Pty Ltd, Perth.
- Terrestrial Ecosystems (2015b) *Level 1 Fauna Risk Assessment for the Gloster Project and haul road*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2016a) *Level 1 Fauna Risk Assessment for the Anchor Project Area*. Unpublished report for Regis Resources Ltd, Perth.

- Terrestrial Ecosystems (2016b) *Level 1 Fauna Risk Assessment for the Baneygo Project*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2016c) Level *1 Fauna Risk Assessment for the Dogbolter-Coopers Project Area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2016d) *Level 1 Fauna Risk Assessment for the Petra Project Area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2016e) *Level 1 Fauna Risk Assessment for the Tooheys Project Area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2017a) *Level 1 Fauna Risk Assessment for the proposal Haul Road to the Baneygo Project Area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2017b) *Level 1 Fauna Risk Assessment for the proposal Haul Road to the proposed Petra Mining area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2018a) *Level 1 Fauna Risk Assessment for the proposal Haul Road to the proposed Petra Mining area*. Unpublished report for Regis Resources Ltd, Perth.
- Terrestrial Ecosystems (2018c) *Vertebrate Fauna Risk Assessment for the Petra Mining Project*, Perth.
- Terrestrial Ecosystems (2018b) *Vertebrate Fauna Risk Assessment for the Granny Smith Solar Power Farm Project*, Unpublished report for Granny Smith Mining Company Pty Ltd, Perth.
- Volschenk, E. S. (2011) *Granny Deeps Scorpion Identification Report*. Perth.
- Whisson, C. and Slack-Smith, S. (2011) *Land Snails from the area of Laverton, Western Australia (Granny Deeps Project)*, Perth.

In addition, there are individual records for fauna contained in the Atlas of Living Australia, Western Australian Museum collection and in NatureMap's records that have also been accessed. Plate 1 provides a visual indication of the available fauna survey data for the region (blue is the project area; black dots are incidental records; and red dots are survey sites).

The most relevant and useful data are those from Coffey Environments (2008) and the two Terrestrial Ecosystems' (2010, 2011b) Level 2 surveys as they are comprehensive and incorporate habitat similar to that in the project area. These surveys were undertaken in 2007, 2010 and 2011 to the east and north-east of the project area. These surveys included pit trapping, funnel traps, echolocation bat detection surveys, avifauna surveys and short-range invertebrate surveys. Terrestrial Ecosystems has also completed multiple Level 1 fauna risk assessments in similar habitats nearby (Terrestrial Ecosystems 2012g, a, e, c, d, f, h, b, 2013, 2014, 2015a, b, 2016a, e, c, b, d, 2017b, a, 2018a, c, b).

Western Australian Museum's (WAM) regional eastern goldfields biological surveys were undertaken in the Duketon-Sir Samuel, Sandstone–Sir Samuel and Laverton areas (How et al. 1992, McKenzie *et al*. 1994). These surveys were to the north-east of the project area. HGM (1999) undertook a terrestrial fauna assessment for the Rosemont Gold Project, which is also located to the north-east of the project area. A survey was undertaken by Terrestrial Ecosystems staff for the Duketon Gold Project (Coffey Environments 2008) in the summer of 2007/08 and subsequently, Terrestrial Ecosystems (2010) surveyed the Garden Well mine; both of these surveys included habitat similar to the project area. The WAM bioregional surveys of the Edjudina – Menzies and the Kurnalpi - Kalgoorlie areas (Dell and How 1988, McKenzie and Hall 1992) and the Murrin Murrin Expansion project fauna survey (Ninox Wildlife Consulting 1998); east of the project area, surveyed similar habitat.

In addition, Terrestrial Ecosystems has reviewed the Thompson (2004) fauna survey data; which was collected after Thompson's (2004) PhD was completed. Much of this work has been published or been presented at various workshops and conferences (Thompson and Thompson 2002, Thompson *et al*. 2003a, Thompson *et al*. 2003b, Thompson *et al*. 2003c, Thompson and Thompson 2003a, Thompson and Thompson 2003b, Thompson and Thompson 2004a, Thompson and Thompson 2004b, Thompson and Thompson 2005a, Thompson and Thompson 2005c, b, Thompson *et al*. 2005a, b, Thompson and Thompson 2006a, Thompson and Thompson 2006c, b, Thompson and Thompson 2006d, Thompson and Thompson 2007a, b, c, 2008a, Thompson and Thompson 2008c). These data are to the south of the project area but contain similar habitat types.

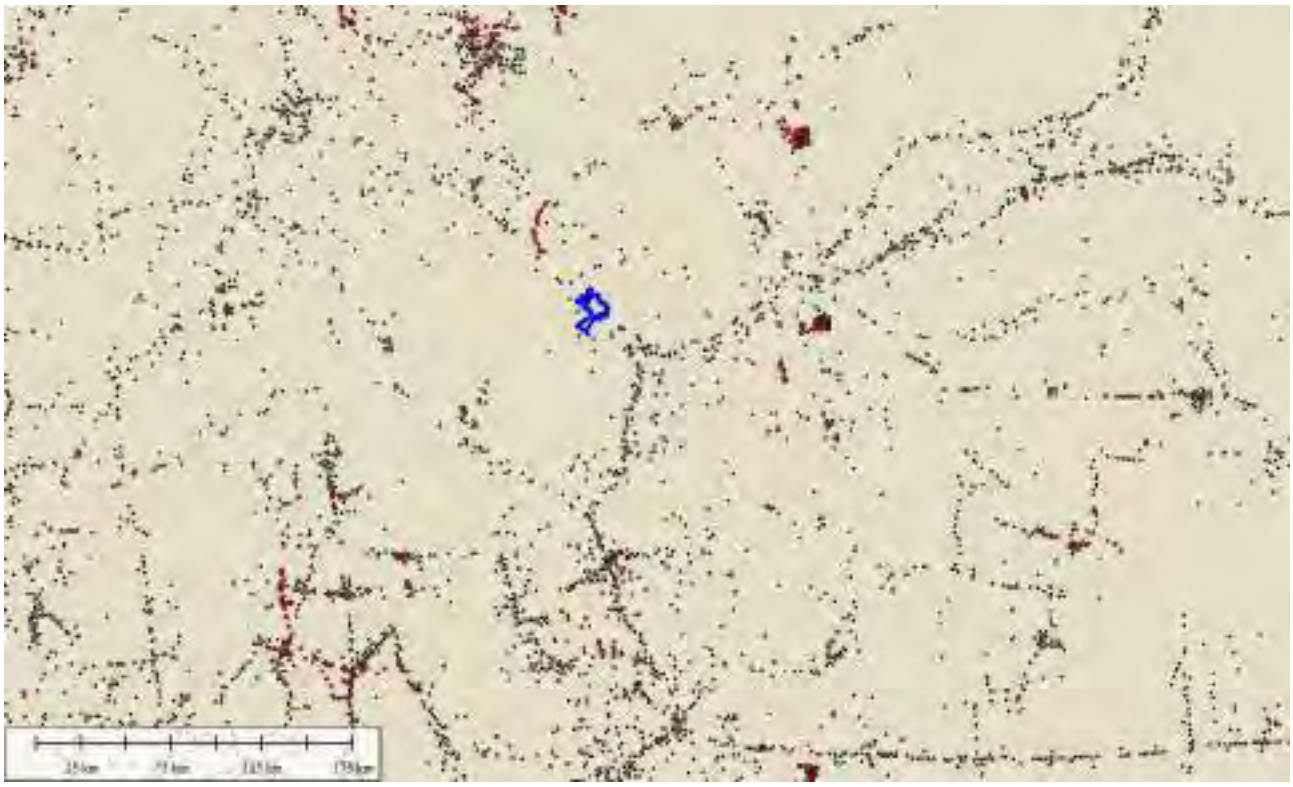


Plate 1. Regional fauna surveys

Ninox Wildlife Consulting (2006) undertook a Level 1 fauna assessment of the project area, but did not include a trapping program, and previous to this, Minesite Rehabilitation Services (1997) reported on the flora, vegetation and fauna in the project area, with the fauna data coming from the Western Australian online database.

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

2.5 FAUNA SPECIES AT RISK

Cowan (2003) reported the fauna species at risk in the East Murchison subregion as Bilby (*Macrotis lagotis*), Marsupial Mole (*Notoryctes typhlops*), Mulgara (*Dasycercus cristicauda / blythi*), Malleefowl (*Leipoa ocellata*), Princess Parrot (*Polytelis alexandrae*), Slender-billed Thornbill (*Acanthiza iredalei iredalei*), Giant Desert Skink (*Liopholis kintorei*) and Peregrine Falcon (*Falco peregrinus*). This report assesses the potential for these species to be found in the project area and the potential impact that a proposed development might have on these species, and other conservation significant fauna. The Cowan (2003) report is now very dated, but the DBCA has not updated the biodiversity audit for Western Australia since that report.

3. METHODOLOGY

3.1 DETERMINATION OF SURVEY SAMPLING DESIGN AND INTENSITY

Prior to the development of the survey methodology, a review was undertaken of the factors likely to influence the survey design, and a summary of the issues considered is provided in Table 1.

Table 1. Factors likely to influence the survey design

Factor	Relevance	Comment
Bioregion – level of existing survey knowledge of the region and associated ability to predict accurately.	The study area is located in the Eastern Murchison (MUR1) subregion of the Murchison biogeographic region. Numerous fauna surveys and similar Level 2 fauna assessments have been undertaken in the region.	There are numerous fauna surveys in similar habitat that provide data on fauna assemblages in mulga woodland habitats.
Landform special characteristics/specific fauna/specific context of the landform characteristics and their distribution and rarity in the region.	Fauna habitat in the project area is not dissimilar to that in the many square kilometres of surrounding area, being a relative flat plain mostly vegetated with sparse mulga with more dense groves along ephemeral drainage lines.	Survey sites have sampled all the major fauna habitats present.
Life forms, life cycles, types of assemblages and seasonality (e.g. migration) of species likely to be present.	Two surveys were undertaken, one in summer and the second in early autumn. The site is not used by a large number of migratory avifauna species.	The project area supports variations of Goldfields mulga habitat, which are best sampled in the warmer months to record the reptiles and mammals and after heavy rains to maximise the inventory of birds and amphibians.
Level of existing knowledge and results of previous regional sampling (e.g. species accumulation curves, species/area curves).	Vertebrate fauna habitats present in the project area and surrounds have been well surveyed by numerous researchers and environmental consultants across the region.	Survey data in the vicinity of the project area provides a comprehensive list of vertebrate fauna likely to be recorded in the project area.
Number of different habitats or degree of similarity between habitats within a survey area.	The project area was dominated by two fauna habitat types. There were no salt lakes or wetlands present in the project area, although there is an ephemeral creekline running north-south through the project area.	Most of the proposed disturbance will occur in the mulga woodland on the plain. This was the focus area for the trapping program.
Climatic constraints (e.g. temperature or rainfall that preclude certain sampling methods).	The Murchison bioregion experiences hot summers with rainfall peaks that result from decaying cyclones and summer and winter thunderstorms. Summer rainfall is unpredictable.	The survey was conducted in summer and early autumn at a time suitable to catch/observe a representative sample of most vertebrate fauna except amphibians. Very few plants were flowering so the avifauna data will underrepresent the avifauna potentially in the project during periods after heavy rain when multiple plants are flowering.
Sensitivity of the environment to the proposed activities.	Habitat in the project area is well represented in the surrounding area.	There were no environmentally sensitive areas present in the project area. The project area was both

Factor	Relevance	Comment
	There are no environmentally sensitive environments in the project area.	systematically and opportunistically sampled.
Size, shape and location of the proposed activities.	The project area is an irregular shape (Figure 2) and is approximately 23km by 15km, with the access road into the existing mining area approximately 27km north of Leonora on the Goldfields Highway.	The proposed disturbance area is unknown, however, the assessed project area is 15,450ha. EPA's (2016b) Guidance Statement suggests a Level 2, two season survey is required for an area of this size in this location.
Scale and impact of the proposal.	The scale of the project is unknown, but early indications are that it warrants a Level 2 survey, in accordance with EPA guidelines.	A large-scale mining project located in the Goldfields requires a Level 2 survey unless there are adequate data to describe the fauna assemblage in the intended impact areas.

3.2 DATABASE SEARCHES

Several databases were consulted in the preparation of the potential list of vertebrate species that could be found in the project area. A search of Terrestrial Ecosystems' fauna survey database was undertaken to develop a list of birds, reptiles, mammals, amphibians and fish that have been recorded in previous surveys in the region. A search of the Department of Biodiversity, Conservation and Attractions' (DBCA) NatureMap was undertaken to identify potential threatened or priority species in the region and a search of the Department of Agriculture, Water and the Environment's *EPBC Act 1999* online database was also undertaken to identify species of conservation interest to the Commonwealth Government potentially in the project area. The search area for this database search had a centre point of 28.66596°S,121.14082°E and a buffer zone of a radius of 50km (Appendix A).

Other more general texts were also used to provide supplementary information including Tyler *et al*. (2000) for frogs; Storr *et al*. (1983, 1990, 1999, 2002, Thompson and Thompson 2006e) for reptiles; Johnstone and Storr (1998, 2004) for birds, and van Dyck and Strahan (2008) for mammals. In addition, the list of published and unpublished reports on fauna surveys identified in Section 2.4 have been used to provide a regional context for the small vertebrate assemblages sampled in the project area.

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

There are errors in most databases, including NatureMap and the WAM collection. These errors occur because of a misidentification of individuals, taxonomic name changes and incorrect coordinates being entered into the database. Terrestrial Ecosystems was unable to verify the primary records, so it has used the information provided. Readers should therefore appreciate that species lists, and fauna surveys reported in the tables and appendices may include these errors.

3.3 FAUNA HABITAT ASSESSMENT

A fauna habitat assessment was undertaken for the entire project area (see Figure 2 and Figure 6 for assessment coverage). This field assessment had three foci:

- assessing fauna habitat types and their condition;
- recording evidence of conservation significant fauna; and
- assessing the possible presence of Malleefowl, Mulgara and Bilbies within the project area, so that mitigation and management strategies might be implemented to reduce potential impacts.

Fauna assessors stopped at multiple locations within the project area (Figure 6) and recorded a suite of data about the fauna habitat and its condition (Appendix B). This information included a description of the habitat structure, habitat condition, landform, soils and vegetation and time since last fire. Appendix O shows the data that were recorded at each location as part of the habitat assessment.

3.4 TRAPPING

The survey methodology adopted for the vertebrate fauna trapping program was aligned with the Terrestrial Ecosystems' interpretation of EPA's Guidance Statement (Environmental Protection Authority 2016b), and the Technical Guide on terrestrial fauna assessments (Environmental Protection Authority 2016a).

Published literature based on goldfields survey data (Thompson and Thompson 2005c) indicate that spring and summer are the optimum time periods for vertebrate fauna surveys in the arid and semi-regions of Western Australia.

Survey sites were established between 29 October and 7 November 2019. All traps were opened between 19- 26 November 2019, and again between 11- 18 March 2020. Fauna survey sites were selected so that they sampled a representative set of the fauna habitats in the project area.

Fifteen survey sites were established (Figure 3). Each site consisted of four trapping lines. Each trap line consisted of three 20L buckets, three PVC pipes (500mm deep, 150mm wide) and six funnel traps (3 pair) spread along a 30m, 250mm high fly-wire drift fence (Plate 2 and Plate 3).

Plate 2. Trap line

There are no trappable fauna anticipated to be in the region which will be specifically caught in aluminium box traps or wire cage traps. Both of these trap types are unlikely to provide any additional useful information if an adequate number of pit-traps and funnel traps are used (Thompson et al. 2005b, Thompson and Thompson 2007d). The risks of compromising animal welfare due to heat and ants are also higher in aluminium box traps and wire cages in arid environments so we didn't use these strategies.

All 20L buckets contained pieces of white polystyrene in the bottom to help reduce trap deaths due to heat stress. During thunderstorms or significant rainfall events when the traps were open, the polystyrene floated and provided caught animals a raft if the pit-traps filled with water. Polystyrene was not necessary in the PVC pipes as the sun is only directly overhead for a small time and water drains freely through the fly-wire bottom. All funnel traps were covered with two shade cloth covers to minimise heat stress.

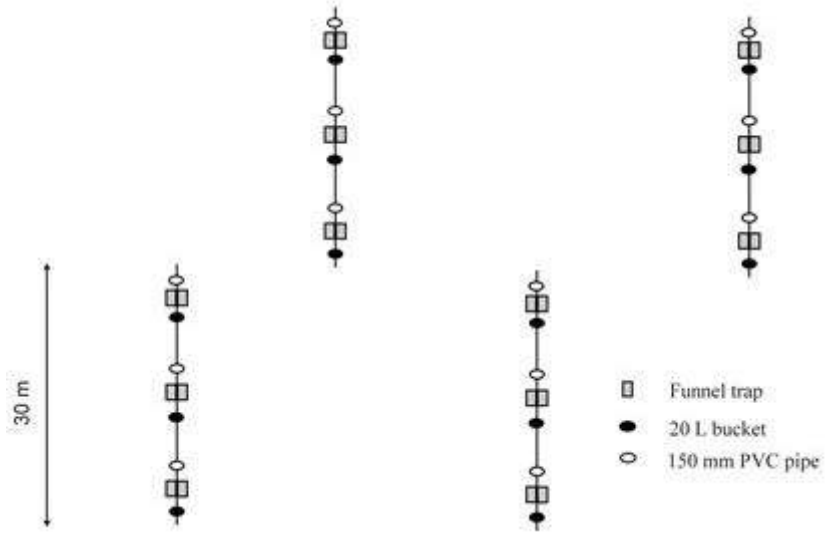


Plate 3. Layout of a single trapping site

A total of 5,040 pit-trap nights and 5,040 funnel trap-nights were used to sample the small vertebrate fauna. All traps were cleared within 4 hours of sunrise each day. The coordinates for trapping sites are shown in Appendix C.

3.4.1 Spotlighting surveys

Searches at night using spotlights were undertaking on three occasions in November 2019 and two occasions in March 2020 for a total of 40 person hours. This was mostly done in a vehicle travelling at about 5-10km per hour along the various tracks in the project area. Call playback was also undertaken during these assessments to assess the presence of nocturnal avifauna.

3.4.2 Avian surveys

Systematic avifauna surveys were carried out on most days that traps were open during both trapping periods. Areas searched for birds are shown in Appendix D and Figure 2. Twenty minutes was spent searching for birds in 2ha using a wandering transect method (Thompson and Thompson 2010). Where the habitat did not allow for a wandering approach around a central point (i.e. Sullivan Creek) a linear 2ha search (400m*50m) was adopted.

3.4.3 Camera traps

Fifty Reconyx 600 camera traps were deployed on 4 November and retrieved on 20, 21 or 22 November 2019 and 25 Reconyx HC600 camera traps were deployed on 13, 14 or 15 March and retrieved on 6 April 2020. All camera traps (Plate 4) had a non-reward bait lure (Plate 5) which consisted of peanut butter, sardines, oats and soaked in fish/whale oil. The location and deployment of camera traps is shown in Appendix E and Figure 4.

Plate 4. Camera trap

Plate 5. Non-reward camera trap lure

3.4.4 Song meters

Five SM2 Audio Song Meters were deployed at various sites each for a single night around the project area in both November 2019 and March 2020. A total of ten nights were surveyed providing a total of 50 survey sites (Appendix F and Figure 3).

3.5 DATA ANALYSIS

The first aspect of the data analysis was to characterise the vertebrate fauna assemblage in the project area and to indicate similarities and differences among sites.

3.5.1 Defining fauna habitats

Fauna habitats can be determined in multiple ways. Prior to deploying traps in the ground and undertaking avian surveys, it is necessary to assess potential habitat types in the entire project area. This was done by Dr Scott Thompson with a visual inspection of the project area on 10-11 September 2019. Based on the visual assessment, it was determined that there were two major fauna habitat types: a) mulga woodland with varying densities of mulga with sparse mid and understorey of shrubs and grasses, and b) the ephemeral creekline that runs north-south through the project area (Figure 2). Based on this visual assessment it was decided that 10 of the 15 trapping sites would be in the mulga woodland and five would be placed in the vegetated areas along the ephemeral creekline. Avian and bat echolocation surveys would ensure broad scale coverage of the entire project area, including the vegetated ephemeral creekline.

To confirm visually identified fauna habitats, a Principal Component Analysis (PCA) was calculated based on the vertebrate fauna trapping data. This would test the assumption of two broad fauna habitats, as the vertebrate fauna assemblage should cluster into two groups representing the two preselected habitat types.

A PCA was also calculated on the avian data, however, it was not expected that these data would display habitat groups, as very few birds (i.e. species and individuals) were recorded in each of the 20 minute-2ha searches, so there was unlikely to be sufficient data for each survey site to provide a meaningful result in the PCA.

The PCA was performed in StatistiXL (www.statistixl.com) using the correlation matrix and plotting the Eigenvalues for PC1 and PC2 as these two principal components accounted for the highest percentage of variance.

3.5.2 Analysing data based on fauna habitats

Fauna data are best analysed based on habitat types, which is what has been done here for the trapping data.

The diversity for the trapped fauna assemblage can be measured in numerous ways (Hayek and Buzas 1997, Magurran 2004). The four most common attributes are species richness, evenness, a single diversity score and relative abundance. These metrics are interrelated and there are a diverse number of analytical tools available to quantify these metrics and similarity among the trapped assemblages for each site.

3.5.2.1 Species richness and relative abundance

The actual number of species caught at each trapping site is one measure of species richness and is directly related to the trapping effort and number of individuals caught. Had the trapping effort been extended and more individuals caught, then it is likely the number of species caught at each site would increase (Colwell and Coddington 1994, Magurran 2004).

3.5.2.2 Evenness

Smith and Wilson (1996), supported by Magurran (2004), reported their measure of evenness (Evar) to be the most satisfactory overall. Evar was calculated for each of the survey sites using Species, Diversity and Richness software (Pisces Conservation Ltd 2010, V4.1).

3.5.2.3 Diversity

Log series diversity (also known as Fisher's alpha) was used to measure diversity because of its good discriminating ability and low sensitivity to sample size (Kempton and Taylor 1974, Magurran 1988, Hayek and Buzas 1997). Log series diversity was calculated using Species, Diversity and Richness software (Pisces Conservation Ltd 2010, V4.1). Shannon-Wiener and Simpson's indices are also provided for each trapping site for comparison with other reports.

3.5.2.4 Similarity

Having established that there were significant differences among the trapped assemblages at each site, Terrestrial Ecosystems wished to indicate the extent to which the sites were similar. The Morisita-Horn similarity index was used to compare similarity between combinations of fauna assemblages at each site. The quantitative Morisita-Horn similarity index was selected because it is not strongly influenced by either species richness or sample size (Wolda 1981) and it was recommended by Magurran (2004). Readers should, however, be aware that it is heavily influenced by the abundance of the most abundant species.

3.5.2.5 Species accumulation curves

Species accumulation curves, or collectors' curves, plot the cumulative number of species discovered in a defined sampling area with increasing levels of survey effort (Thompson *et al*. 2007). Species accumulation curves provide a measure of species inventory efficacy and completeness, and can be used to compare surveys based upon standardized sampling protocols (Moreno and Halffter 2000). Soberón and Llorente (1993) suggested that species accumulation curves lend rigour to fauna inventories.

Species accumulation curves were prepared to demonstrate the adequacy of the survey effort. Input data was the number of individuals by species for each of 14 days (i.e. data for the two survey periods combined). For the trapping data, captures were randomly allocated across the 14-day trapping period and 10,000 iterations were used to average the curve. For the bird data, site survey results were used instead of days, and again

10,000 iterations were used to average the curve. Non-linear regression curves were then calculated using the Beta-P model (Thompson *et al*. 2003c) in NLREG software (Sherrod 2001) for the combined trapping and avian data. Species accumulation curves were plotted with the ordinate axis as species richness and the abscissa the number of individuals caught or seen for birds.

3.6 FIELD WORK AND REPORTING STAFF

Dr Scott Thompson was the team leader and coordinated the overall field assessment. Dr Scott Thompson and Ray Turnbull with support from Georgia Ford, Dr Cara Sambell and John-Michael Stuart undertook the fauna habitat assessment using an ATV or 4WD to move around the project area. Dr Scott Thompson, Dr Cara Sambell, Ray Turnbull, Georgia Ford, John-Michael Stuart undertook the trapping program and Ray Turnbull undertook the avian survey. Additional staff were used to assist with the set up of trapping sites prior to the surveys. Tim Clarke (Red 5) provided logistical and field assistance during the set up and trapping programs. Dr Kyle Armstrong, of Specialised Zoological, undertook the analysis of bat echolocation data. The data analysis was undertaken by Dr G Thompson and the report prepared by Drs G. and S. Thompson.

Senior scientists have appropriate relevant post-graduate qualifications, extensive experience in conducting fauna assessments in the Goldfields, have published research articles on biodiversity, fauna assemblages, conservation significant species, trapping techniques and temporal variations in trapped fauna assemblages based on Goldfields surveys and are therefore appropriately trained and experienced to undertake the survey and prepare the assessment. The qualifications and experience of the survey personnel are shown in Table 2.

Table 2. Project personnel and their qualifications

Name	Qualifications	Experience	Role
Dr Scott Thompson	BSc. (Env. Sc.), MSc. (Env. Mngt.), PhD (Env. Sc./Mngt).	> 15 years	Survey coordinator and principal zoologist
Dr Graham Thompson	Post Grad. Dip. (Zool.), PhD (Zoology)	> 20 years	Principal zoologist
Ray Turnbull	BNat Sc., GDip Ornithology	> 8 years	Senior Zoologist
Dr Cara Sambell	BA (Outdoor Env Ed), PhD (Cons Biol)		Zoologist
Georgia Ford	BSc., MSc.	> 4 years	Zoologist
Dr Kyle Armstrong	BSc. (Hons), PhD (Zoology)	> 15 years	Chiropterologist
John-Michael Stuart	BSc. (Hons),	> 5 years	Zoologist

All fauna trapping was conducted under a DBCA Regulation 27 licence #BA27000160 issued to Dr Scott Thompson.

3.7 ANIMAL ETHICS

Environmental consultants in WA are currently not required to obtain approval from an established animal ethics committee to undertake terrestrial vertebrate fauna surveys.

To minimise fauna deaths due to heat stress, all funnel traps had shade covers and all buckets contained two pieces of polystyrene. Polystyrene sheets insulate against heat and float, providing a raft for small individuals when pit-traps filled with water (Thompson and Thompson 2009). Traps were cleared daily commencing at first light with the last traps cleared within 4 hours of sunrise. Ant powder was placed around and in pit and funnel traps where ants were an obvious problem.

3.8 TAXONOMY AND NOMENCLATURE

Taxonomy and nomenclature for fauna species used in this report are generally based on the WA Museum species list except for bats, which follow Churchill (2008) and birds which follow Christidis and Boles (2008) and updated from ebird (www.ebird.org). Terrestrial Ecosystems has presumed that the identifications referred to in the appendices and in the reports used to provide regional comparative data are correct and we have only corrected obvious records where the nomenclature was known to be incorrect.

3.9 LIMITATIONS

This Level 2 fauna risk assessment uses information contained in the Commonwealth Government Matters of National Environmental Significance (MNES) online database and other published and unpublished fauna survey data for the bioregion and site surveys.

The EPA (2016b) *Technical Guidance Terrestrial Fauna Surveys* suggested that fauna surveys may be limited by many variables. Limitations associated with each of these variables are assessed in Table 3.

Table 3. Fauna survey limitations and constraints

Possible limitations	Constraint (yes/no); significant, moderate or negligible	Comment
Competency and experience of the consultant carrying out this assessment	No	The senior environmental scientists that undertook the field survey and assessment, drafted and reviewed this report are familiar with the vertebrate fauna of this bioregion.
Scope	No	All aspects of the scope of works have been addressed.
Proportion of fauna identified, recorded and/or collected	Yes, negligible	As discussed below.
Accuracy of previous survey work	Yes, negligible	Terrestrial Ecosystems has reported fauna survey data recorded by various authors but is not able to vouch for the accuracy of this information (other than its own work). It is acknowledged that the taxonomy of Western Australian vertebrates is continually being revised and the nomenclature of some of the species listed in the appendices may have changed since publication by the authors.
Sources of information	Yes, negligible	Vertebrate fauna information was available from on-line databases and unpublished and published reports of surveys conducted in the bioregion in a variety of habitat types. Many of these surveys employed a low level of trapping effort which significantly impacts on the capacity of these data to represent the fauna assemblages in the areas surveyed.
Proportion of the task achieved	No	All tasks completed.
Timing/weather/ season/ cycle	N/A	Weather was appropriate during the site surveys.
Disturbances which affected results of the survey	No	Disturbance in the project area have been factored into this assessment.
Intensity of survey effort	N/A	The survey effort applied here generally far exceeds that undertaken for other vertebrate fauna assessments in the Goldfields and the Pilbara (Fraser *et al*. 2003, Thompson and Thompson 2010, Thompson and Thompson in press).
Completeness	No	All aspects of this assessment have been completed.
Resources	No	Adequate resources were available.
Remoteness and/or access problems	No	All parts of the project area, other than the active mining area, were accessed.
Availability of contextual information on the region	No	Fauna survey data are available for the general area and specifically fauna habitats accessed in the project area.

4. RESULTS

4.1 FAUNA HABITAT

4.1.1 Fauna habitat type

There are two broad fauna habitats in the project area:

- open mulga woodland over mixed shrubs and scattered grasses or bare ground (Plate 6, Plate 7, Plate 8, Plate 9); and
- woodland of large eucalypts over mixed shrubs and scattered grasses along the ephemeral creekline that runs north-south through the project area (Plate 10 and Plate 11).

Plate 6. Open mulga woodland over mixed shrubs and scattered grasses or bare ground

Plate 7. Open mulga woodland over mixed shrubs and scattered grasses or bare ground

Plate 8. Open mulga woodland over mixed shrubs and scattered grasses or bare ground

Plate 9. Open mulga woodland over mixed shrubs and scattered grasses or bare ground

Plate 10. Woodland of large eucalypts over mixed scattered grasses and shrubs along the ephemeral creekline

Plate 11. Woodland of large eucalypts over mixed scattered grasses and shrubs along the ephemeral creekline

Plate 12. Woodland of large eucalypts over mixed scattered grasses and shrubs along the ephemeral creekline

Plate 13. Woodland of large eucalypts over mixed scattered grasses and shrubs along the ephemeral creekline

The results of the rapid habitat assessment are shown in Appendix O and the location of each of these assessment sites is provided in Figure 6. The density of trees and shrubs in both habitat types varied across the project area but was mostly sparse in the open mulga woodland.

4.1.2 Fauna habitat condition

Tarmoola and Sturt Meadows stations run cattle on their respective stations, and these cattle graze over the entire project area, excluding the active mining area. The quality of fauna habitat varies from highly degraded to good. The more degraded areas include the active mining area, historical and recent exploration areas and where cattle grazing is occurring. There are numerous access tracks in the project area (Figure 3), but these are generally narrow and mostly only wheel tracks on a sand-clay substrate. There is extensive evidence of feral fauna (i.e. wild dogs and cats) in the project area.

There is an isolated old mining pit (Rainbow Pit) that contains permanent freshwater water and attracts waterbirds and is a drinking point for avifauna in the dry periods.

4.2 FAUNA ASSEMBLAGE

4.2.1 Trapped terrestrial vertebrate fauna

The terrestrial vertebrate fauna were trapped at 15 sites using buckets and pipes as pit-traps and funnel traps along fly-wire drift fences. The results of the trapping program are provided by survey period and site and trap type in Appendix G. Buckets, followed by funnel traps were the most successful method of catching terrestrial fauna.

Less than five individuals were recorded for multiple species during each survey period, with five species caught once and three species caught twice. Small mammals were relatively scarce, as were large snakes and dragon lizards. The most abundant species caught were small geckos and skinks. There was a marked difference in the fauna species caught into two habitat types.

4.2.2 Spotlighting

Surveyors observed rabbits (*Oryctolagus cuniculus*), Euros (*Macropus robustus*), Red Kangaroos (*Macropus rufus*), a Stimson's Python (*Antaresia stimsoni* – dead on the haul road) and a Rosen's Snake (*Suta fasciata*) during nocturnal spotlighting surveys. The scarcity of small vertebrate fauna in the project area was evident in the spotlighting surveys.

4.2.3 Avifauna

Avifauna records are provided by site in Appendix H. Of the 53 species recorded at the 87 avifauna survey sites, 10 were recorded once, eight recorded twice and 36 species recorded on less than 10 occasions, indicating the scarcity of numerous species in the project area. Eight waterbird species were recorded in the Rainbow Pit, which was not unexpected as there is permanent freshwater in the bottom of this mine pit.

4.2.4 Camera trapping

Camera trap results are provided in a matrix in Appendix I. Cattle were the most commonly recorded species on camera traps (i.e. 43 of the 75 camera traps). Wild dogs and feral cats were each recorded on 19 camera traps, and Red Kangaroos on 24. Feral predators (e.g. cats and wild dogs) appear to be relatively abundant in the project area.

Plate 14. Feral cat

Plate 15. Wild dogs

Plate 16. Red Kangaroo

Plate 17. Cow

Plate 18. Wild dog/dingo

Plate 19. Rabbit

4.2.5 Bats

Specialised Zoological (2020) analysed the data from the SM2 Audio Acoustic Meters and a summary of the results is provided in Appendix J. The methodology is provided in the report (Appendix N).

Bats from two families (i.e. Vestertilionidae and Molossidae) were recorded at multiple survey sites using their echolocation calls. The six named species (appendix J) are widespread and abundant in the Goldfields and elsewhere in Western Australia's semi-arid regions.

4.3 FAUNA ASSEMBLAGE STRUCTURE

4.3.1 Trap type

Three trap types were deployed in this survey. Different trap types sample the small vertebrate assemblages differently (Thompson *et al*. 2005b, Thompson and Thompson 2007d). Small mammals were only caught in pit traps, with buckets and pipes catching equally well when seasonal survey data were combined (16 in buckets and 15 in pipes); however, buckets were more successful in November (6 in buckets and 2 in pipes) compared to pipes in March (10 in buckets and 13 in pipes). Buckets followed by funnel traps were the most effective in catching reptiles for both November and March (Appendix G). These trapping results differ with the conclusions of Thompson and Thompson (2007d) who reported funnel traps being important for capturing reptiles, but is similar to Thompson *et al*. (2005b) who reported buckets and pipes as having a trapping bias and capturing a different component of the fauna assemblage. If different trap types were not used, then the results may misrepresent the faunal assemblage that actually occurred on site.

4.3.2 Fauna assemblages determining fauna habitats

PCA calculated for the trapping data indicated two distinct fauna habitats (Chart 2). Trapping sites 4, 7, 8 9 and 10 are in the ephemeral creekline, whereas, all other sites are mulga woodland with variable densities of vegetation. This clear separation of fauna habitats based on the trapped fauna assemblage confirms the visual observation and the initial determination of placing five sites in the ephemeral creekline and the remaining 10 sites in the mulga woodland as they represented different fauna habitats. PCA1 recorded 45.4% of total variance and PCA2 27.9% of total variance, indicating that these two components removed 73.4% of the available variance (Chart 2).

Species accumulation curves for the trapping data should therefore be calculated based on the fauna assemblages in each of these two fauna habitat types.

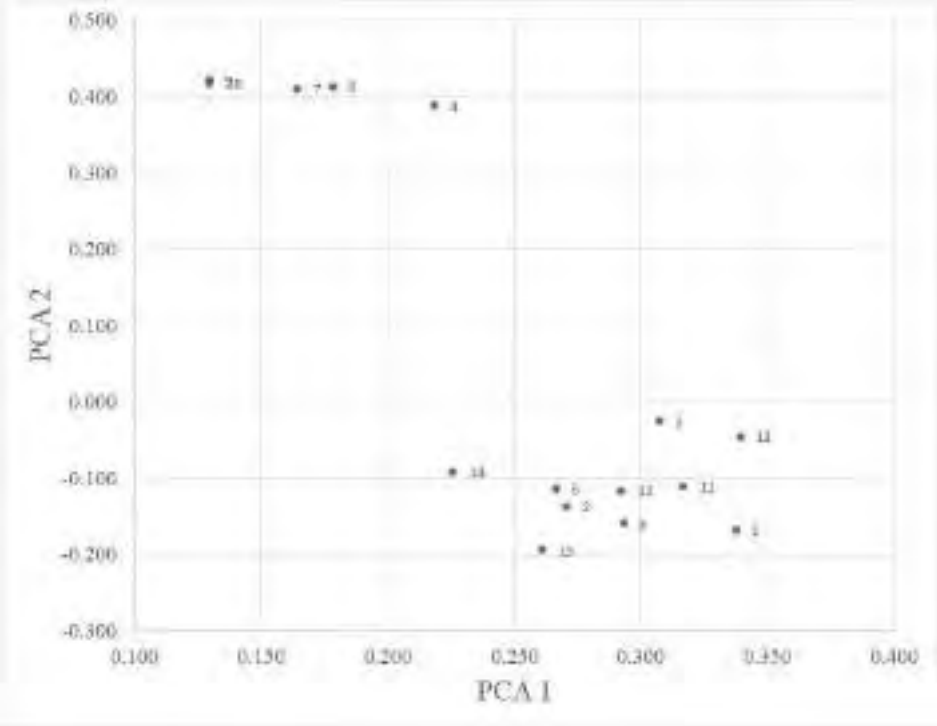


Chart 2. PCA with Eigenvectors 1 and 2

4.3.3 Species accumulation curves

Species accumulation curves plot the cumulative number of species recorded in a defined sampling area with increasing levels of survey effort (Thompson *et al*. 2003c, Thompson and Thompson 2007e). They can provide a measure of species inventory efficacy and completeness, can be used to compare surveys based upon standardized sampling protocols (Moreno and Halffter 2000) and can provide information about the assemblage structure (Thompson and Withers 2003).

When the data from all sites were combined, 40 species of reptiles and small mammals were trapped in the project area. Species accumulation curves were calculated for the two habitat types and this modelling predicted that 28 species would be caught in the ephemeral creekline and 23 species would have been caught if 1,000 individuals had been were caught (Chart 3). Our survey caught 22 species in this habitat type. For the mulga woodland, it was predicted that there were 127 species, and if 1,000 individuals had been caught, then it would have recorded 35 species (Chart 4). One hundred and twenty-seven species is clearly incorrect and occurred because of the large number of singletons and doubletons recorded in the trapping survey. We

caught 33 species which is comparable to the estimate of 35 if 1000 individuals were recorded. For trappable vertebrate fauna, reasonable estimates of species richness are 23 for the ephemeral creekline and 35 for the mulga woodland.

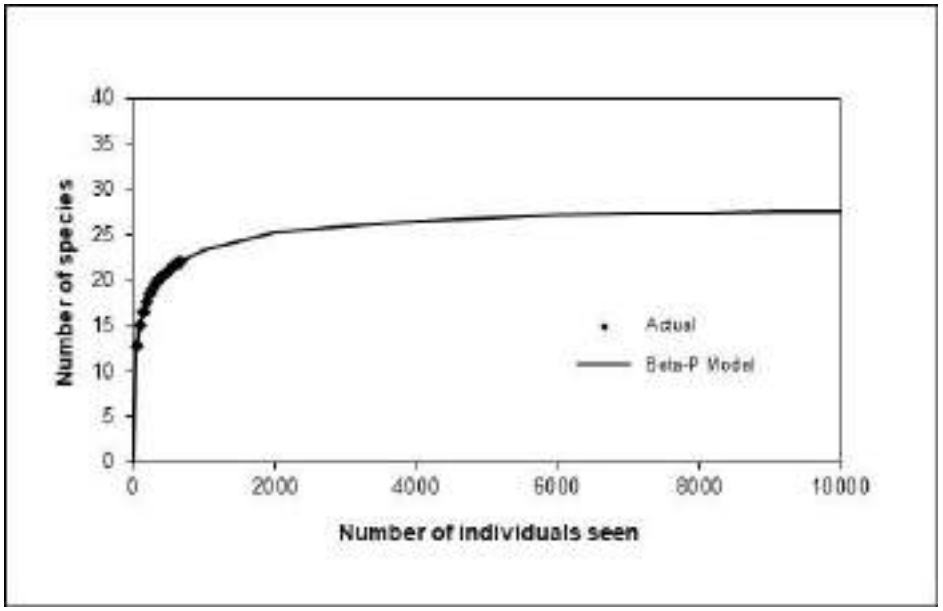


Chart 3. Species accumulation curve for the ephemeral creekline habitat

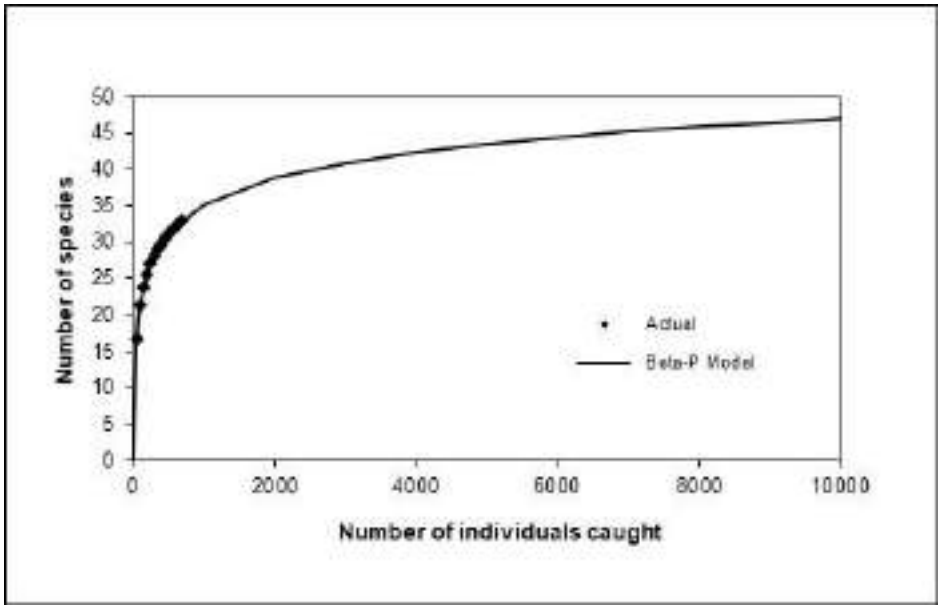


Chart 4. Species accumulation curve for the mulga woodland habitat

The species accumulation curve for avifauna based on birds recorded at the 87 surveys sites is shown in Chart 5. The projected species richness was 91 species; and had 1,000 birds been recorded then the estimated number of species recorded would have been 56. When all species were included, including incidental observations, the recorded avifauna species richness was 72. However, this included the species recorded in Rainbow Pit (Appendix D) during two visits (11 and 17 March 2020). Rainbow Pit is an old, long-used mining pit that contains permanent freshwater and supported numerous waterbirds, that were not recorded elsewhere in the project area due to a lack of suitable habitat.

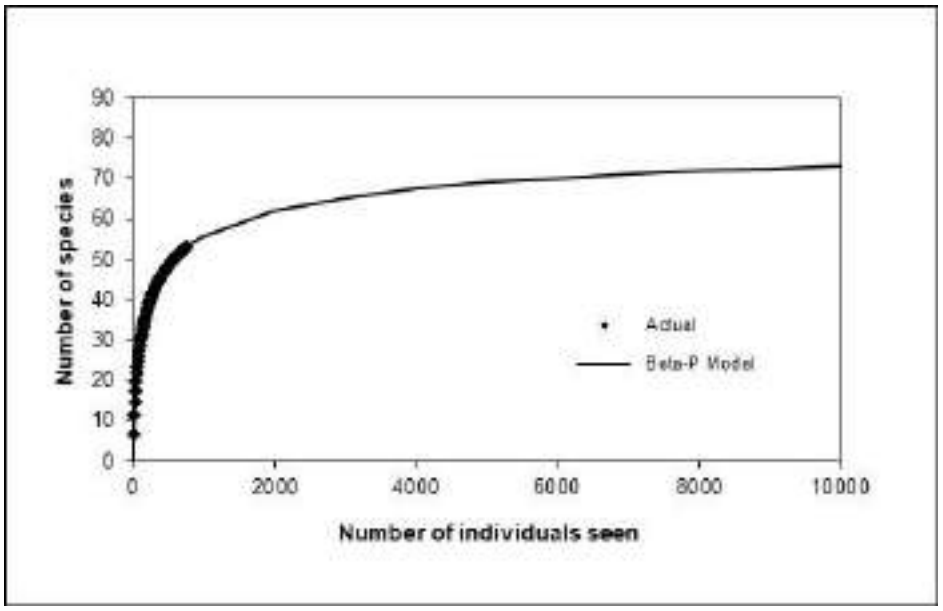


Chart 5. Species accumulation curve for all bird observations at the 87 site sites

4.3.4 Diversity and evenness

Diversity scores indicated that vertebrate diversity varied appreciably among trapping sites (Table 4). Sites 2, 9, 10, 11 and 14 had species richness of 17 or higher, and all sites had a species richness higher than 13 with the overall species richness of 40.

The most diverse sites were 11, 12 and 14, all with Fisher's Alpha scores above 7, whereas, Shannon-Weiner Index is highest for site 11, with sites 6, 9, 10, 12 and 14 having scores higher than 2.4. Simpson's Index more closely reflects the Fisher's Alpha values recording site 11 as the highest, and sites 6 and 12 being above 10 (Table 4).

All sites scored above 6.4 except site 15 on evenness, with sites 6 and 11 scoring the higher values (Table 4).

Table 4. Diversity and evenness indices and species richness for vertebrate fauna captures for trapping sites

Trapping site	Fisher's Alpha	Shannon-Weiner Index (H)	Simpson's Index	Evenness	Species richness
1	5.449	2.229	7.524	0.716	15
2	5.770	2.253	6.516	0.643	17
3	6.747	2.167	6.842	0.684	14
4	3.506	2.185	7.704	0.778	13
5	5.633	2.273	8.674	0.774	14
6	6.598	2.448	10.600	0.804	16
7	4.355	2.197	7.418	0.737	14
8	3.258	2.114	7.258	0.778	12
9	6.258	2.426	9.426	0.740	19
10	4.611	2.422	9.235	0.769	17

Trapping site	Fisher's Alpha	Shannon-Weiner Index (H)	Simpson's Index	Evenness	Species richness
11	7.638	2.600	12.760	0.829	18
12	8.704	2.444	10.780	0.788	16
13	5.559	2.189	7.700	0.723	15
14	7.344	2.413	8.570	0.721	17
15	4.665	1.869	4.101	0.534	13
Overall	7.726	2.914	13.880	0.711	40

4.3.5 Similarity

A similarity score of 1.0 (range 0.0–1.0) indicates that the two sites being compared have identical fauna assemblages, whereas a low score indicates that the fauna assemblages differ appreciably. Based on the PCA, it would be expected that sites in each of the fauna habitats might have a similar fauna assemblage and would score higher that those between habitat types. This is true for the sites in the ephemeral creekline (Table 5; coloured mustard) but there is high variability in the mulga woodland sites, as might be expected due to the variable densities of vegetation.

Table 5. Similarity in the trapped fauna assemblage among each of the survey sites

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
2	0.779													
3	0.844	0.864												
4	0.352	0.308	0.501											
5	0.800	0.527	0.605	0.367										
6	0.801	0.447	0.568	0.377	0.746									
7	0.235	0.210	0.401	0.935	0.213	0.255								
8	0.257	0.296	0.454	0.932	0.192	0.238	0.944							
9	0.203	0.152	0.324	0.888	0.210	0.276	0.818	0.868						
10	0.242	0.131	0.354	0.862	0.225	0.344	0.825	0.862	0.906					
11	0.751	0.745	0.660	0.439	0.675	0.578	0.358	0.393	0.278	0.272				
12	0.806	0.447	0.541	0.399	0.797	0.793	0.327	0.272	0.292	0.273	0.691			
13	0.783	0.569	0.630	0.570	0.834	0.704	0.437	0.439	0.374	0.331	0.818	0.817		
14	0.578	0.878	0.680	0.334	0.501	0.292	0.280	0.360	0.197	0.154	0.757	0.356	0.518	
15	0.736	0.462	0.426	0.144	0.640	0.613	0.076	0.130	0.109	0.105	0.609	0.676	0.692	0.382

4.4 BIOREGIONAL VERTEBRATE FAUNA ASSEMBLAGE

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

Appendix L provides a list of vertebrate species potentially found near the project area that have been compiled based on the fauna survey report results shown in Appendix K.

The Goldfields support multiple and differing fauna habitats, with the five most noticeable being open mulga woodland, spinifex on sandplains, eucalypt woodlands, chenopod shrublands and salt lakes. Each of these habitat types supports a unique fauna assemblage, and there are shared species that are widespread and ubiquitous. It was therefore expected that many of the species in the lists provided in Appendix L would not be found in the project area. Similarly, there are some species that are very tolerant of disturbance and persist in highly disturbed environments (e.g. *Heteronotia binoei, Underwoodisauris milii*) and might therefore be expected to be present in relatively high abundance in the project area.

There are multiple species that were expected in the project area, but were not recorded (e.g. *Ctenophorus cristatus, Ctenophorus nuchalis, Tympanocryptis cephala, Cercartetus concinnus* and *Antechinomys laniger*). The lack of these species is probably due to the altered fauna habitats due to cattle and goat grazing and predation by wild dogs and feral cats, with the dry conditions in the months prior to the survey also having an influence.

The avifauna list in Appendix L contains a lot of wetland bird species. Wetland bird abundance in the Goldfields is determined by rainfall and the presence of freshwater water or salt lakes. Salt lakes are scattered throughout the Goldfields and water levels change based on major rainfall events. Permanent freshwater is probably more common now than historically because the water has filled the bottom of many abandoned mining pits. There are very few freshwater lakes in the Goldfields and water in many of the mining pits is saline, and many of the paleochannels are saline or hypersaline.

4.5 CONSERVATION SIGNIFICANT FAUNA

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

Wetland and wetland migratory bird species have been excluded from the following list and assessments, as there is no suitable habitat for these species in the project area. One threatened species of fauna and one migratory/marine species of birds identified under the *EPBC Act 1999* potentially occur in the project area. There are three Schedule species listed under the *BC Act 2016* and one species listed on the DBCA's Priority Fauna List that potentially occur in the project area. The following is an assessment of the likelihood of each of the species listed in Table 6 being found in the project area.

Table 6. Assessment of the potential presence and impact on a species of conservation significance

Species	DBCA Schedule / Priority	Status under Commonwealth *EPBC Act 1999*	Comment on the potential presence of a species and potential impact from development
Night Parrot *Pezoporus occidentalis*	Critically Endangered	Endangered	Highly unlikely to be in the project area, due to a lack of suitable habitat. The potential for impacting on this species is therefore very low.
Arid Bronze Azure Butterfly *Ogyris subterrestris petrina*	Critically Endangered	Critically Endangered	Highly unlikely to be in the project area, due to a lack of suitable habitat and lack of nearby records. The potential for impacting on this species is therefore very low.
Malleefowl *Leipoa ocellata*	Vulnerable	Vulnerable	Highly unlikely to be in the project area due to a lack of suitable habitat and high density of feral fauna. The potential for impacting on this species is therefore very low.
Chuditch *Dasyurus geoffroii*	Vulnerable	Vulnerable	Highly unlikely to occur in the project area. The potential for impacting on this species is therefore very low.
Princess Parrot *Polytelis alexandrae*	Priority 4	Vulnerable	May infrequently be seen in the region, however, clearing vegetation or development is unlikely to impact on this species.
Mulgara *Dasycercus blythi*	Priority 4		Highly unlikely to be in the project area due to a lack of suitable habitat. The potential for impacting on this species is therefore very low.
Fork-tailed Swift *Apus pacificus*	IA	Migratory	May very infrequently be seen in the region area, however, clearing vegetation is unlikely to impact on this aerial species.
Grey Wagtail *Motacilla cinereal*	IA	Migratory	Highly unlikely to be present in the project area. The potential for impacting on this species is therefore low.
Yellow Wagtail *Motacilla flava*	IA	Migratory	Highly unlikely to be present in the project area. The potential for impacting on this species is therefore low.
Peregrine Falcon *Falco peregrinus*	OS		May infrequently be seen in the region, however, clearing vegetation is unlikely to impact on this species.
Branchinella apophysata	Priority 1		Unlikely to be in the project area, so the potential for impact on this species is low.
Long-tailed Dunnart *Sminthopsis longicaudata*	Priority 4		Unlikely to be in the project area due to a lack of typical habitat and high density of feral fauna. The potential for impacting on this species is therefore low.

IA – Migratory birds protected under international agreements;

OS – Other Specially protected fauna

Night Parrot (*Pezoporus occidentalis*) - Critically Endangered under the *BC Act 2016* and Endangered under the *EPBC Act 1999*

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

The Night Parrot was probably originally distributed over much of semi-arid and arid Australia (Garnett *et al*. 1993, Threatened Species Scientific Committee 2016). Records in north-west and western Queensland in the early 1990-2000s were in a broad cross section of the habitats available (Garnett *et al*. 1993, Cupitt and Cupitt 2008, Boles *et al*. 2016). There have been recent sightings in the Pilbara in 1980, 2005 and 2017, central WA in 1979, north-eastern South Australia in 1979, western Queensland (including Pullen-Pullen-Mt Windsor-Diamantina population) in 1980, 1990, 1993, 2006 and 2013-17 (Davis and Metcalf 2008, Garnett *et al*. 2011, Charalambous 2016, Pickrell 2016, AG staff 2017, Palaszxzuk and Miles 2017, Rykers 2017, AG staff 2018), Pilbara in 2017 (Jones 2017) and the northern Goldfields (Jackett *et al*. 2017). Garnett *et al*. (2011) suggested that there were between 50-250 mature individuals in less than 5% of its previous range.

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

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

There are no mature spinifex hummocks in the project area and numerous feral fauna. As the preferred roosting and nesting sites for Night Parrots are not present and there is a significant threatening process for the species in the area (i.e. feral cats), it is Terrestrial Ecosystems' assessment that Night Parrots are not present in the project area and will therefore not be impacted by any proposed development.

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

Arid Bronze Azure Butterfly is associated with colonies of the ant *Camponotus terebrans* in mallee vegetation on sandy soil, often near flood plains, and the ant typically digs its nest at the base of eucalypts (Threatened Species Scientific Committee 2014). Butterfly larvae hatching from eggs laid near an ant nest entrance (often near the bases of various mallee eucalypts) are carried, by the ants, into their nest. Details of *C. terebrans* biology and of any form of herbivory by the larvae are unknown; however, it is likely that the larvae are myrmecophagous. These butterflies fly close to the ground and have been observed flying over agricultural lands near presumed breeding colonies (Williams and Williams 2008). The goldfields population was originally known from Lake Douglas, about 12kms south-west of Kalgoorlie (Field 1999), however, this population is reported to have become extinct (Williams *et al*. 2008, Williams *et al*. 2018) and also in the Barbalin Nature

Reserve (~11km west of Mukinbudin) in the Avon Wheatbelt which is now the only know extant population (Threatened Species Scientific Committee 2014).

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

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

Due to a lack of suitable smooth bark Eucalypts in the project area and lack of records in the region Terrestrial Ecosystems' assessment is that the Arid Bronze Azure Butterfly is highly unlikely to be present.

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

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

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

Malleefowl have been observed in the bioregion, however, there are no recent records of active breeding mounds in the vicinity of the project area. Open fauna habitat and the presence of feral and pest species significantly reduce the probability of Malleefowl utilising the project area. As a consequence, Terrestrial Ecosystems' assessment is that vegetation clearing or development in the project area is unlikely to have any significant impact on this species.

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

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

How *et al*. (1988) reported Chuditch being found near the Norseman-Lake King Road and near Mount Holland. DBCA records show that one specimen was recorded in 1974 in Kambalda East. There are multiple records south of Southern Cross and Marvel Loch and there have been other reported sightings east of Kambalda and near Norseman, but Terrestrial Ecosystems can find none north of Kalgoorlie. It is therefore highly unlikely that the Chuditch will be found as far north at Leonora and in atypical habitat.

As the project area is a long way north-east of the known distribution it is unlikely that the Chuditch would be found in the project area. As a consequence, Terrestrial Ecosystems' assessment is that any development is highly unlikely to have a significant impact on this species.

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

The Princess Parrot is found mostly in the inland arid areas of Australia, and in Western Australia in the Gibson, Little Sandy and Great Victoria Deserts (Johnstone and Storr 1998, Pavey *et al*. 2014). They are also occasionally found in lightly wooded areas adjacent to the sandy deserts (Moriarty 1972).

Very little is known about the Princess Parrot; even the exact extent of its geographical distribution. It is thought to be nomadic within the central desert regions of Australia, occupying arid shrub lands, particularly those dominated by Mulga, Desert Oak and spinifex. Due to the paucity of information on the species, accurate estimates of its conservation significance are difficult to make, however, this species is probably threatened by habitat loss to agricultural practices and changes in fire regimes.

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

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

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

The reported distribution of Mulgara includes much of the inland spinifex covered sandy desert and spinifex vegetated areas in the Pilbara and northern goldfields. Within these areas their distribution is patchy and it is most frequently confined to mature spinifex dominated habitat (Gibson and Cole 1992, Masters 1998, Masters *et al*. 2003, Thompson and Thompson 2008a). In some areas, their relative abundance is positively associated

with rainfall in the previous 12 to 24 months (Gibson and Cole 1992, Masters 1998, Dickman *et al*. 2001, Letnic and Dickman 2005) and recent burning of the spinifex does not seem to be sufficient to shift Mulgara out of an area (Thompson and Thompson 2007b). Mulgara are generally sedentary in contrast with some other small dasyurids and have high site fidelity and a low propensity for dispersal once a home range has been established (Masters 1998, Dickman *et al*. 2001).

Fauna habitat in the project area is not suitable for Mulgara. It is therefore Terrestrial Ecosystems' assessment that they are unlikely of be found in the project area.

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

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

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

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

The Grey Wagtail is a small yellow breasted bird with a grey back and head. Johnstone and Storr (2004) reported this migratory species as breeding in Palearctic from western Europe and north-west Africa to eastern Asia and wintering in Africa, south-east Asia, Indonesia, the Philippines, New Guinea and Australia. Its preferred habitat in Australia is banks and rocks in fast-running fresh water including rivers, streams and creeks where it feeds on insects.

The Atlas of Living Australia records two sightings on the south-coast of Western Australia and none around the project area. It is highly unlikely to be seen in the project area due to a lack of records and suitable habitat.

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

The Yellow Wagtail is found in the millions in the northern hemisphere and the Atlas of Living Australia records multiple records of this bird in Australia in the coastal areas. There are no records for this species in inland Western Australia near the project area, therefore it is highly unlikely to be impacted by the proposed development.

Peregrine Falcon (Falco peregrinus) - Otherwise specially protected under the *BC Act 2016*

The Peregrine Falcon is uncommon, although widespread throughout much of Australia excluding the extremely dry areas and has a wide and patchy distribution. It shows habitat preference for areas near cliffs along coastlines, rivers and ranges and within woodlands along watercourses and around lakes. Nesting sites include ledges along cliffs, granite outcrops and quarries, hollow trees near wetlands and old nests of other large bird species. There is no evidence to suggest any change in status in the last 50 years. The Peregrine Falcon has been seen in the Wanjarri Nature Reserve (Moriarty 1972, Ninox Wildlife Consulting 1994), at Honeymoon Well (Ninox Wildlife Consulting 1994) and Mileura (Tingay and Tingay 1977), so they could infrequently be seen in the general area.

Terrestrial Ecosystems' assessment is that the Peregrine Falcon may infrequently be seen in the project area, however, development is unlikely to have a significant impact on this species as it will readily move away from disturbance and there are abundant areas of similar habitat in the region.

Branchinella apophysata - Priority 1 species with DBCA

Notes from DBCA indicate that this fairy shrimp is known from a single location near Mt Margaret, but nothing is known of its habits or ecological requirements. As there are no salt lakes near the project area, it is Terrestrial Ecosystems' assessment that *B. apophysata* is unlikely to be impacted by the proposed development.

Long-tailed Dunnart (Sminthopsis longicaudata) - Priority 4 species with DBCA.

Burbidge *et al*. (2008) summarised the Long-tailed Dunnart geographic distribution as widely scattered in arid zone where it inhabits rugged rocky areas. They went on to suggest that its striated footpads, long tail and behaviour in captivity indicated that it was an active and capable climber. Specimens have been recorded in several rocky ranges in the Gibson Desert, West MacDonnell National Park, Murchison, Carnarvon Basin and the Pilbara. All previous capture sites for Long-tailed Dunnarts are within rugged rocky landscapes that support a low open woodland or shrubland of Acacias (especially mulga) with an understorey of spinifex hummocks, and (occasionally) also perennial grasses and cassias.

Three adult Long-tailed Dunnarts were caught in the Granny Smith Level 2 fauna survey (Terrestrial Ecosystems 2011b) and a single individual was caught in the follow up targeted survey (Terrestrial Ecosystems 2011c). Subsequently, Long-tailed Dunnarts have been caught at Mt Ida and Bottle Creek, which area west of Leonora. This dunnart is unlikely to be recorded in the project area due to a lack of suitable habitat and high density of feral cats.

5. DISCUSSION

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

The EPA's (2016b) Technical Guidance on Terrestrial Fauna indicated that a Level 2 fauna assessment is required for a disturbance area of in excess of 75ha in this bioregion. The project area is 15,450ha, so it exceeds one of the criterion to require a Level 2 survey in the Murchison 1 IBRA bioregion.

The majority of the project area is disturbed as cattle and probably goats have foraged on both stations for many years and much of the grasses and lower level vegetation has either been lost, depleted or altered. The consequence is that the vertebrate fauna assemblage will differ significantly from what existed prior to it becoming pastoral lease.

5.2 VERTEBRATE FAUNA ASSEMBLAGE

The project area is large and straddles two pastoral leases - Tarmoola and Sturt Meadows stations, both of which run cattle, and have done so for many years with the consequence the fauna habitat is degraded. There is an existing large mining pit, tailing storage facility and waste dumps around the mining pits toward the centre of the project area. All current mining operations are underground.

The is an old abandon mining pit – Rainbow pit – south of the administration building and mining operations. It appears as if the water in this pit is permanent and relatively fresh, so it provides a permanent water point for seed eating birds, water birds, cattle and native or feral fauna.

Visual observations of fauna habitats were confirmed by a PCA on the trapped fauna data, displaying two distinct fauna assemblages that correspond to two distinct fauna habitats.

Particularly in the mulga woodland habitat, small vertebrate fauna are generally in very low densities. The consequence of this low density is:

- very few small vertebrates were seen during nocturnal spotlighting;
- hand searches found almost no individuals;
- of the forty species recorded in the 15 site-trapping program, five were singletons, three were doubletons;
- when only the 10 mulga woodland habitat trapping sites were considered, 16 of the 33 trapped species recorded less than 10 individuals in 14 days trapping;
- when only the 5 ephemeral creekline habitat trapping sites were considered, 10 of the 22 species recorded six or less captures over 14 days;
- although 695 and 672 individual animals were caught in the mulga woodland and ephemeral creekline sites respectively, the high proportion of singletons and doubletons meant that the predicted number of species based on species accumulation curve analyses was less likely to be accurate. So, although the trapping effort met the requirements (Thompson *et al*. 2007) to record 90% of the species in both of those habitat types, the low abundance of many species has altered the shape of the species accumulation curves (Thompson and Withers 2003, Thompson *et al*. 2003c, Coffey Environments 2008, Terrestrial Ecosystems 2010).

Species richness, abundance and diversity, particularly in the mulga woodland habitat, is lower than at other surveyed sites in the Goldfields (Thompson 2004, Thompson and Thompson 2005c, Thompson and Thompson 2008b) indicating that the project area has low ecological and biodiversity value compared with other locations in the Goldfields.

Very few of the shrubs and trees were flowering, so birds that depend on nectar or the invertebrates that depend on nectar are likely to be absent or in low abundance. Given the small number of species and number of individuals recorded during most of the 20 minute - 2 ha searches for avifauna, the species accumulation curve for birds is likely to be an overestimate of the actual species present in the project area.

Although there was rain immediately prior to the March 2020 survey, none had been recorded in the region for many months, so these 'dry' conditions would have significantly suppressed breeding of small vertebrates and probably avifauna (Spiller and Schoener 1995, Southgate and Masters 1996, Dickman *et al*. 1999, Dickman *et al*. 2001, Craig and Chapman 2003, Letnic *et al*. 2004, Kelly *et al*. 2013) contributing to the scarcity of small vertebrate fauna. Of note, no House Mice (*Mus musculus*) were recorded which is an indication of how dry the area is.

Diversity scores were in the mid-range of what might be expected and similarity scores among trapping sites in the ephemeral creekline habitat were generally higher than the more variable scores among mulga woodland habitat trapping sites, as might be expected. The habitat in the ephemeral creekline was more uniform and consistent than the highly variable density of vegetation in the mulga woodland habitat.

Small mammal abundance was very low and likely to be a consequence of the dry conditions in months prior to the surveys. No small mammals were recorded in the ephemeral creekline, which was a surprise as the leaf litter under the trees appeared to provide better foraging opportunities than many of the more sparsely vegetated mulga woodland habitat. This result is atypical of surveys in the goldfields (Thompson 2004, Thompson and Thompson 2005c, Thompson and Thompson 2008b).

Reptile species that were caught in high numbers in the ephemeral creekline habitat where typically those that utilise softer substrate to support a fossorial existence or live in the leaf litter (e.g. *Lerista desertorum, Heteronotia binoei* (Plate 20), *Ctenotus severus, Underwoodisaurus milii* (Plate 21)*, Simoselaps bertholdi* and *Brachyurophis semifasciata*, etc).

Plate 20. *Heteronotia binoei*

Plate 21. *Underwoodisaurus milii*

Three amphibian species were recorded during the March 2020 survey with *Neobatrachus sutor* (Plate 22) being a cocoon forming burrowing species that comes to the surface after rain and *Pseudophryne occidentalis* and *Litoria rubella* (Plate 23) finding retreat sites where they do not become decimated during the dry conditions and becoming surface active when conditions are favourable. More species and more individuals are likely to have been caught if the trapping program occurred during or immediately after a heavy rainfall event.

Plate 22. *Neobatrachus sutor*

Plate 23. *Litoria rubella*

A single *Antaresia stimsoni* (Stimson's python - Plate 24) was caught and one was found dead on the road. These observations are toward the southern geographical boundary for this species. A single blind snake was caught (i.e. *Anilios hamatus*), which is not unusual given the sparse ground cover and dry conditions.

Of the 53 species recorded at avifauna survey sites, 10 species were recorded once, a further eight species twice and 36 species were recorded on less than 10 occasions. If incidentals observations are included, then a total of 72 avian species were recorded. The most abundant species were the small species that utilise shrubby habitats [i.e. *Acanthiza uropygialis* (Chestnut-rumped Thornbill), *Gavicalis virescens* (Singing Honeyeater), *Malurus splendens* (Splendid Wren), *Petroica goodenovii* (Red-capped Robin) and *Acanthagenys rufogularis* (Spiny-cheeked Honeyeater)]; all of these species are common in the semi-arid Goldfields.

The presence of permanent potable water at Rainbow Pit (Plate 25) meant there were waterbirds present in this habitat (see Appendix H) that were not found at other locations in the project area, This is a very typical pattern of avifauna abundance in the Goldfields (Donato Environmental Services 2005b).

Plate 24. Stimson's python

Plate 25. Rainbow pit

Based on the species accumulation curves, and taking into account the relatively high proportion of singletons and doubletons in the data set for both fauna habitat types, it is likely that 23 species in the ephemeral creekline and 35 species in the mulga woodland habitat would represent 90% of the small trappable terrestrial species present. For the avifauna, it is probable that approximately 65 species represent 90% of the bird species present

excluding the waterbirds utilising Rainbow Pit. After heavy rain and flowering by many of the plants, species richness and relative abundance of avifauna in the project area would increase (Craig and Chapman 2003).

There are many terrestrial species that have been recorded in the adjacent areas (see Appendices K and L) in similar habitat that were not recorded and are unlikely to be present in the project area. In addition to the small terrestrial reptiles, mammals and amphibians, there were two species of macropods [i.e. *Osphranter rufus* (Red Kangaroo; 24 of 75 camera traps) and *O. robustus* (Euro; 2 of 75 camera traps)] that were recorded in the camera trap survey. *Canis lupus* (wild dogs / dingo; 19 of 75 camera traps) and feral *Felis catus* (cat; 19 of 75 camera traps) were relatively abundant across the project area, with a high number of dogs nearer the mining operations. There was a herd *Capra hircus* (goats [Plate 28]; 2 of 75 camera traps) that were mostly seen around the mining operations. The two feral predators (i.e. *C. lupus* and *F. catus*) will be predating of small native reptiles, mammals and amphibians. The most obvious impact on the fauna habitat were *Bos taurus* (cattle) and they were recorded in all habitats.

Plate 26. Wild dog/dingo

Plate 27. Caption

Plate 28. Goat

Plate 29. Echidna

Plate 30. *Varanus panoptes*

Plate 31. Red kangaroo

5.2.1 Amphibians

Frogs are normally only detected immediately after rainfall or around semi-permanent pools. There were pools of water in the drainage channels (Plate 33) during the March 2020 field assessment, but there had been many months without rain prior to the November survey. *Neobatrachus sutor*, *P. occidentalis, C. occidentalis* (Plate 32) and *L. rubella* were recorded during the March survey. It is likely that *Neobatrachus kunapalari*, *Neobatrachus wilsmorei*, *Cyclorana maini* and *Platyplectrum spenceri* could also be found in the general area based on the regional data provided in Appendix K, as these species are widespread and abundant in the Goldfields. Development of the project area is likely to result in a loss of individuals within the disturbed area, however, vegetation clearing, and mining operations are unlikely to have a significant impact on these species when assessed in a bioregional context.

Plate 32. *Cyclorana occidentalis*

Plate 33. Inundated mulga woodland

5.2.2 Reptiles

Typically, approximately 35-40 species of reptiles are caught in open mulga woodland (Coffey Environments 2008, Terrestrial Ecosystems 2010, 2011b, 2020). If there had been more rain in the months before the two surveys, and cattle had not been grazing on both pastoral leases, then there would have been a higher abundance and possibly more reptile species recorded in the project area. The regional reptile data provided in Appendix K provides an indication of the diversity of herpetofauna in the Goldfields, however, these lists include species that are found in semi-arid sandplains vegetated with spinifex, which is not present in the project area, but has a high abundance of reptiles (Pianka 1986, 1989, 1992).

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

5.2.3 Birds

The number of birds and bird species in the northern Goldfields fluctuates based on seasons and recent rainfall (Craig and Chapman 2003). Semi-arid and arid areas of inland Australia support a diverse range of transient and nomadic species that move through large areas in search of available resources. Heavy rain that is followed by flowering and seeding of many plant species is often sufficient to draw a large number of these nomadic species to the general area. These species move on to other areas once the resource is depleted or better resources are available in adjacent areas.

The project area is likely to support a similar avifauna assemblage to that present in the adjacent areas. There are no bird species of conservation significance likely to reside in the project area, however, some may infrequently be observed in the region (i.e. Peregrine Falcon and Princess Parrot). The Princess Parrot is nomadic and moves around the arid interior often in search of water and resources and the Peregrine Falcon will normally have a very large home range. Development of a portion of the project area, particularly when similar habitat exists in the adjacent areas, is unlikely to significantly impact on any conservation significant species of bird. All birds will readily shift to other areas when there is a disturbance.

Terrestrial Ecosystems' view is that the proposed development is unlikely to significantly impact on the avian fauna of the bioregion.

Plate 34. Strip-faced Dunnart

5.2.4 Non-volant Mammals

The abundance of small terrestrial mammals caught in the project area was low due the sparsely vegetated and degraded habitat, presence of feral and pest fauna and the dry conditions in the many months prior to the surveys.

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

5.2.5 Bats

Bats recorded in the project area are shown in Table 7. All of these bats are common throughout the Goldfields and many other parts of semi-arid Western Australia and none are of conservation significance. Clearing of vegetation, development activities and mining operations will not significantly impact on the bat fauna when considered in a bioregional context.

Table 7. Bats recorded in the project area

Vestertilionidae	
Gould's Wattle Bat	*Chalinolobus gouldii*
Inland Broad-nosed Bat	*Scotorepens balstoni*
Inland Forest Bat	*Vespadelus baverstocki*
Finlayson's Cave Bat	*Vespadelus finlaysoni*
Unidentified long-eared bat	*Nyctophilus* sp.
Molossidae	
Western Free-tailed Bat	*Ozimops kitcheneri*
Inland Free-tailed Bat	*Ozimops petersi*

5.3 BIODIVERSITY VALUE

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

The two fauna habitat types represented in the project area are abundant and in similar condition in adjacent areas. Therefore, the fauna assemblage that is present in the project area will also be present and abundant in the adjacent areas. The available fauna survey data (Appendix K) provides a good indication of the vertebrate fauna that are potentially in the project area, but the vertebrate fauna found on sandplains vegetated with spinifex habitats should be excluded from these lists.

5.3.1 Ecological functional value at the ecosystem level

Cattle and possibly goats grazing over many years has significantly negatively impacted on the fauna habitat, in particular, it has depleted, reduced and modified the grasses and shrubs that would have vegetated the areas prior to the introduction of cattle. In addition, there is an existing mine toward the centre of the project area that commenced as an open pit but is now an underground operation. The existing pits are surrounded by waste dumps and tailing storage facility. These developments have depleted the vertebrate fauna assemblage from these areas.

Rainbow Pit (Plate 25) provides a source of permeant freshwater that attracts waterbirds. This source of permanent freshwater is a recent addition to the landscape and has altered the avifauna assemblage as a consequence. These waterbirds should be excluded from the assessment as the lake is man-made and if it were to dry-out or be re-mined then the waterbirds would move to another location.

The second most significant impact on vertebrate fauna in the project area and surrounds will have been feral cats and wild dogs. Historically, goats would have heavily grazed parts of the region which would have impacted the vertebrate fauna assemblages, but the recent increase in the wild dog population has reduced the abundance of feral goats. It is unknown whether the two pastoral leases supported large goat populations in the recent past.

The more densely vegetated ephemeral creekline carries water after heavy rain. Aerial photography indicates that this creekline has a wide catchment area to the north and flows south, then south-east to discharge into a lake with no external outlet. The creek would flow infrequently. Large mature trees in this creekline would provide nesting hollows for birds that utilise tree hollows (e.g. parrots; Plate 35). There are many other similar sites within the northern Goldfields and these nesting avian species will readily find other locations should some of these trees be removed. This ephemeral creekline provides the highest area of ecological value in the project area.

The project area doesn't support conservation significant fauna or a conservation significant ecosystem.

Plate 35. Large mature tree with potential nesting hollows

5.3.2 Maintenance of threatened ecological communities

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

5.3.3 Condition of fauna habitat

Much of the project area has been negatively impacted by many years of cattle grazing and some of the project area has been denuded of native terrestrial vertebrate fauna by mining activity. The uncleared fauna habitat present in the project area is similar to many square kilometres of adjacent habitat. Therefore, any proposed development is unlikely to have a significant impact on the vertebrate fauna when considered in a bioregional context.

5.3.4 Ecological linkages

The north-south ephemeral creekline would provide a movement pathway for some avifauna and over a period of many years, for small terrestrial mammals, reptiles and amphibians.

Maintaining native vegetation and the relatively undisturbed north-south corridor through the central portion of the project area would enable this ecological linkage to remain intact.

5.3.5 Size and scale of the proposed disturbance

The project area is large; however, it represents a small proportion of similar fauna habitat found in the adjacent area and region. Similar habitat is abundant in the many adjacent square kilometres.

5.3.6 Abundance and distribution of similar habitat in the adjacent areas

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

5.3.7 Potential impacts on ecosystem function

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

Impacts associated with clearing vegetation and development in the project area in a landscape or bioregional context on the vertebrate fauna are likely to be low as the proposed disturbance area is small relative to the quantity of similar habitat in the bioregion and there will be no impact on conservation significant fauna.

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

6. POTENTIAL ENVIRONMENTAL IMPACTS

It is not intended that the entire project area is cleared. This report will be used as a source of information and data to support multiple small mining proposals, and native vegetation clearing permit applications.

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

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

6.1 DIRECT IMPACTS

6.1.1 Animal deaths during the clearing process and displacement of fauna

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

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

Edge effects can lead to the disruption of ecological processes such as predation and dispersal, animal movements and can change assemblage structure. The consequence is that the impact area will always be much larger than the cleared area.

6.1.2 Reduction or loss of activity areas and closure of burrows

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

Although vegetation clearing seldom results in the death of adult avian species, clearing of vegetation reduces and alters their foraging areas. The loss of foraging areas shifts individuals into adjacent areas and increases completion for resources, with the inevitable result that some of the migrants and some of the residents fail to thrive in the altered environment and some could be lost.

6.1.3 Habitat fragmentation

In addition to direct impacts of vegetation clearing, infrastructure including tracks, has the potential to fragment habitat. Clearing vegetation isolates sections of established communities and may alter long and medium-term patterns of movement around established home ranges particularly for small mammals and reptiles. A reduction in the population because of this development would be difficult to detect given our current knowledge of the spatial ecology for most of the small mammals known to be in the area. The project area contains sparse vegetation, multiple exploration tracks and existing pastoral and mining vehicle tracks.

6.1.4 Introduced fauna and weeds

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

Cats and wild dogs are known to be established in the region and based on camera trap images there are multiple cats and a relatively high density of wild dogs in the project area. In many situations, both these species have become a 'naturalised' species in the Australian bush. Increases in dog or cat numbers can have a detrimental impact on native fauna because they predate on and compete with native species, severely disrupting the natural balance. The feral cat is a particularly damaging predator on native fauna and any increase in their numbers could have a detrimental effect on local native fauna (Kinnear 1993, Bamford 1995, Woinarski *et al*. 2017, Woinarski *et al*. 2018, Murphy *et al*. 2019); hence it is important to ensure that populations of the feral predators, such as cats under control.

There are reliable reports that the population of wild dogs has significantly increased in response to the abundance of feral goats that were present in the region. The goat population has now been significantly reduced, so the wild dogs will turn their attention to predating of station cattle (i.e. most newly born calves), native animals and anthropogenic waste (i.e. rubbish tips and putrescible waste).

Infrastructure known to support feral species, such as poorly managed waste disposal sites and bins and permanent water, should be managed to minimise increases in these populations. A wild dog reduction program has been recommended for the project area.

Introduced plant species can successfully and rapidly invade areas of cleared native vegetation or otherwise disturbed by humans. Introduced plant species may replace native species that provide shelter or foraging areas for native fauna. Bringing new cattle to the stations and vehicle movement can introduce weeds to the project area. Major changes to the structure of vegetation will alter the fauna habitat and consequently may influence fauna species composition. Preparing and implementing a weed management plan will largely reduce their threat to native fauna species.

6.1.5 Road fauna deaths

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

6.1.6 Fire

Increased human activity is often associated with an altered fire regime which lead to a degradation of natural ecosystems. Fire has been identified as one of the threatening processes for some conservation significant species as numerous small mammal and bird species rely on long unburnt vegetation, however, many Australian small mammal and reptile species are adapted to landscape scale wild fires (Pianka and Goodyear 2012, Letnic *et al*. 2013, Swan *et al*. 2016).

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

6.1.7 Anthropogenic activity

Unnatural noises, vibrations, artificial light sources, and vehicle and human movement in an area may be sufficient to force individuals or fauna species to move from adjacent areas or alter their activity periods. This form of disturbance is likely to occur during the vegetation clearing and on-going mining operations. The overall impact is likely to be confined to small areas adjacent to mining operations and infrastructure.

6.1.8 Dust

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

6.1.9 Risk assessment

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

Any risk assessment is a product of the likelihood of an impact occurring and the consequences of that impact. Likelihood and consequences are categorised and described below. The assessed risk level (likelihood x consequences) is then calculated as the overall risk for the development. This is followed by an assessment of the acceptability of the risk associated with each of the impacts. Disturbances and vegetation clearing have an impact on the fauna at multiple scales – site, local, landscape and regional. Each of these is considered in the risk assessment. This assessment should be considered in the context of the summary in Table 8.

Table 8. Fauna impact risk assessment descriptors

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

Table 9. Levels of acceptable risk

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

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

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

			Before management				With management		
	Princess Parrot	Death or reduced viability of this species.	A	2	Low				
	Mulgara	Death or reduced viability of this species.	A	2	Low				
	Oriental Plover	Death or reduced viability of this species.	A	2	Low				
	Fork-tailed Swift	Death or reduced viability of this species.	A	2	Low				
	Grey Wagtail	Death or reduced viability of this species.	A	2	Low				
	Yellow Wagtail	Death or reduced viability of this species.	A	2	Low				
	Peregrine Falcon	Death or reduced viability of this species.	A	2	Low				
	Branchinella anophysata	Death or reduced viability of this species.	A	2	Low				
	Long-tailed Dunnart	Death or reduced viability of this species.	A	2	Low				
Human impacts	Increase or spread of weeds	Changed vegetation and a resulting loss of fauna habitat.	E	2	Mod.	Implementation of a weed management plan.	D	2	Low
	Road kills	Animals being killed by vehicles as they cross roads	E	1	Low	Limiting speeds	E	1	Low
	Increase in feral pests, specifically wild dogs and feral cats	Increased predation on the native fauna	C	3	Mod.	Active feral and pest management programs	C	2	Low

6.2 NATIVE VEGETATION CLEARING PRINCIPLES AS THEY PERTAIN TO VERTEBRATE FAUNA

The *Environmental Protection Act 1986* outlines 10 principles that are to be used in the assessment of native vegetation clearing permit applications which are also applicable for other assessments and approvals (Table 11). Where possible, native vegetation should not be cleared if any of the following principles are comprised.

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

Principle	Response
It comprises a high level of biological diversity.	Clearing vegetation will not comprise a high level of biodiversity.
It comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	Clearing the vegetation will not result in the loss of significant habitat for indigenous fauna. Where possible, the ephemeral creek habitat should not be impacted.
It includes, or is necessary for the continued existence or, rare flora.	N/A
It comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.	The area does not contain a threatened ecological fauna community.
It is significant as a remnant of native vegetation in an area that has been extensively cleared.	The area is not a remnant.
It is growing in, or in association with, an environment associated with a watercourses or wetland.	The area does not contain a natural wetland. There is a disused mining pit that contains near-permanent freshwater water. There is an ephemeral creekline running north-south through the project area that supports a terrestrial and avifauna assemblage that differs from the adjacent mulga woodland, but the creekline runs further north and south outside of the project area.
The clearing of the vegetation is likely to cause appreciable land degradation.	N/A
The clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	Clearing of vegetation is unlikely to impact on conservation areas in the region.
The clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	N/A
The clearing of the vegetation is likely to cause, or exacerbate the incidence of flooding.	N/A

6.3 REFERRAL UNDER THE EPBC ACT

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

7. SUMMARY

The total assessed area is 15,450ha but any proposed development areas are likely to be substantially less. There are two broad fauna habitats in the project area:

- open mulga woodland over mixed shrubs and scattered grasses or bare ground; and
- woodland of large eucalypts over mixed shrubs and scattered grasses along the ephemeral creekline that runs north-south through the project area.

The density of trees and shrubs varied across the project area but was mostly sparse in the mulga woodland habitat type. The fauna habitat has been degraded by many years of cattle grazing and to a lesser extent mining and feral predators (i.e. feral cat and wild dogs). There are numerous pastoral and exploration tracks in the project area, but these are generally narrow and mostly only wheel tracks on a red-clay substrate. Camera traps indicated the presence of wild dogs and feral cats in the project area.

When the data from all sites were combined, 40 species of reptiles and small mammals were trapped in the project area. Species accumulation curves were calculated for the two habitat types and this modelling predicted that 23 species would be present in the ephemeral creekline, with 22 species actually caught. For the mulga woodland, 33 species were caught, and it is modelled that there are a about 35 species in this habitat type.

For the avifauna, it is probable that 65 species represent about 90% of the bird species present excluding the waterbirds utilising Rainbow Pit. Of the 53 species recorded at avifauna survey sites, 10 species were recorded once, a further eight species twice and 36 species on less than 10 occasions. Avifauna species richness and abundance would be expected to increase after a major rainfall event as many of the plant species would flower and seed.

The ephemeral creekline habitat that runs north-south through the central portions of the project area (i.e. Sullivan Creek) would provide a linkage for small terrestrial and avian fauna from areas to the north and south and is of the highest ecological value.

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

There was evidence of a population of feral cats, wild dogs and goats on-site. Other than cattle grazing, it is probable that these feral predators are having a greater impact on the native fauna than the proposed vegetation clearing and mining operations.

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

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

8. MANAGEMENT STRATEGIES

The purpose of this section is to identify generic management and mitigation strategies to address the potential impacts of development in the project area. Specific management and mitigation strategies to address potential impacts should be addressed in the recommended Vertebrate Fauna Management Plan and Construction Environmental Management Plan.

8.1 INDUCTION AND AWARENESS

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

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

8.2 DUST

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

> **Recommendation 2:** The impact of dust on adjacent vegetation and fauna habitat is managed against appropriate KPIs and in accordance with the clients' Construction Environmental Management Plan.

8.3 MINIMISING SECONDARY IMPACTS TO FAUNA AND FAUNA HABITAT

Pets and feral animals have the potential to impact on native fauna. Pets should not be permitted on site and feral and pest fauna numbers regularly monitored and controlled. To be effective, management of feral and pest species needs to be undertaken in collaboration with the pastoralist and neighbouring tenement holders.

Putrescible waste likely to attract feral animals should be suitably contained and disposed of so as not to encourage the feeding of fauna around the site. The existing putrescible waste management systems is enabling wild dogs and feral cats to access a food source, and this needs to be addressed.

Reducing the impacts of feral cats and wild dogs will reduce the stress on native fauna and fauna assemblages in the project area and surrounds. The herd of goats seen regularly around the administration and mining area should be removed. Goats are destructive and negatively impact on the native vegetation and provide an easy food source for wild dogs.

Dead animals on the road also have the propensity to attract raptors, goannas and even cattle, which are then likely to be killed.

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

- Control and reduction methods for feral and pest fauna;
- Management of pets on site;
- Habitat fragmentation and barriers to fauna movement (e.g. fencing and access tracks);
- Vehicle impacts on vertebrate fauna (short and long term);
- Vehicle speed limits on site; and
- Anthropogenic activity.

Recommendation 3: Management of the mine sites' waste management facility is reviewed and altered so that putrescible waste is not available to pest animals and birds.

Recommendation 4: A feral predator (i.e. feral cat and wild dog) reduction program is implemented, their numbers regularly monitored (e.g. biannually) and the population periodically reduced.

Recommendation 5: The goats in the project area are removed. They can either be penned and removed or shot.

Recommendation 6: A Vertebrate Fauna Management is prepared and implemented.

The ephemeral creekline that runs north-south though the central part of the project area (i.e. Sullivan Creek) provides habitat for the most diverse vertebrate fauna assemblage in the project area, so, where practical this area should be avoided.

Recommendation 7: Where practical, vegetation clearing, and mining activity should avoid impacting on the ephemeral creekline habitat that runs north-south through the central portions of the project area and the linkages within this habitat type are maintained.

9. REFERENCES

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

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

Baker, J., R. L. Goldingay, and R. J. Whelan. 1998. Powerline easement through forests: a case study of impacts on avifauna. Pacific Conservation Biology **4**:79-89.

Bamford Consulting Ecologists. 2007. Fauna Assessment and Targeted Mulgara Search of the Fish Deposit, Laverton Gold Project. Perth.

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

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

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

Benshemesh, J., and P. Burton. 1999. Fox predation on Malleefowl three years after the spread of RCD in Victoria. Unpublished report for Parks Victoria and Department of Natural Resources and Environment, Mildura.

Biota Environmental Sciences. 2004. Cosmos Nickel Mine Extension Fauna Survey. Perth.

Biota Environmental Sciences. 2007. Bannockburn Fauna Habitat and Assemblage Survey. Perth.

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

Burbidge, A. A., N. L. McKenzie, and P. J. Fuller. 2008. Long-tailed Dunnart *Sminthopsis longicaudata*. Pages 148-150 *in* S. van Dyck and R. Strahan, editors. The Mammals of Australia. Reed New Holland, Sydney.

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

Christidis, L., and W. E. Boles. 2008. Systematics and Taxonomy of Australian Birds. CSIRO Publishing, Collingwood, Victoria.

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

Clarke, M. F., and J. M. Oldland. 2007. Penetration of remnant edges by noisy miners (*Manorina melanocphala*) and implications for habitat restoration. Wildlife Research **34**:253-261.

Coffey Environments. 2007. Level 1 Fauna Assessment, Leinster Nickel Operations. Perth.

Coffey Environments. 2008. Level 2 Fauna Assessment for the Duketon Gold Project.

Colwell, R. K., and J. A. Coddington. 1994. Estimating terrestrial biodiversity through extrapolation. Philosophical Transactions of the Royal Society of London, Series B. **345**:101-118.

Cowan, M. 2003. Murchison 1 (MUR1 - East Murchison subregion). Pages 466-479 *in* N. L. McKenzie, J. E. May, and S. McKenna, editors. A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002. Department of Conservation and Land Management, Perth.

Craig, M. D., and A. Chapman. 2003. Effects of short-term drought on the avifauna of Wanjarri Nature Reserve: What do they tell us about drought refugia? Journal of the Royal Society of Western Australia **86**:133-137.

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

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

Dell, J., and R. A. How. 1988. Vertebrate Fauna. Records of the Australian Museum **Supplement No 31**:38-75.

Dell, J., R. A. How, and A. V. Milewski. 1992. The biological Survey of the Eastern Goldfields, Part 6, Youanmi - Leonora Study Area. Records of the Western Australian Museum **Supplement 40**:131.

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

Dickman, C. R., P. S. Mahon, P. Masters, and D. F. Gibson. 1999. Long-term dynamics of rodent populations in arid Australia: the influence of rainfall. Wildlife Research **26**:389-403.

Donato Environmental Services. 2005a. Leinster Nickel Operations Tailing Storage Facility and Water Storage Areas: Wildlife Interactions and Assessment of Risks. Perth.

Donato Environmental Services. 2005b. Ornithological Survey of the Leinster Nickel Operation Mining Lease: An assessment of Goat Grazing Impact. Perth.

Dunlop, J. N. 1990. The small vertebrate ground fauna of mulga habitats near Wiluna, Western Australia. Mulga Research Centre Journal **10**:19-27.

ENV Australia. 2008. Agnew Prospects Fauna Assessment. Perth.

Environmental Protection Authority. 2016a. Technical Guidance - Sampling methods for terrestrial vertebrate fauna. Environmental Protection Authority, Perth.

Environmental Protection Authority. 2016b. Technical Guidance Terrestrial Fauna Surveys. Perth.

Field, R. P. 1999. A new species of *Ogyris* Angus (Lepidoptera: Lycaenidae) from southern arid Australia. Memoirs of Museum Victoria **57**:251-251.

Fraser, J. L., G. G. Thompson, and D. Moro. 2003. Adequacy of terrestrial fauna surveys for the preparation of Environmental Impact Assessments in the mining industry of Western Australia. Ecological Management and Restoration **4**:187-192.

Garnett, S., G. Crowley, R. Duncan, N. Baker, and P. Doherty. 1993. Notes on live Night Parrot sightings in north-western Queensland. Emu **93**:292-296.

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

Gibson, D. F., and J. R. Cole. 1992. Aspects of the ecology of the Mulgara, *Dasycercus cristicauda*, (Marsupialia: Dasyuridae) in the Northern Territory. Australian Mammalogy **15**:105-112.

Goldingay, R. L., and R. J. Whelan. 1997. Powerline easements: do they promote edge effects in eucalypt forest for small mammals? Wildlife Research **24**:737-744.

Goosem, M. 2000. Effects of tropical rainforest roads on small mammals: edge changes in community composition. Wildlife Research **27**:151-163.

Goosem, M., Y. Izumi, and S. Turton. 2001. Efforts to restore habitat connectivity for an upland tropical rainforest fauna: A trial of underpasses below roads. Ecological Management and Restoration **2**:196-202.

Goosem, M. W., and H. Marsh. 1997. Fragmentation of small mammal community by a powerline corridor through tropical rainforest. Wildlife Research **24**:613-629.

Hall, N. J., N. L. McKenzie, and B. J. Keighery. 1994. The Biological Survey of the Eastern Goldfields of Western Australia Part 10. Sandstone-Sir Samuel and Laverton-Leonora Study Areas. Records of the Western Australian Museum **Supplement No. 47**:166.

Halpern Glick Maunsell. 1999. Rosemont Gold Project Biological Assessment Survey - Phases 1 & 2. Perth.

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

Harewood, G. 2011. Terrestrial Fauna Survey (Level 1) of the West Laverton Area (P38/3717, P38/3718, P38/3491, P38/3492, P38/3314, P38/3490, P38/3315, M38/0046, M38/0049, M38/0040, M38/0358, M38/0048, M38/0101, M38/0364, M38/0342, M38/0345, L38/0179, L38/0177, L38/0178, L38/0153, L38/0092, E38/1930, E38/2347, E38/2084 & E38/1966). Bunbury.

Hart Simpson and Associates. 2000. Anaconda Nickel Ltd, Cawse Expansion Project, Fauna Survey. Perth.

Hayek, L. C., and M. A. Buzas. 1997. Surveying natural populations. Columbia University Press, New York.

How, R. A., and J. Dell. 1992. Vertebrate Fauna. Records of the Australian Museum **Supplement No 40**:90-103.

How, R. A., J. Dell, A. V. Milewski, and G. J. Keighery. 1992. The Biological Survey of the Eastern Goldfields of Western Australia: Part 7, Duketon-Sir Samuel Study Area. Records of the Western Australian Museum **Supplement 40**:69-131.

How, R. A., J. Dell, and B. G. Muir. 1988. Vertebrate Fauna. Pages 44-94 *in* R. A. How, K. R. Newbey, J. Dell, B. G. Muir, and R. J. Hnatiuk, editors. The Biological Survey of the Eastern Goldfields of Western Australia; Part 4, Lake Johnston - Hyden Study Area. Records of the Western Australian Museum.

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

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

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

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

Kelly, L. T., R. Dayman, D. G. Nimmo, M. F. Clarke, and A. F. Bennett. 2013. Spatial and temporal drivers of small mammal distributions in a semi-arid environment: The role of rainfall, vegetation and life-history. Austral Ecology **38**:786-797.

Kempton, R. A., and L. R. Taylor. 1974. Log-series and log-normal parameters as diversity discriminants for the *Lepidoptera*. Journal of Animal Ecology **43**:381-399.

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

Laurance, W. F. 1991. Edge effects in tropical forest fragments: application of a model for design of nature reserves. Biological Conservation **57**:205-219.

Laurance, W. F. 1994. Rainforest fragmentation and the structure of small mammal communities in tropical Queensland. Biological Conservation **69**:23-32.

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

Letnic, M., C. R. Dickman, M. K. Tischler, B. Tamayo, and C. L. Beh. 2004. The responses of small mammals and lizards to post-fire succession and rainfall in arid Australia. Journal of Arid Environments **59**:85-114.

Letnic, M., M. Tischler, and C. Gordon. 2013. Desert small mammal responses to wildfire and predation in the aftermath of a La Nińa driven resource pulse. Austral Ecology **38**:841-849.

Lewis, M., and M. Hines. 2014. Malleefowl activity at nesting sites increase fox and other feral animal visitation rates. Pages 242-247 Proceedings of the 5th National Malleefowl Forum 2014.

Luck, G. W., H. P. Possingham, and D. C. Paton. 1999. Bird responses at inherent and induced edges in the Murray Mallee, South Australia. 1. Differences in abundance and diversity. Emu **99**:157-169.

Magurran, A. E. 1988. Ecological Diversity and Its Measurement. Princeton University Press, Princeton, New Jersey.

Magurran, A. E. 2004. Measuring Biological Diversity. Blackwell, Oxford.

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

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

MBS Environmental. 2004. Vegetation and Habitat Assessment of the Euro, Sickle and Admiral Hill Project Areas, Laverton. Perth.

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

McKenzie, N. L., and N. J. Hall. 1992. The Biological Survey of the Eastern Goldfields of Western Australia. Part 8. Kurnalpi-Kalgoorlie Study Area. Records of the Western Australian Museum **Supplement No. 41**.

McKenzie, N. L., J. K. Rolfe, and K. Youngson. 1994. Vertebrate Fauna: In The Biological Survey of the Eastern Goldfields of Western Australia Part 10. Sandstone-Sir Samuel and Laverton-Leonora Study Areas. Records of the Western Australian Museum **Supplement No. 47**:166.

McKenzie, N. L., J. K. Rolfe, and W. K. Youngson. 1992. IV Vertebrate fauna. Pages 37-64 The Biological Survey of the Eastern Goldfields of Western Australia. Part 8. Kurnalpi-Kalgoorlie Study Area. Records of the Western Australian Museum, Supplement, No 41.

Minesite Rehabilitation Services Pty Ltd. 1997. Tarmoola Gold Mine Flora and Fauna Survey.

Moreno, C. E., and G. Halffter. 2000. Assessing the completeness of bat biodiversity inventories using species accumulation curves. Journal of Applied Ecology **37**:149-158.

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

Murphy, B. P., L.-A. Woolley, H. M. Geyle, S. M. Legge, R. Palmer, C. R. Dickman, J. Augusteyn, S. C. Brown, S. Comer, T. S. Doherty, C. Eager, G. Edwards, D. A. Fordham, D. Harley, P. J. McDonald, H. McGregor, K. E. Moseby, C. Myers, J. Read, J. Riley, D. Stokeld, G. J. Trewella, J. M. Turpin, and J. C. Z. Woinarski. 2019. Introduced cats (*Felis catus*) eating a continental fauna: The number of mammals killed in Australia. Biological Conservation **237**:28-40.

Murphy, D. 1994. Vertebrate fauna species of the North-Eastern Goldfields: Report to Western Mining's Leinster Nickel and Mount Keith Operations. High Wycombe, Western Australia.

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

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

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

Ninox Wildlife Consulting. 1994. A Fauna Assessment of the Honeymoon Well Project Area. April and September 1993. Perth.

Ninox Wildlife Consulting. 1998. A Vertebrate Fauna Survey of the Murrin Murrin Expansion Project. Perth.

Ninox Wildlife Consulting. 2005. Vertebrate Fauna Habitat Assessment of the Proposed Expansions to the Cosmos Nickel Mine, near Leinster, Western Australia. Perth.

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

Onus, M. L., J. K. Rolfe, and D. Algar. 2011. Assessment of Feral Cat Abundance and Control Options at Barrick, Granny Smith. Perth.

Oxley, D. J., M. B. Fenton, and G. R. Carmody. 1974. The effects of roads on populations of small mammals. Journal of Applied Ecology **11**:51-59.

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

Paton, P. W. C. 1994. The effect of edge on avian nest success: How strong is the evidence? Conservation Biology **8**:17-26.

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

Pianka, E. R. 1986. Ecology and Natural History of Desert Lizards. Princeton University Press, Princeton, Jersey.

Pianka, E. R. 1989. Desert lizard diversity: Additional comments and some data. The American Naturalist **134**:344-364.

Pianka, E. R. 1992. A land of lizards. Landscope **7**:11-16.

Pianka, E. R., and S. E. Goodyear. 2012. Lizard responses to wildfire in arid interior Australia: Long-term experimental data and commonalities with other studies. Austral Ecology **37**:1-11.

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

Priddel, D., and R. Wheeler. 1990. Survival of Malleefowl *Leipoa ocellata* chicks in the absence of ground-dwelling predators. Emu **90**:81-87.

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

Sherrod, P. H. 2001. Nonlinear Regression Analysis Program. Brentwood, Tennessee.

Smith, B., and J. B. Wilson. 1996. A consumer's guide to evenness measures. OIKOS **76**:70-82.

Soberón, J., and J. Llorente. 1993. The use of species accumulation functions for the prediction of species richness. Conservation Biology **7**:480-488.

Southgate, R., and P. Masters. 1996. Fluctuations of rodent populations in response to rainfall and fire in a Central Australian hummock grassland dominated by *Plectrachne schinzii*. Wildlife Research **23**:289-303.

Specialised Zoological. 2020. Acoustic analysis and bat call identification from near Laverton, Western Australia. Adelaide.

Spiller, D. A., and T. W. Schoener. 1995. Long-term variation in the effect of lizards on spider density is linked to rainfall. Oecologia **103**:133-139.

Storr, G. M., L. A. Smith, and R. E. Johnstone. 1983. Lizards of Western Australia. II: Dragons and Monitors. Western Australian Museum, Perth, Western Australia.

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

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

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

Swan, M., C. Galindez-Silva, F. Christie, A. York, and J. Di Stefano. 2016. Contrasting responses of small mammals to fire and topographic refugia. Austral Ecology **41**:443-451.

Temple, S. A. 1998. The edge of the cut: implications for wildlife populations. Journal of Forestry **96**:22-26.

Terrestrial Ecosystems. 2010. Level 2 Fauna Risk Assessment for the Garden Well Project Area. Perth.

Terrestrial Ecosystems. 2011a. Investigation of Short-Range Endemic Invertebrates for the Granny Deeps Project Area. Perth.

Terrestrial Ecosystems. 2011b. Level 2 Fauna Risk Assessment for the Granny Deeps Project Area. Perth.

Terrestrial Ecosystems. 2011c. Targeted Survey for Long-tailed Dunnarts for the Granny Deeps Project Area. Perth.

Terrestrial Ecosystems. 2012a. Level 1 Fauna Risk Assessment for the Anchor Project Area. Perth.

Terrestrial Ecosystems. 2012b. Level 1 Fauna Risk Assessment for the Moolart Well to Garden Well Access Road on M38/354, M38/302, M38/303 and L38/216. Perth.

Terrestrial Ecosystems. 2012c. Level 1 Fauna Risk Assessment for the Petra Project Area. Perth.

Terrestrial Ecosystems. 2012d. Level 1 Fauna Risk Assessment for the Reichelt Project Area. Perth.

Terrestrial Ecosystems. 2012e. Level 1 Fauna Risk Assessment for the Rosemont Project Area. Perth.

Terrestrial Ecosystems. 2012f. Level 1 Fauna Risk Assessment for the Russell Find Project Area. Perth.

Terrestrial Ecosystems. 2012g. Level 1 Vertebrate Fauna Risk Assessment for the Proposed Exploration Areas around the Granny Open Pit Project Area. Perth.

Terrestrial Ecosystems. 2012h. Level 1 Vertebrate Fauna Risk Assessment for the Proposed Mining Areas around the Granny Open Pit Project Area. Perth.

Terrestrial Ecosystems. 2013. Level 1 Fauna Risk Assessment for Two Waste Dumps either side of the proposed Rosemont Project Area (G38/29, G38/30, G38/31, G38/32) and a Slurry Pipeline from the Rosemont mine to the Garden Well processing plant (L38/219). Perth.

Terrestrial Ecosystems. 2014. Fauna risk assessment of the proposed power station site. Perth.

Terrestrial Ecosystems. 2015a. Fauna risk assessment of the proposed borrow pit expansion. Perth.

Terrestrial Ecosystems. 2015b. Level 1 Fauna Risk Assessment for the Gloster Project and haul road. Perth.

Terrestrial Ecosystems. 2016a. Level 1 Fauna Risk Assessment for the Anchor Project Area. Perth.

Terrestrial Ecosystems. 2016b. Level 1 Fauna Risk Assessment for the Baneygo Project. Perth.

Terrestrial Ecosystems. 2016c. Level 1 Fauna Risk Assessment for the Dogbolter-Coopers Project Area. Perth.

Terrestrial Ecosystems. 2016d. Level 1 Fauna Risk Assessment for the Petra Project Area. Perth.

Terrestrial Ecosystems. 2016e. Level 1 Fauna Risk Assessment for the Tooheys Project Area. Perth.

Terrestrial Ecosystems. 2017a. Level 1 Fauna Risk Assessment for the proposal Haul Road to the Baneygo Project Area. Perth.

Terrestrial Ecosystems. 2017b. Level 1 Fauna Risk Assessment for the proposed Haul Road to the proposed Petra Mining area. Perth.

Terrestrial Ecosystems. 2018a. Level 1 Fauna Risk Assessment for the proposed Haul Road to the proposed Petra Mining Area. Perth.

Terrestrial Ecosystems. 2018b. Vertebrate Fauna Risk Assessment for the Granny Smith Solar Power Farm Project. Perth.

Terrestrial Ecosystems. 2018c. Vertebrate Fauna Risk Assessment for the Petra Mining Project. Perth.

Terrestrial Ecosystems. 2020. Level 2 Vertebrate Fauna Assessment - King of the Hills Project Perth.

Thompson, G., and S. Thompson. 2006a. Terrestrial Fauna Survey of Waste Dumps and Undisturbed Areas Around Placer Dome Australia Pty Ltd - Kalgoorlie West Operations and OMG Cawse Nickel Operations during January 2006.

Thompson, G. G., and S. A. Thompson. 2002. Terrestrial fauna surveys: Why, when and how much? Pages 25-36 *in* Goldfields Environmental Management Group 2002 Workshop on Environmental Management in Arid and Semi-Arid Areas. Goldfields Environmental Management Group, Kalgoorlie.

Thompson, G. G., and S. A. Thompson. 2004a. Rehabilitation: Being environmentally neutral. Pages 129-134 *in* Workshop on Environmental Management: Proceedings 2004. Goldfields Environmental Management Group, PO Box 2412, Boulder, WA 6432, Kalgoorlie.

Thompson, G. G., and S. A. Thompson. 2005a. Mammals or reptiles, as surveyed by pit-traps, as bio-indicators of rehabilitation success for mine sites in the goldfields region of Western Australia? Pacific Conservation Biology **11**:268-286.

Thompson, G. G., and S. A. Thompson. 2006b. The impact of land clearing and mining on arid-adapted frogs. Pages 18-35 *in* Goldfields Environmental Management Workshop 2006 Proceedings. Goldfields Environmental Management Group, Kalgoorlie.

Thompson, G. G., and S. A. Thompson. 2006c. Small vertebrate colonisers of mine site rehabilitated waste dumps in the Goldfields of Western Australia. Pages 309-318 *in* Mine Closure 2006, Proceedings of the First International Seminar on Mine Closure 13-15 September 2006. Australian Centre for Geomechanics, University of Western Australia, Perth.

Thompson, G. G., and S. A. Thompson. 2007a. Early and late colonizers in mine site rehabilitated waste dumps in the Goldfields of Western Australia. Pacific Conservation Biology **13**:235-243.

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

Thompson, G. G., and S. A. Thompson. 2007c. Temporal and spatial variability in trappable terrestrial vertebrate fauna assemblages in semi-arid habitats. Page 162 *in* ESA 2007, Program and Abstracts. Ecological Society of Australia, Perth.

Thompson, G. G., and S. A. Thompson. 2007d. Usefulness of funnel traps in catching small reptiles and mammals, with comments on the effectiveness of the alternatives? Wildlife Research **34**:491-497.

Thompson, G. G., and S. A. Thompson. 2007e. Using species accumulation curves to estimate trapping effort in fauna surveys and species richness. Austral Ecology **32**:564-569.

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

Thompson, G. G., and S. A. Thompson. 2008b. Spatial variability in terrestrial fauna surveys; a case study from the goldfields of Western Australia. Journal of the Royal Society of Western Australia **91**:219-228.

Thompson, G. G., and S. A. Thompson. 2009. Comparative temperature in funnel and pit traps. Australian Journal of Zoology **57**:311-316.

Thompson, G. G., and S. A. Thompson. in press. A comparison of an EIA vertebrate fauna survey with a post-approval fauna salvage program: Consequences of not adhering to EIA survey guidelines, a Western Australian example. Pacific Conservation Biology.

Thompson, G. G., S. A. Thompson, and J. L. Fraser. 2003a. Surface activity of arid-adapted frogs. Journal of the Royal Society of Western Australia **86**:115-116.

Thompson, G. G., S. A. Thompson, P. C. Withers, and J. Fraser. 2007. Determining adequate trapping effort and species richness using species accumulation curves for environmental impact assessments. Austral Ecology **32**:570-580.

Thompson, G. G., S. A. Thompson, P. C. Withers, and E. R. Pianka. 2003b. Diversity and abundance of pit-trapped reptiles in Australian arid and mesic habitats: Biodiversity for environmental impact assessments. Pacific Conservation Biology **9**:120-135.

Thompson, G. G., and P. C. Withers. 2003. Effect of species richness and relative abundance on the shape of the species accumulation curve. Austral Ecology **28**:355-360.

Thompson, G. G., P. C. Withers, E. R. Pianka, and S. A. Thompson. 2003c. Assessing biodiversity with species accumulation curves; inventories of small reptiles by pit-trapping in Western Australia. Austral Ecology **28**:361-383.

Thompson, S., and G. Thompson. 2003a. Rehabilitation index and monitoring protocol for evaluating the success of rehabilitated mining sites. Perth.

Thompson, S. A. 2004. Mine site rehabilitation index using reptile assemblage as a bio-indicator. PhD. Edith Cowan University, Perth.

Thompson, S. A., and G. G. Thompson. 2003b. The western bearded dragon, *Pogona minor,* (Squamata: Agamidae): An early lizard coloniser of rehabilitated areas. Journal of the Royal Society of Western Australia **86**:1-6.

Thompson, S. A., and G. G. Thompson. 2004b. Adequacy of rehabilitation monitoring practices in the Western Australian mining industry. Ecological Management and Restoration **5**:30-33.

Thompson, S. A., and G. G. Thompson. 2005b. Rehabilitation index for evaluating the success of rehabilitated disturbed areas using reptile assemblages as a bio-indicator. Page 98 *in* Fifth World Congress of Herpetology. Fifth World Congress of Herpetology, Stellenbosch, South Africa, June 2005.

Thompson, S. A., and G. G. Thompson. 2005c. Temporal variation in reptile assemblages in the Goldfields of Western Australia. Journal of the Royal Society of Western Australia **88**:25-36.

Thompson, S. A., and G. G. Thompson. 2006d. Quantification of rehabilitation success on mine site waste dumps. Pages 731-740 *in* Mine Closure 2006, Proceedings of the First International Seminar on Mine Closure 13-15 September 2006 Australia. Australian Centre for Geomechanics, University of Western Australia, Perth.

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

Thompson, S. A., and G. G. Thompson. 2008c. Vertebrate by-catch in invertebrate wet pitfall traps. Journal of the Royal Society of Western Australia **91**:237-241.

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

Thompson, S. A., G. G. Thompson, and P. C. Withers. 2005a. Capture rates of small vertebrates decrease as the pit-trapping effort increase at Ora Banda. Journal of the Royal Society of Western Australia **88**:37-39.

Thompson, S. A., G. G. Thompson, and P. C. Withers. 2005b. Influence of pit-trap type on the interpretation of fauna diversity. Wildlife Research **32**:131-137.

Threatened Species Scientific Committee. 2014. Conservation Advice *Ogyris subterrestris petrina* Arid bronze azure (a butterfly). Canberra.

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

Tingay, A., and S. R. Tingay. 1977. A Vertebrate Fauna Survey of Yeelirrie Station, Western Australia. Perth.

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

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

Volschenk, E. S. 2011. Granny Deeps Scorpion Identification Report. Perth.

Whisson, C., and S. Slack-Smith. 2011. Land Snails from the area of Laverton, Western Australia (Granny Deeps Project). Perth.

Williams, A., T. Gamblin, J. Richardson, M. Williams, and P. Blechynden. 2008. The critically endangered Arid Bronze Azure butterfly (*Ogyris subterrestris petrina*): progress report and recommendations for future actions. Perth.

Williams, A. A. E., M. Williams, and R. A. Coppen. 2018. Conservation of the Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*) and host sugar ant (*Camponotus terebrans*). Survey results from *Camponotus terebrans* sites GIM 01, GIM 03, GIM 09, GIM 10, GIM 11, GIM 13, GIM 14, GIM 51, GIM 63, GIM 66, and GIM 68 south of Southern Cross (2014), and from *C. terebrans* site east of Merredin., Perth.

Williams, M. R., and A. A. E. Williams. 2008. Threats to the critically endangered Arid Bronze Azure butterfly (*Ogyris subterrestris petrina*) by proposed vegetation clearing. Perth.

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

Woinarski, J. C. Z., B. P. Murphy, S. M. Legge, S. T. Garnett, M. J. Lawes, S. Comer, C. R. Dickman, T. S. Doherty, G. Edwards, A. Nankivell, D. Paton, R. Palmer, and L. A. Woolley. 2017. How many birds are killed by cats in Australia? Biological Conservation **214**:76-87.

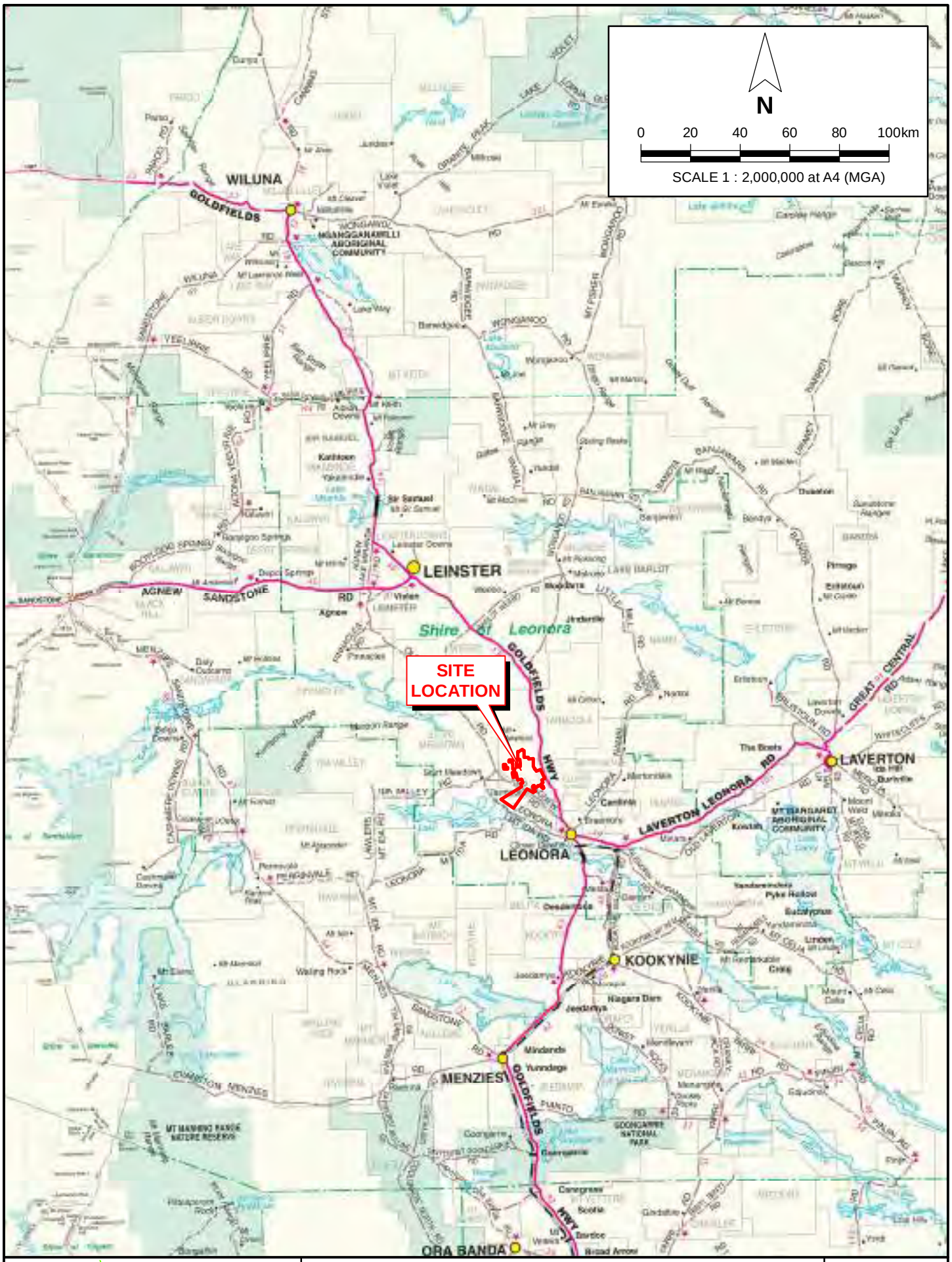
Woinarski, J. C. Z., B. P. Murphy, R. Palmer, S. M. Legge, C. R. Dickman, T. S. Doherty, G. Edwards, A. Nankivell, J. L. Read, and D. Stokeld. 2018. How many reptiles are killed by cats in Australia? Wildlife Research **45**:247-266.

Wolda, H. 1981. Similarity indices, sample size and diversity. Oecologia **50**:296-302.

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

Figures

Level 2 Vertebrate Fauna Assessment
King of the Hills Project



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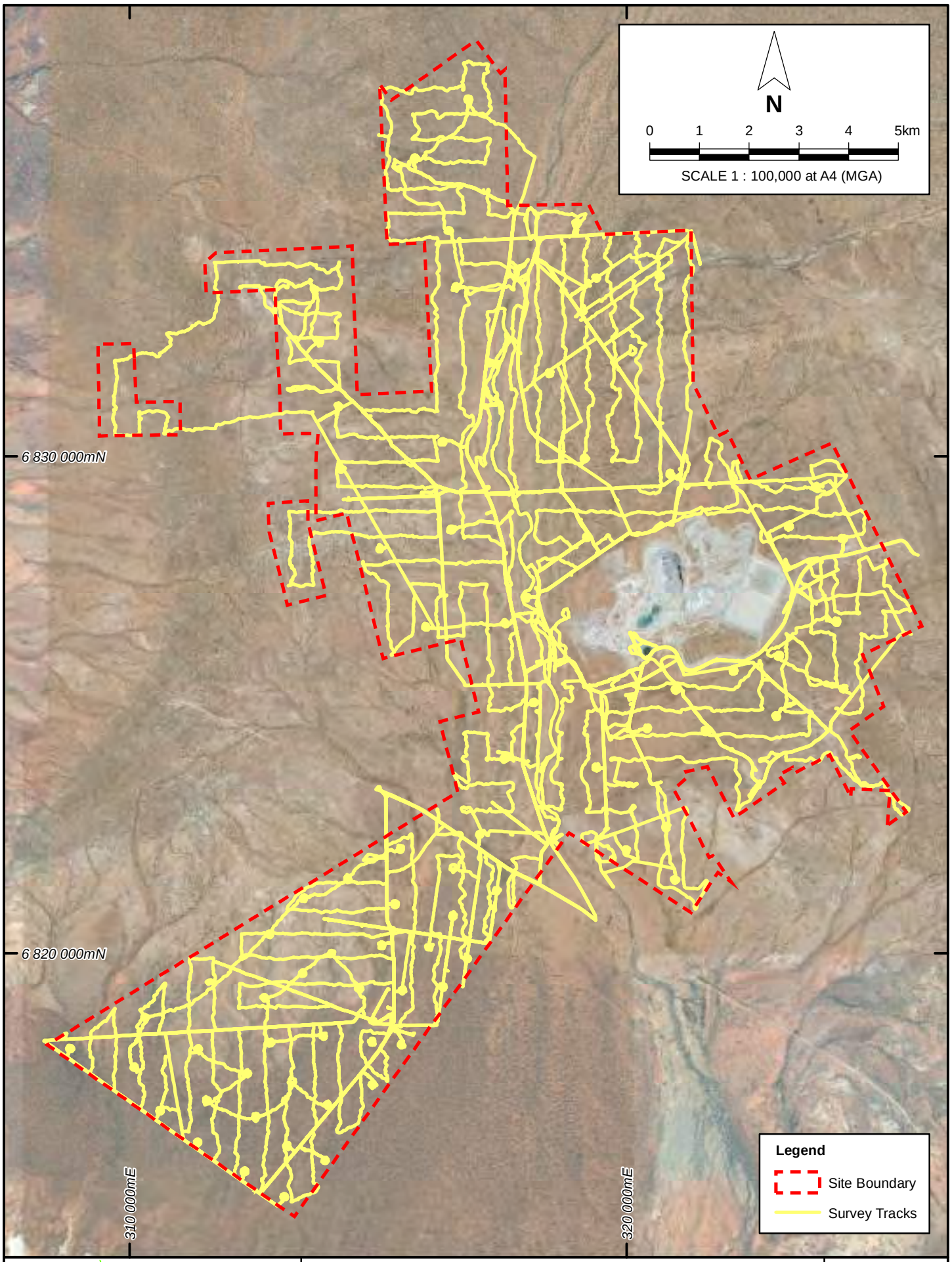
TERRESTRIAL ECOSYSTEMS

Red 5 Limited
LEVEL 2 VERTEBRATE FAUNA ASSESSMENT
KING OF THE HILLS PROJECT

Figure 1

REGIONAL LOCATION

Drawn: S. Thompson | Date: 18 May 2020 | Job: 2019-0084



TERRESTRIAL ECOSYSTEMS

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SURVEY COVERAGE

Figure 2

Drawn: S. Thompson | Date: 18 May 2020 | Job: 2019-0084

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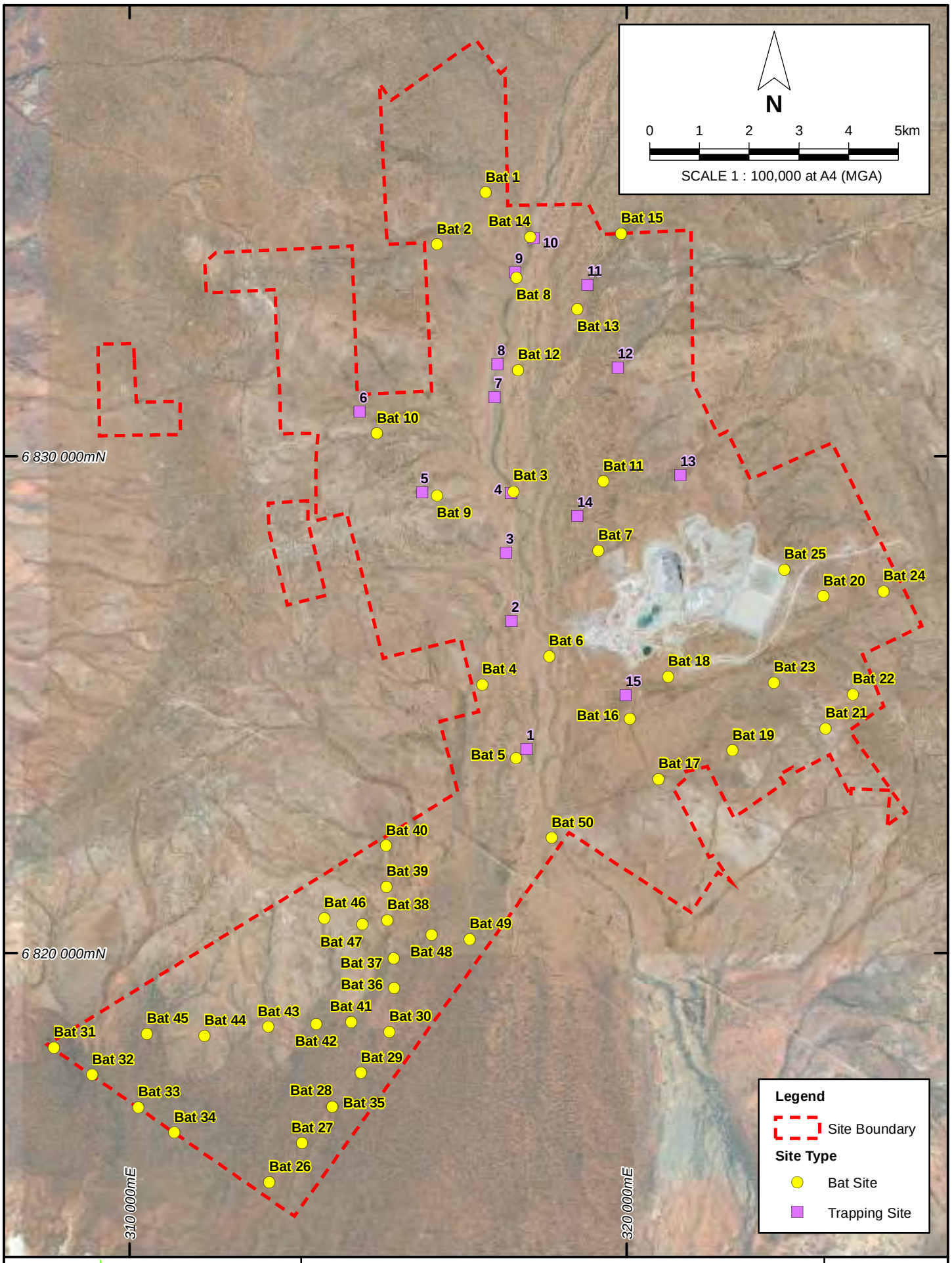

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TERRESTRIAL ECOSYSTEMS

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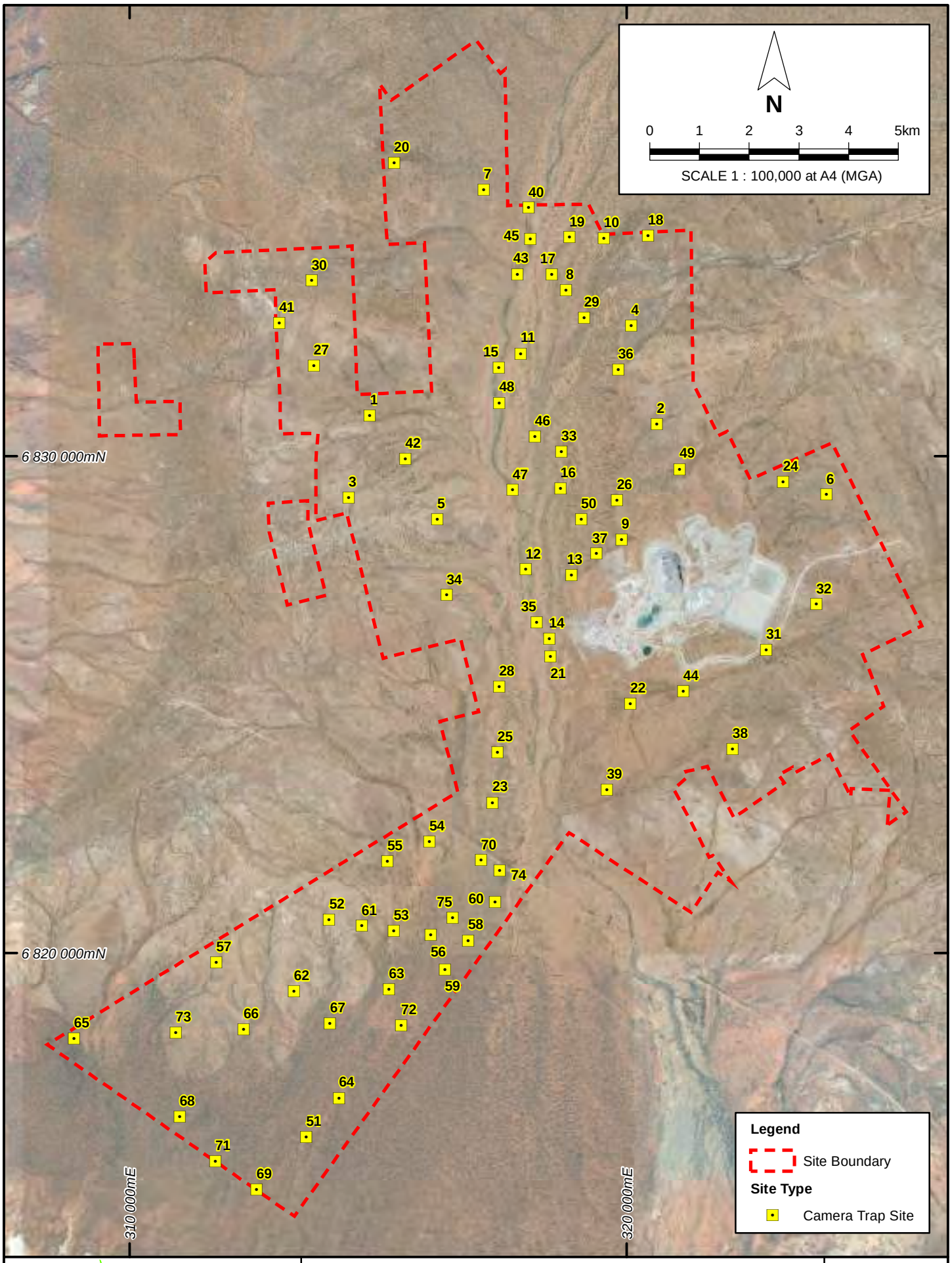
Figure 3

TRAPPING AND BAT DETECTION SITES

Drawn: S. Thompson | Date: 18 May 2020 | Job: 2019-0084



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TERRESTRIAL ECOSYSTEMS

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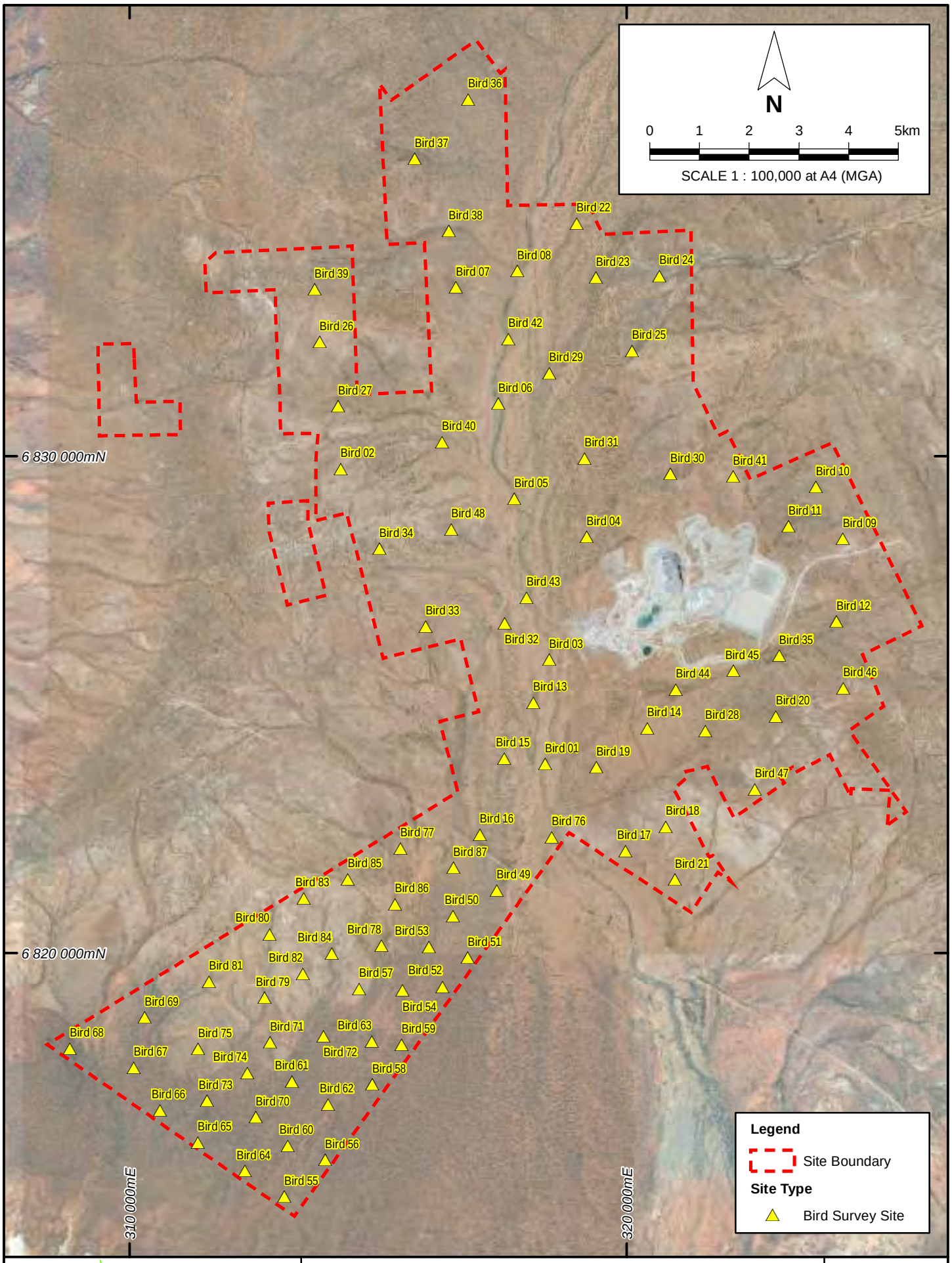
KING OF THE HILLS PROJECT

CAMERA TRAPPING SITES

Figure 4

Drawn: S. Thompson | Date: 18 May 2020 | Job: 2019-0084



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TERRESTRIAL ECOSYSTEMS

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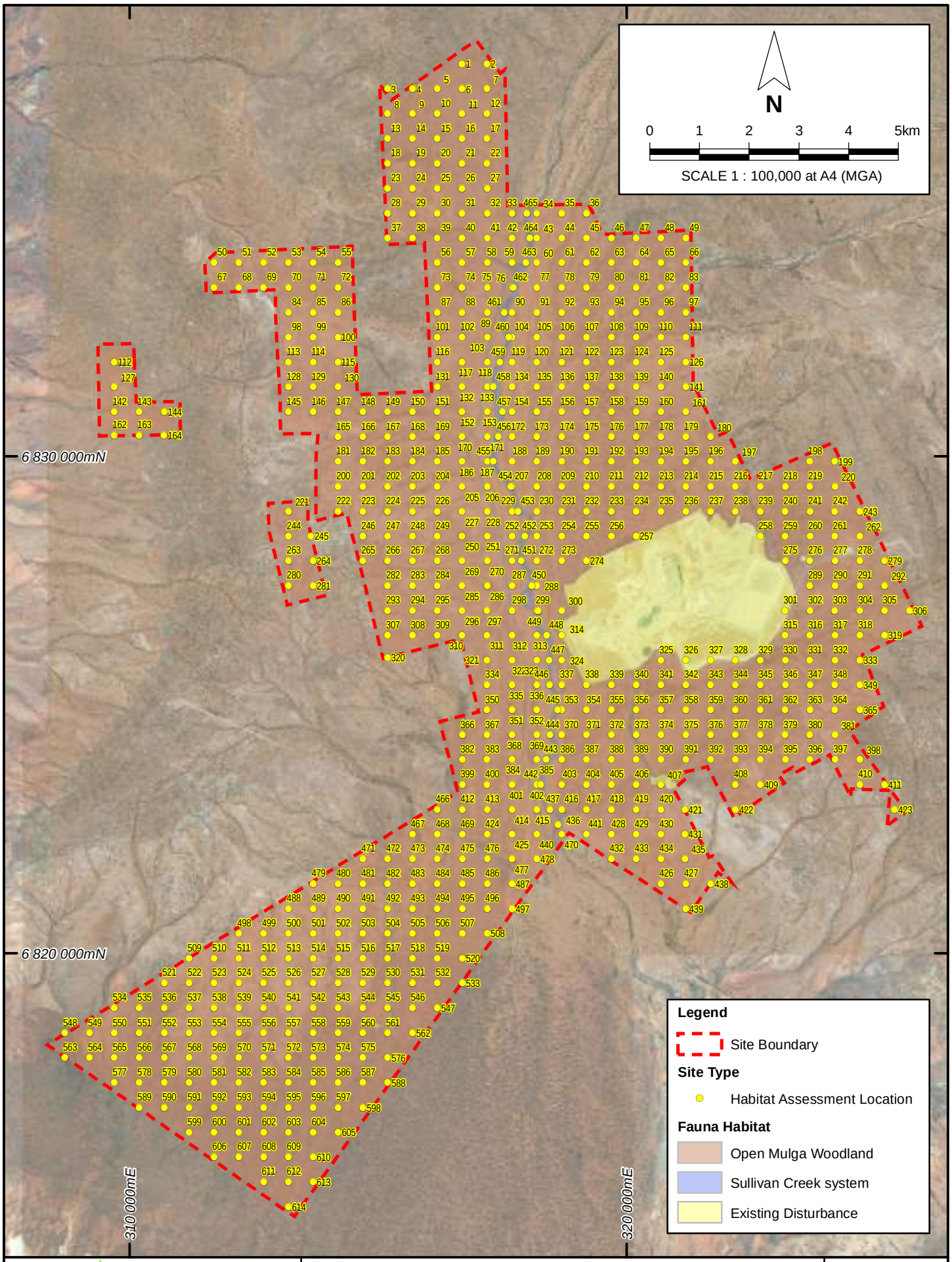
KING OF THE HILLS PROJECT

Figure 5

BIRD SURVEY SITES

Drawn: S. Thompson | Date: 18 May 2020 | Job: 2019-0084



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TERRESTRIAL ECOSYSTEMS

Red 5 Limited
LEVEL 2 VERTEBRATE FAUNA ASSESSMENT
KING OF THE HILLS PROJECT

RAPID HABITAT ASSESSMENTS

Figure 6

Drawn: S. Thompson | Date: 18 May 2020 | Job: 2019-0084

Appendix A. Results of the EPBC Act Protected Matters Search

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

Australian Government
Department of the Environment and Energy

EPBC Act Protected Matters Report

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

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

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

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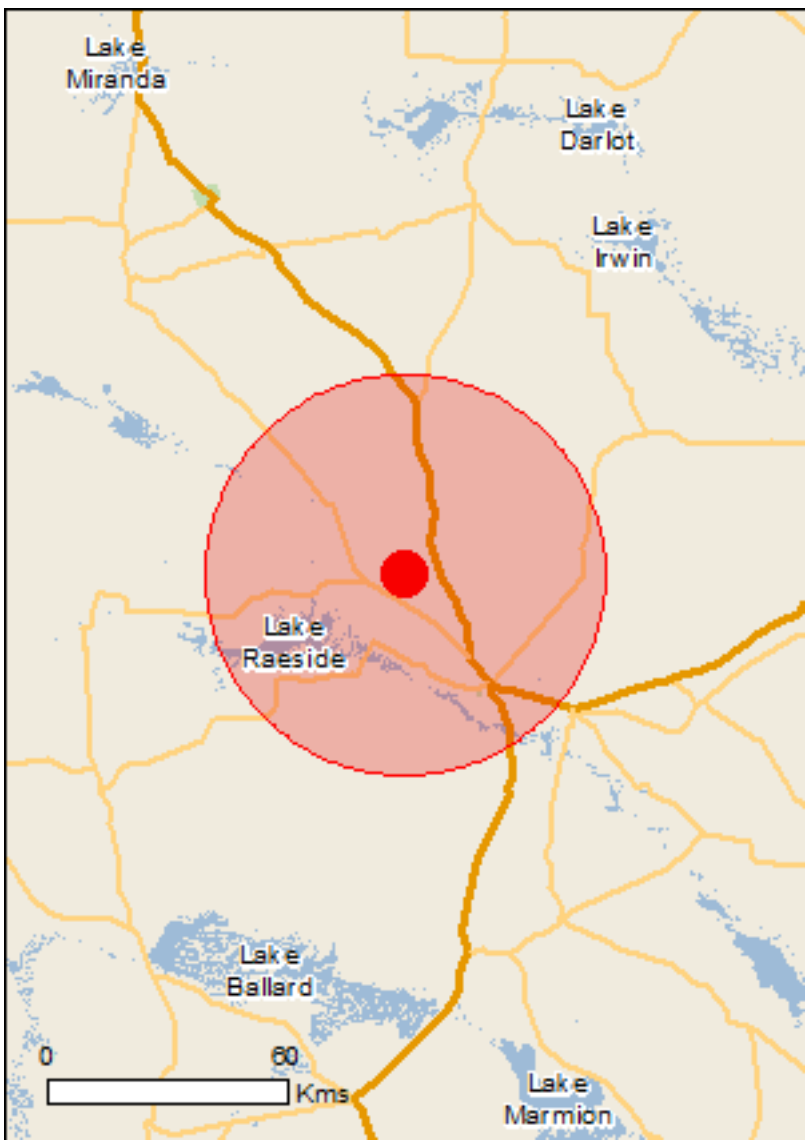

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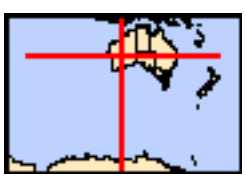

Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	4
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	12
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	15
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat known to occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land -

Listed Marine Species [Resource Information]

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

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Chrysococcyx osculans		
Black-eared Cuckoo [705]		Species or species habitat known to occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Plants		
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Cylindropuntia spp. Prickly Pears [85131]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-28.66596 121.14082

Acknowledgements

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

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

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

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

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Appendix B. Rapid habitat assessment variables

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

B.1 VARIABLES ASSESSED DURING THE RAPID HABITAT ASSESSMENT

Observer's Name:			
Coordinates of the location as UTM (GDA94):			
Fire history – options			
☐	> 5 years		
☐	1-5 years		
☐	< 1 year		
Landform – options			
☐	Beach	☐	Lower slope
☐	Clay plain	☐	Mid slope
☐	Cliff	☐	Ridge
☐	Creek line	☐	River
☐	Dam	☐	Rocky outcrop / breakaway
☐	Drainage line	☐	Salt lake
☐	Dune crest	☐	Sand dune
☐	Dune slope	☐	Sand plain
☐	Dune swale	☐	Stony plain
☐	Escarpment	☐	Swamp
☐	Flat	☐	Undulating
☐	Gorge	☐	Upper slope
☐	Gully	☐	Wetland
☐	Intertidal / mangrove	☐	Water hole
☐	Lake / lake edge		
Habitat quality – options			
☐	*High quality fauna habitat* – These areas closely approximate the vegetation mix and quality that would have been in the area prior to any disturbance. The habitat has connectivity with other habitats and is likely to contain the most natural vertebrate fauna assemblage.		
☐	*Very good fauna habitat* - These areas show minimal signs of disturbance (e.g. grazing, clearing, fragmentation, weeds) and generally retain many of the characteristics of the habitat if it had not been disturbed. The habitat has connectivity with other habitats and fauna assemblages in these areas are likely to be minimally affected by disturbance.		
☐	*Good fauna habitat* – These areas showed signs of disturbance (e.g. grazing, clearing, fragmentation, weeds) but generally retain many of the characteristics of the habitat if it had not been disturbed. The habitat has connectivity with other habitats and fauna assemblages in these areas are likely to be affected by disturbance.		
☐	*Disturbed fauna habitat*– These areas showed signs of significant disturbance. Many of the trees, shrubs and undergrowth are cleared. These areas may be in the early succession and regeneration stages. Areas may show signs of significant grazing, containing weeds or have been damaged by vehicle or machinery. Habitats are fragmented or have limited connectivity with other fauna habitats. Fauna assemblages in these areas are likely to differ significantly from what might be expected in the area had the disturbance not occurred.		
☐	*Highly degraded fauna habitat* – These areas often have a significant loss of vegetation, an abundance of weeds, and a large number of vehicle tracks or are completely cleared. Limited or no fauna habitat connectivity. Fauna		

Observer's Name:	
assemblages in these areas are likely to be significantly different to what might have been in the area pre-disturbance.	
Habitat structure – combined into habitat description	
Upper stratum	
☐ Tall open woodland	☐ Scattered tall trees
☐ Tall woodland	☐ Scattered trees
☐ Open woodland	☐ Scattered low trees
☐ Woodland	☐ Low closed forest
☐ Open forest	☐ Low open forest
☐ Closed forest	☐ Low woodland
☐ Tall closed forest	☐ Low open woodland
☐ Tall open forest	
Middle stratum	
☐ Shrubland	☐ Open heath
☐ Tall shrubland	☐ Low closed heath
☐ Tall open shrubland	☐ Low open heath
☐ Low shrubland	☐ Tall closed scrub
☐ Scattered low shrubs	☐ Tall open scrub
☐ Low open shrubland	☐ Scattered tall shrubs
☐ Scattered tall shrubs	☐ Open shrubland
☐ Closed heath	☐ Scattered shrubs
Lower stratum	
☐ Closed hummock grassland	☐ Closed tussock grassland / sedgeland / herbland
☐ Mid-dense hummock grassland	☐ Tussock grass land / sedgeland / herbland
☐ Hummock grassland	☐ Open tussock grassland / sedgeland / herbland
☐ Open hummock grassland	☐ Scattered tussock / grasses / sedges / herbs
☐ Scattered hummock grassland	☐ Very open tussock grassland / herbland
Soil Type – options	
☐ Sand	☐ Silty loam
☐ Loamy sand	☐ Sand clay loam
☐ Clayey sand	☐ Clay
☐ Clay loam	☐ Peat / organic
☐ Silty clay loam	☐ Stony
☐ Sandy loam	
Soil colour - options	
☐ Black	☐ Red

Observer's Name:	
☐ Brown	☐ White
☐ Grey	☐ Yellow
☐ Orange	
Surface stones – options	
☐ None	☐ Boulders (>250mm)
☐ Pebbles (0-50mm)	☐ Rocks
☐ Cobbles (51-250)	

Appendix C. Trapping sites

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

C.1 LOCATION OF TRAPPING SITES AND OPENING AND CLOSING DATES (GDA 94, ZONE 51)

Site #	Easting	Northing	1st opening	1st closing	2nd opening	2nd closing	Days opened
1	317991	6824109	19/11/2019	26/11/2019	11/03/2020	18/03/2020	14
2	317685	6826688	19/11/2019	26/11/2019	11/03/2020	18/03/2020	14
3	317580	6828062	19/11/2019	26/11/2019	11/03/2020	18/03/2020	14
4	317676	6829265	19/11/2019	26/11/2019	11/03/2020	18/03/2020	14
5	315893	6829280	19/11/2019	26/11/2019	11/03/2020	18/03/2020	14
6	314633	6830902	19/11/2019	26/11/2019	11/03/2020	18/03/2020	14
7	317346	6831201	19/11/2019	26/11/2019	11/03/2020	18/03/2020	14
8	317404	6831848	19/11/2019	26/11/2019	11/03/2020	18/03/2020	14
9	317758	6833704	19/11/2019	26/11/2019	11/03/2020	18/03/2020	14
10	318133	6834400	19/11/2019	26/11/2019	11/03/2020	18/03/2020	14
11	319219	6833451	19/11/2019	26/11/2019	11/03/2020	18/03/2020	14
12	319829	6831795	19/11/2019	26/11/2019	11/03/2020	18/03/2020	14
13	321089	6829627	19/11/2019	26/11/2019	11/03/2020	18/03/2020	14
14	319013	6828795	19/11/2019	26/11/2019	11/03/2020	18/03/2020	14
15	319991	6825194	19/11/2019	26/11/2019	11/03/2020	18/03/2020	14

Appendix D. Trapping site images in November 2019

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

D.1 TRAPPING SITES IN NOVEMBER 2019

[Appendix Content Begins Here]

Plate 36. November 2019 Site 1 –

Plate 37. November 2019 Site 1

Plate 38. November 2019 Site 1

Plate 39. November 2019 Site 1

Plate 40. November 2019 Site 2

Plate 41. November 2019 Site 2

Plate 42. November 2019 Site 2

Plate 43. November 2019 Site 2

Plate 44. November 2019 Site 3

Plate 45. November 2019 Site 3

Plate 46. November 2019 Site 3

Plate 47. November 2019 Site 3

Plate 48. November 2019 Site 4

Plate 49. November 2019 Site 4

Plate 50. November 2019 Site 4

Plate 51. November 2019 Site 4

Plate 52. November 2019 Site 5

Plate 53. November 2019 Site 5

Plate 54. November 2019 Site 5

Plate 55. November 2019 Site 5

Plate 56. November 2019 Site 6

Plate 57. November 2019 Site 6

Plate 58. November 2019 Site 6

Plate 59. November 2019 Site 6

Plate 60. November 2019 Site 7

Plate 61. November 2019 Site 7

Plate 62. November 2019 Site 7

Plate 63. November 2019 Site 7

Plate 64. November 2019 Site 8

Plate 65. November 2019 Site 8

Plate 66. November 2019 Site 8

Plate 67. November 2019 Site 8

Plate 68. November 2019 Site 9

Plate 69. November 2019 Site 9

Plate 70. November 2019 Site 9

Plate 71. November 2019 Site 9

Plate 72. November 2019 Site 10

Plate 73. November 2019 Site 10

Plate 74. November 2019 Site 10

Plate 75. November 2019 Site 10

Plate 76. November 2019 Site 11

Plate 77. November 2019 Site 11

Plate 78. November 2019 Site 11

Plate 79. November 2019 Site 11

Plate 80. November 2019 Site 12

Plate 81. November 2019 Site 12

Plate 82. November 2019 Site 12

Plate 83. November 2019 Site 12

Plate 84. November 2019 Site 13

Plate 85. November 2019 Site 13

Plate 86. November 2019 Site 13

Plate 87. November 2019 Site 13

Plate 88. November 2019 Site 14

Plate 89. November 2019 Site 14

Plate 90. November 2019 Site 14

Plate 91. November 2019 Site 14

Plate 92. November 2019 Site 15

Plate 93. November 2019 Site 15

Plate 94. November 2019 Site 15

Plate 95. November 2019 Site 15

Appendix E. Trapping site images in March 2020

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

E.1 TRAPPING SITES IN MARCH 2020

Plate 96. March 2020 Site 1

Plate 97. March 2020 Site 1

Plate 98. March 2020 Site 1

Plate 99. March 2020 Site 1

Plate 100. March 2020 Site 2

Plate 101. March 2020 Site 2

Plate 102. March 2020 Site 2

Plate 103. March 2020 Site 2

Plate 104. March 2020 Site 3

Plate 105. March 2020 Site 3

Plate 106. March 2020 Site 3

Plate 107. March 2020 Site 3

Plate 108. March 2020 Site 4

Plate 109. March 2020 Site 4

Plate 110. March 2020 Site 4

Plate 111. March 2020 Site 4

Plate 112. March 2020 Site 5

Plate 113. March 2020 Site 5

Plate 114. March 2020 Site 5

Plate 115. March 2020 Site 5

Plate 116. March 2020 Site 6

Plate 117. March 2020 Site 6

Plate 118. March 2020 Site 6

Plate 119. March 2020 Site 6

Plate 120. March 2020 Site 7

Plate 121. March 2020 Site 7

Plate 122. March 2020 Site 7

Plate 123. March 2020 Site 7

Plate 124. March 2020 Site 8

Plate 125. March 2020 Site 8

Plate 126. March 2020 Site 8

Plate 127. March 2020 Site 8

Plate 128. March 2020 Site 9

Plate 129. March 2020 Site 9

Plate 130. March 2020 Site 9

Plate 131. March 2020 Site 9

Plate 132. March 2020 Site 10

Plate 133. March 2020 Site 10

Plate 134. March 2020 Site 10

Plate 135. March 2020 Site 10

Plate 136. March 2020 Site 11

Plate 137. March 2020 Site 11

Plate 138. March 2020 Site 11

Plate 139. March 2020 Site 11

Plate 140. March 2020 Site 12

Plate 141. March 2020 Site 12

Plate 142. March 2020 Site 12

Plate 143. March 2020 Site 12

Plate 144. March 2020 Site 13

Plate 145. March 2020 Site 13

Plate 146. March 2020 Site 13

Plate 147. March 2020 Site 13

Plate 148. March 2020 Site 14

Plate 149. March 2020 Site 14

Plate 150. March 2020 Site 14

Plate 151. March 2020 Site 14

Plate 152. March 2020 Site 15

Plate 153. March 2020 Site 15

Plate 154. March 2020 Site 15

Plate 155. March 2020 Site 15

Appendix F.
Bird survey sites

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

F.1 BIRD SURVEY SITES (GDA 94, ZONE 51)

Site name	Easting	Northing	Date surveyed
KH-BS-#001	318361	6823809	21/11/2019
KH-BS-#002	314246	6829754	20/11/2019
KH-BS-#003	318444	6825907	20/11/2019
KH-BS-#004	319204	6828382	22/11/2019
KH-BS-#005	317743	6829152	22/11/2019
KH-BS-#006	317421	6831064	22/11/2019
KH-BS-#007	316571	6833406	23/11/2019
KH-BS-#008	317805	6833735	23/11/2019
KH-BS-#009	324354	6828347	24/11/2019
KH-BS-#010	323815	6829386	24/11/2019
KH-BS-#011	323263	6828592	24/11/2019
KH-BS-#012	324226	6826676	24/11/2019
KH-BS-#013	318130	6825048	21/11/2019
KH-BS-#014	320419	6824534	25/11/2019
KH-BS-#015	317544	6823919	21/11/2019
KH-BS-#016	317051	6822389	21/11/2019
KH-BS-#017	319983	6822055	21/11/2019
KH-BS-#018	320796	6822545	21/11/2019
KH-BS-#019	319392	6823741	21/11/2019
KH-BS-#020	323012	6824766	25/11/2019
KH-BS-#021	320976	6821482	21/11/2019
KH-BS-#022	318995	6834693	23/11/2019
KH-BS-#023	319391	6833599	23/11/2019
KH-BS-#024	320668	6833630	23/11/2019
KH-BS-#025	320115	6832124	22/11/2019
KH-BS-#026	313828	6832307	20/11/2019
KH-BS-#027	314202	6831011	20/11/2019
KH-BS-#028	321591	6824477	25/11/2019
KH-BS-#029	318447	6831677	22/11/2019
KH-BS-#030	320881	6829648	22/11/2019
KH-BS-#031	319156	6829967	22/11/2019

Site name	Easting	Northing	Date surveyed
KH-BS-#032	317554	6826647	20/11/2019
KH-BS-#033	315960	6826574	20/11/2019
KH-BS-#034	315027	6828145	20/11/2019
KH-BS-#035	323074	6825995	24/11/2019
KH-BS-#036	316817	6837188	23/11/2019
KH-BS-#037	315740	6835999	23/11/2019
KH-BS-#038	316427	6834541	23/11/2019
KH-BS-#039	313722	6833367	20/11/2019
KH-BS-#040	316293	6830292	22/11/2019
KH-BS-#041	322150	6829597	17/03/2020
KH-BS-#042	317626	6832364	22/11/2019
KH-BS-#043	317988	6827163	24/11/2019
KH-BS-#044	320992	6825312	25/11/2019
KH-BS-#045	322153	6825688	25/11/2019
KH-BS-#046	324365	6825330	24/11/2019
KH-BS-#047	322586	6823302	25/11/2019
KH-BS-#048	316475	6828532	25/11/2019
KH-BS-#049	317390	6821261	12/03/2020
KH-BS-#050	316510	6820750	12/03/2020
KH-BS-#051	316802	6819906	12/03/2020
KH-BS-#052	316299	6819329	12/03/2020
KH-BS-#053	316023	6820123	17/03/2020
KH-BS-#054	315491	6819256	17/03/2020
KH-BS-#055	313117	6815101	13/03/2020
KH-BS-#056	313934	6815834	13/03/2020
KH-BS-#057	314620	6819281	16/03/2020
KH-BS-#058	314888	6817361	12/03/2020
KH-BS-#059	315477	6818161	12/03/2020
KH-BS-#060	313184	6816123	13/03/2020
KH-BS-#061	313269	6817416	15/03/2020
KH-BS-#062	313994	6816954	15/03/2020

Site name	Easting	Northing	Date surveyed
KH-BS-#063	314877	6818226	12/03/2020
KH-BS-#064	312319	6815614	13/03/2020
KH-BS-#065	311369	6816195	13/03/2020
KH-BS-#066	310613	6816833	13/03/2020
KH-BS-#067	310088	6817700	14/03/2020
KH-BS-#068	308799	6818079	13/03/2020
KH-BS-#069	310303	6818708	14/03/2020
KH-BS-#070	312543	6816699	15/03/2020
KH-BS-#071	312827	6818207	16/03/2020
KH-BS-#072	313902	6818335	16/03/2020
KH-BS-#073	311561	6817029	15/03/2020
KH-BS-#074	312370	6817586	15/03/2020
KH-BS-#075	311378	6818071	15/03/2020

Site name	Easting	Northing	Date surveyed
KH-BS-#076	318501	6822342	17/03/2020
KH-BS-#077	315449	6822106	14/03/2020
KH-BS-#078	315074	6820158	17/03/2020
KH-BS-#079	312715	6819103	16/03/2020
KH-BS-#080	312819	6820386	14/03/2020
KH-BS-#081	311602	6819426	14/03/2020
KH-BS-#082	313485	6819591	16/03/2020
KH-BS-#083	313506	6821108	14/03/2020
KH-BS-#084	314073	6819996	16/03/2020
KH-BS-#085	314395	6821492	14/03/2020
KH-BS-#086	315344	6820991	17/03/2020
KH-BS-#087	316515	6821718	17/03/2020

Appendix G.
Bird survey site images

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

G.1 BIRD SURVEY SITE IMAGES

[Appendix Content Begins Here]

Plate 156. Bird survey site 1

Plate 157. Bird survey site 2

Plate 158. Bird survey site 3

Plate 159. Bird survey site 4

Plate 160. Bird survey site 5

Plate 161. Bird survey site 6

Plate 162. Bird survey site 7

Plate 163. Bird survey site 8

Plate 164. Bird survey site 9

Plate 165. Bird survey site 10-

Plate 166. Bird survey site 11

Plate 167. Bird survey site 12

Plate 168. Bird survey site 13

Plate 169. Bird survey site 14

Plate 170. Bird survey site 15

Plate 171. Bird survey site 16

Plate 172. Bird survey site 17

Plate 173. Bird survey site 18

Plate 174. Bird survey site 19

Plate 175. Bird survey site 20

Plate 176. Bird survey site 21

Plate 177. Bird survey site 26

Plate 178. Bird survey site 25

Plate 179. Bird survey site 24

Plate 180. Bird survey site 25

Plate 181. Bird survey site 26

Plate 182. Bird survey site 27

Plate 183. Bird survey site 28

Plate 184. Bird survey site 29

Plate 185. Bird survey site 30

Plate 186. Bird survey site 31

Plate 187. Bird survey site 32

Plate 188. Bird survey site 33

Plate 189. Bird survey site 34

Plate 190. Bird survey site 35

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Plate 192. Bird survey site 37

Plate 193. Bird survey site 38

Plate 194. Bird survey site 39

Plate 195. Bird survey site 40

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Plate 198. Bird survey site 43

Plate 199. Bird survey site 44

Plate 200. Bird survey site 45

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Plate 240. Bird survey site 85

Plate 241. Bird survey site 86

Plate 242. Bird survey site 87

Appendix H.
Camera trap locations

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

H.1 CAMERA TRAP LOCATIONS AND DEPLOYMENT PERIOD

Camera trap #	Easting	Northing	Start	Finish	Days open
1	314838	6830822	4/11/2019	20/11/2019	16
2	320618	6830656	4/11/2019	22/11/2019	18
3	314407	6829173	4/11/2019	20/11/2019	16
4	320100	6832637	4/11/2019	22/11/2019	18
5	316200	6828733	4/11/2019	20/11/2019	16
6	324023	6829233	4/11/2019	24/11/2019	20
7	317131	6835371	4/11/2019	20/11/2019	16
8	318788	6833351	4/11/2019	22/11/2019	18
9	319906	6828330	4/11/2019	21/11/2019	17
10	319546	6834396	4/11/2019	22/11/2019	18
11	317868	6832074	4/11/2019	22/11/2019	18
12	317976	6827730	4/11/2019	21/11/2019	17
13	318892	6827614	4/11/2019	21/11/2019	17
14	318451	6826328	4/11/2019	21/11/2019	17
15	317428	6831795	4/11/2019	20/11/2019	16
16	318680	6829357	4/11/2019	21/11/2019	17
17	318496	6833670	4/11/2019	22/11/2019	18
18	320435	6834448	4/11/2019	22/11/2019	18
19	318856	6834416	4/11/2019	22/11/2019	18
20	315327	6835913	4/11/2019	20/11/2019	16
21	318472	6825977	4/11/2019	21/11/2019	17
22	320085	6825017	4/11/2019	23/11/2019	19
23	317301	6823036	4/11/2019	20/11/2019	16
24	323154	6829493	4/11/2019	24/11/2019	20
25	317408	6824047	4/11/2019	20/11/2019	16
26	319813	6829120	4/11/2019	22/11/2019	18
27	313704	6831836	4/11/2019	20/11/2019	16
28	317444	6825368	4/11/2019	20/11/2019	16
29	319150	6832800	4/11/2019	22/11/2019	18
30	313667	6833545	4/11/2019	20/11/2019	16
31	322814	6826107	4/11/2019	23/11/2019	19
32	323820	6827027	4/11/2019	23/11/2019	19
33	318694	6830095	4/11/2019	21/11/2019	17
34	316382	6827210	4/11/2019	20/11/2019	16
35	318197	6826666	4/11/2019	21/11/2019	17
36	319837	6831748	4/11/2019	19/11/2019	15
37	319395	6828042	4/11/2019	21/11/2019	17
38	322139	6824113	4/11/2019	23/11/2019	19
39	319610	6823296	4/11/2019	21/11/2019	17
40	318037	6835005	4/11/2019	21/11/2019	17
41	313014	6832690	4/11/2019	20/11/2019	16
42	315550	6829952	4/11/2019	20/11/2019	16
43	317803	6833673	4/11/2019	20/11/2019	16
44	321148	6825274	4/11/2019	23/11/2019	19
45	318066	6834371	4/11/2019	21/11/2019	17
46	318161	6830398	4/11/2019	22/11/2019	18
47	317714	6829330	4/11/2019	20/11/2019	16
48	317439	6831083	4/11/2019	20/11/2019	16
49	321072	6829746	4/11/2019	22/11/2019	18
50	319091	6828732	4/11/2019	21/11/2019	17
51	313555	6816298	13/03/2020	6/04/2020	24
52	314017	6820675	15/03/2020	6/04/2020	22
53	315317	6820446	13/03/2020	6/04/2020	24
54	316037	6822241	13/03/2020	6/04/2020	24
55	315191	6821857	13/03/2020	6/04/2020	24
56	316058	6820370	13/03/2020	6/04/2020	24
57	311741	6819816	15/03/2020	6/04/2020	22
58	316813	6820259	13/03/2020	6/04/2020	24
59	316349	6819676	13/03/2020	6/04/2020	24
60	317360	6821028	13/03/2020	6/04/2020	24
61	314676	6820550	15/03/2020	6/04/2020	22
62	313307	6819230	15/03/2020	6/04/2020	22

Camera trap #	Easting	Northing	Start	Finish	Days open
63	315219	6819276	15/03/2020	6/04/2020	22
64	314219	6817085	13/03/2020	6/04/2020	24
65	308880	6818280	14/03/2020	6/04/2020	23
66	312298	6818471	14/03/2020	6/04/2020	23
67	314034	6818583	14/03/2020	6/04/2020	23
68	311007	6816712	14/03/2020	6/04/2020	23
69	312555	6815240	13/03/2020	6/04/2020	24

Camera trap #	Easting	Northing	Start	Finish	Days open
70	317078	6821873	13/03/2020	6/04/2020	24
71	311728	6815809	13/03/2020	6/04/2020	24
72	315471	6818549	14/03/2020	6/04/2020	23
73	310936	6818398	14/03/2020	6/04/2020	23
74	317452	6821670	13/03/2020	6/04/2020	24
75	316500	6820715	13/03/2020	6/04/2020	24

Appendix I.
Camera trap site images

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

I.1 CAMERA TRAP SITE IMAGES

[Appendix Content Begins Here]

Plate 243. Camera trap 1

Plate 244. Camera trap 2

Plate 245. Camera trap 3

Plate 246. Camera trap 4

Plate 247. Camera trap 5

Plate 248. Camera trap 6

Plate 249. Camera trap 7

Plate 250. Camera trap 8

Plate 251. Camera trap 9

Plate 252. Camera trap 10

Plate 253. Camera trap 11

Plate 254. Camera trap 12

Plate 255. Camera trap 13

Plate 256. Camera trap 14

Plate 257. Camera trap 15

Plate 258. Camera trap 16

Plate 259. Camera trap 17

Plate 260. Camera trap 18

Plate 261. Camera trap 19

Plate 262. Camera trap 20

Plate 263. Camera trap 21

Plate 264. Camera trap 22

Plate 265. Camera trap 23

Plate 266. Camera trap 24

Plate 267. Camera trap 25

Plate 268. Camera trap 26

Plate 269. Camera trap 27

Plate 270. Camera trap 28

Plate 271. Camera trap 29

Plate 272. Camera trap 30

Plate 273. Camera trap 31

Plate 274. Camera trap 32

Plate 275. Camera trap 33

Plate 276. Camera trap 34

Plate 277. Camera trap 35

Plate 278. Camera trap 36

Plate 279. Camera trap 37

Plate 280. Camera trap 38

Plate 281. Camera trap 39

Plate 282. Camera trap 40

Plate 283. Camera trap 41

Plate 284. Camera trap 42

Plate 285. Camera trap 43

Plate 286. Camera trap 44

Plate 287. Camera trap 45

Plate 288. Camera trap 46

Plate 289. Camera trap 47

Plate 290. Camera trap 48

Plate 291. Camera trap 49

Plate 292. Camera trap 50

Plate 293. Camera trap 51

Plate 294. Camera trap 52

Plate 295. Camera trap 53

Plate 296. Camera trap 54

Plate 297. Camera trap 55

Plate 298. Camera trap 56

Plate 299. Camera trap 57

Plate 300. Camera trap 58

Plate 301. Camera trap 59

Plate 302. Camera trap 60

Plate 303. Camera trap 61

Plate 304. Camera trap 62

Plate 305. Camera trap 63

Plate 306. Camera trap 64

Plate 307. Camera trap 65

Plate 308. Camera trap 66

Plate 309. Camera trap 67

Plate 310. Camera trap 68

Plate 311. Camera trap 69

Plate 312. Camera trap 70

Plate 313. Camera trap 71

Plate 314. Camera trap 72

Plate 315. Camera trap 73

Plate 316. Camera trap 74

Plate 317. Camera trap 75

Appendix J.
Song Meter locations

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

J.1 SONG METER LOCATIONS

Bat site	Easting	Northing	Date out	Date in	Serial number
Bat 1	317167	6835313	20/11/2019	21/11/2019	7548
Bat 2	316192	6834272	20/11/2019	21/11/2019	10856
Bat 3	317726	6829298	20/11/2019	21/11/2019	10883
Bat 4	317102	6825405	20/11/2019	21/11/2019	7544
Bat 5	317782	6823925	20/11/2019	21/11/2019	7586
Bat 6	318451	6825973	21/11/2019	22/11/2019	7544
Bat 7	319437	6828098	21/11/2019	22/11/2019	7586
Bat 8	317788	6833602	21/11/2019	22/11/2019	10883
Bat 9	316184	6829209	21/11/2019	22/11/2019	10856
Bat 10	314977	6830461	21/11/2019	22/11/2019	7548
Bat 11	319536	6829495	22/11/2019	23/11/2019	7586
Bat 12	317820	6831743	22/11/2019	23/11/2019	10856
Bat 13	319018	6832966	22/11/2019	23/11/2019	7544
Bat 14	318071	6834423	22/11/2019	23/11/2019	7548
Bat 15	319897	6834487	22/11/2019	23/11/2019	10883
Bat 16	320074	6824718	23/11/2019	24/11/2019	10856
Bat 17	320651	6823502	23/11/2019	24/11/2019	10883
Bat 18	320846	6825566	23/11/2019	24/11/2019	7586
Bat 19	322139	6824080	23/11/2019	24/11/2019	7544
Bat 20	323963	6827189	23/11/2019	24/11/2019	7584
Bat 21	324007	6824523	24/11/2019	25/11/2019	7586
Bat 22	324557	6825210	24/11/2019	25/11/2019	7544
Bat 23	322971	6825441	24/11/2019	25/11/2019	10883
Bat 24	325177	6827284	24/11/2019	25/11/2019	10856
Bat 25	323182	6827724	24/11/2019	25/11/2019	7548

Bat site	Easting	Northing	Date out	Date in	Serial number
Bat 26	312811	6815391	12/03/2020	13/03/2020	7586
Bat 27	313473	6816176	12/03/2020	13/03/2020	10856
Bat 28	314081	6816917	12/03/2020	13/03/2020	7544
Bat 29	314656	6817590	12/03/2020	13/03/2020	10883
Bat 30	315234	6818414	12/03/2020	13/03/2020	7548
Bat 31	308474	6818100	13/03/2020	14/03/2020	7586
Bat 32	309252	6817550	13/03/2020	14/03/2020	10856
Bat 33	310180	6816894	13/03/2020	14/03/2020	7544
Bat 34	310899	6816385	13/03/2020	14/03/2020	10883
Bat 35	314081	6816916	13/03/2020	14/03/2020	7548
Bat 36	315323	6819303	14/03/2020	15/03/2020	10856
Bat 37	315317	6819895	14/03/2020	15/03/2020	7544
Bat 38	315188	6820666	14/03/2020	15/03/2020	7586
Bat 39	315176	9821339	14/03/2020	15/03/2020	10883
Bat 40	315167	6822158	14/03/2020	15/03/2020	7548
Bat 41	314459	6818611	15/03/2020	16/03/2020	10856
Bat 42	313755	6818571	15/03/2020	16/03/2020	7548
Bat 43	312797	6818515	15/03/2020	16/03/2020	10883
Bat 44	311507	6818336	15/03/2020	16/03/2020	7544
Bat 45	310345	6818373	15/03/2020	16/03/2020	7586
Bat 46	313921	6820702	16/03/2020	17/03/2020	10856
Bat 47	314686	6820579	16/03/2020	17/03/2020	7544
Bat 48	316075	6820376	16/03/2020	17/03/2020	10883
Bat 49	316850	6820278	16/03/2020	17/03/2020	7586
Bat 50	318498	6822321	16/03/2020	17/03/2020	7548

Appendix K.
Trapping results

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

K.1 NOVEMBER 2019 TRAPPING RESULTS BY TRAP TYPE

Taxa	Family	Species	Bucket	Funnel	Pipe	Total
Mammals	Dasyuridae	*Sminthopsis dolichura*	1			1
		Sminthopsis macroura	2		1	3
	Muridae	*Pseudomys hermannsburgensis*	3		1	4
Reptiles	Agamidae	*Ctenophorus reticulatus*	2	2	1	5
		Ctenophorus scutulatus		1		1
		Pogona minor	2			2
	Carphodactylidae	*Nephrurus vertebralis*			4	4
		Underwoodisaurus milii	16	10	10	36
	Diplodactylidae	*Diplodactylus granariensis*	54	8	16	78
		Rhynchoedura ornata	4	1	4	9
		Strophurus wellingtonae	5	1	1	7
	Elapidae	*Brachyurophis semifasciata*	4	1	2	7
		Parasuta monachus	2	1		3
		Simoselaps bertholdi	3	1		4
		Suta punctata		1		1
	Gekkonidae	*Diplodactylus pulcher*	43	6	17	66
		Gehyra variegata	28	9	16	53
		Heteronotia binoei	38	25	12	75
	Pygopodidae	*Pygopus nigriceps*	1			1
	Scincidae	*Cryptoblepharus buchananii*	4	1	3	8
		Ctenotus schomburgkii	5	10	2	17
		Ctenotus severus	3	12	2	17
		Ctenotus uber	18	31	6	55
		Egernia depressa	6	2	3	11
		Eremiascincus richardsonii	6	4	1	11
		Lerista desertorum	56	24	36	116
		Lerista muelleri	8	5	2	15
		Menetia greyii	4	1	2	7
		Morethia butleri	15	24	10	49
	Typhlopidae	*Anilios hamatus*	1			1

Taxa	Family	Species	Bucket	Funnel	Pipe	Total
	Varanidae	*Varanus caudolineatus*	2	5	1	8
		Varanus panoptes		2	1	3
		Total	336	188	154	678

K.2 NOVEMBER TRAPPING RESULTS BY SITE

		Sites															
Family	Species	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**Total**
Dasyuridae	*Sminthopsis dolichura*		1														1
	Sminthopsis macroura															3	3
Muridae	*Pseudomys hermannsburgensis*						4										4
Agamidae	*Ctenophorus reticulatus*	1	1	1								1			1		5
	Ctenophorus scutulatus											1					1
	Pogona minor									1	1						2
Carphodactylidae	*Nephrurus vertebralis*											4					4
	Underwoodisaurus milii				3			5	7	5	16						36
Diplodactylidae	*Diplodactylus granariensis*	12	10	4	7	8	9		1		5	5	5	7	1	4	78
	Rhynchoedura ornata					3	1								4	1	9
	Strophurus wellingtonae	1	2	1			1						1		1		7
Elapidae	*Brachyurophis semifasciata*	1						1		1	4						7
	Parasuta monachus									1			1		1		3
	Simoselaps bertholdi				1			2	1								4
	Suta punctata									1							1
Gekkonidae	*Diplodactylus pulcher*	5	4	2		6	6					10	6	7	3	17	66
	Gehyra variegata	2	2	1	8	4	3	4	2	2	6	2	2	11	1	3	53
	Heteronotia binoei				17	2		17	19	5	3	3	1	5	3		75
Pygopodidae	*Pygopus nigriceps*													1			1
Scincidae	*Cryptoblepharus buchananii*							1	1	3	3						8
	Ctenotus schomburgkii	1	6									4			6		17
	Ctenotus severus				3			2	5	1	6						17
	Ctenotus uber	10	15	9	1		1	3	3			3			6	4	55
	Egernia depressa	1	2	1		1	3					1	1	1			11
	Eremiascincus richardsonii					1	2	2		1	2	3					11
	Lerista desertorum	1	1	3	21		5	14	18	18	35						116
	Lerista muelleri		1		2			4	1	1	3	1	1		1		15
	Menetia greyii										3	2	1			1	7
	Morethia butleri	2		1	9		3	6	8	8	7	1	3	1			49

		Sites														
Typhlopidae	*Anilios hamatus*										1					1
Varanidae	*Varanus caudolineatus*	1	3				3					1				8
Dasyuridae	*Varanus panoptes*					2						1				3
	Total	38	48	23	72	27	41	61	66	48	94	42	24	33	28	33	678

K.3 MARCH 2020 TRAPPING RESULTS BY TRAP TYPE

Taxa	Family	Species	Bucket	Funnel	Pipe	Total
Amphibians	Hylidae	*Litoria rubella*	1		1	2
	Limnodynastidae	*Neobatrachus sutor*	39		14	53
	Myobatrachidae	*Pseudophryne occidentalis*	3		1	4
Mammals	Dasyuridae	*Ningaui ridei*			1	1
		Sminthopsis dolichura	9		6	15
		Sminthopsis macroura	1			1
	Muridae	*Pseudomys hermannsburgensis*			6	6
Reptiles	Agamidae	*Ctenophorus reticulatus*	5	3		8
		Ctenophorus scutulatus		1	1	2
		Diporiphora amphiboluroides	1		1	2
		Pogona minor	1			1
	Carphodactylidae	*Nephrurus vertebralis*			1	1
		Underwoodisaurus milii	11	4	4	19
	Diplodactylidae	*Diplodactylus granariensis*	35	3	9	47
		Rhynchoedura ornata	7		4	11
		Strophurus wellingtonae	5	2	4	11
	Elapidae	*Parasuta monachus*	2			2
		Pseudechis butleri		1	1	2
		Pseudonaja modesta	1			1
	Elapidae	*Simoselaps bertholdi*	1	1		2
	Gekkonidae	*Diplodactylus pulcher*	44	1	16	61
		Gehyra variegata	23	18	8	49
		Heteronotia binoei	37	43	14	94
	Pygopodidae	*Pygopus nigriceps*	2		1	3
	Pythonidae	*Antaresia stimsoni*		1		1
	Scincidae	*Cryptoblepharus buchananii*	7			7
		Ctenotus schomburgkii	5	5		10
		Ctenotus severus	16	24	1	41
		Ctenotus uber	28	61	4	93
		Egernia depressa	9	7	5	21

Taxa	Family	Species	Bucket	Funnel	Pipe	Total
		Eremiascincus richardsonii	4	8	3	15
		Lerista desertorum	10	2	8	20
		Lerista muelleri	6	3	2	11
		Menetia greyii	8	2		10
		Morethia butleri	25	25	5	55
	Varanidae	*Varanus caudolineatus*	3	4	2	9
		Varanus panoptes		3	1	4
		Total	349	222	124	695

K.4 MARCH 2020 TRAPPING RESULTS BY SITE

	Sites															
Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Litoria rubella									1	1						2
Neobatrachus sutor				6			1	11	16	14					5	53
Pseudophryne occidentalis									4							4
Ningaui ridei													1			1
Sminthopsis dolichura	2		1		2	2					3		2	2	1	15
Sminthopsis macroura		1														1
Pseudomys hermannsburgensis						5							1			6
Ctenophorus reticulatus		5									1	1			1	8
Ctenophorus scutulatus											1		1			2
Diporiphora amphiboluroides		1										1				2
Pogona minor				1												1
Nephrurus vertebralis											1					1
Underwoodisaurus milii			2	2			2	3	6	4						19
Diplodactylus granariensis	6	4	8	3	4	3	4	1	2	4		2	3	1	2	47
Rhynchoedura ornata		2			5							1		3		11
Strophurus wellingtonae	1	1	1		3						1	1		3		11
Parasuta monachus												1	1			2
Pseudechis butleri	1		1													2
Pseudonaja modesta		1														1
Simoselaps bertholdi			1						1							2
Diplodactylus pulcher	14	4	1		5	6					1	4	9	1	16	61
Gehyra variegata	3	3		8	7	2		3	7	3	4	1	4	2	2	49
Heteronotia binoei			3	15		1	10	12	15	23	4	3	7	1		94
Pygopus nigriceps						2								1		3
Antaresia stimsoni							1									1
Cryptoblepharus buchananii							2	1	2	2						7
Ctenotus schomburgkii		5									2			3		10
Ctenotus severus				8			14	11	3	5						41
Ctenotus uber	4	20	4	8	4	1	2	10	2	1	9	1	9	13	5	93

	Sites															
Egernia depressa	5	3			1	2					2	5	3			21
Eremiascincus richardsonii				2					1	11					1	15
Lerista desertorum	3			3			1	5	2	5					1	20
Lerista muelleri	3	1			1		1		2	1				2		11
Menetia greyii					2					1	1	1	1	3	1	10
Morethia butleri	1	5	2	11	1		8	4	12	8			1	2		55
Varanus caudolineatus	1					2				2				1	3	9
Varanus panoptes						1					1		1	1		4
Total	44	56	24	67	35	27	46	61	76	85	31	22	44	39	38	695

Appendix L.
Avifauna records

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

L.1 AVIFAUNA RECORDS BY SITE FOR NOVEMBER 2019 - SITES 1-24

			Sites																							
Family	Species	Common Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Accipitridae	*Accipiter cirrocephalus*	Collared Sparrowhawk								1																
	Aquila audax	Wedge-tailed Eagle														1										
Columbidae	*Ocyphaps lophotes*	Crested Pigeon													1	6		1								
	Phaps chalcoptera	Common Bronzewing						1																		
Meropidae	*Merops ornatus*	Rainbow Bee-eater	2							1																
Falconidae	*Falco cenchroides*	Nankeen Kestrel					1																			
Acanthizidae	*Acanthiza*	Inland Thornbill	1				4																			
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill																		1						
	Acanthiza robustirostris	Slaty-backed Thornbill				1							2												2	
	Acanthiza uropygialis	Chestnut-rumped Thornbill	3	3		2	3	1	3	1			5	6	3		3	2				2		1	2	2
	Aphelocephala leucopsis	Southern Whiteface																							5	
	Pyrrholaemus brunneus	Redthroat															1	1								
	Smicrornis brevirostris	Weebill	2				5	2																		
Artamidae	*Artamus cinereus*	Black-faced Woodswallow									2															
	Gymnorhina tibicen	Australian Magpie							1									2								
Climacteridae	*Climacteris affinis*	White-browed Treecreeper																2							1	
Corvidae	*Corvus bennetti*	Little Crow																	3							
	Corvus orru	Torresian Crow	1					2													1					

			Sites																								
Hirundinidae	*Hirundo neoxena*	Welcome Swallow											1														
Maluridae	*Malurus splendens*	Splendid Fairywren	2				4		4				2	2			2	2						3			
Meliphagidae	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater						1						1													
	Epthianura tricolor	Crimson Chat																		5							
	Lichenostomus virescens	Singing Honeyeater	1			1		4	1	2	1		2	1	1		2	2	1			1	1	1	1		
	Manorina flavigula	Yellow-throated Miner			2			2					1		1												
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush	1																								
	Oreoica gutturalis	Crested Bellbird				1	1						1		2	1		1			1	1			1		
	Pachycephala rufiventris	Rufous Whistler	1									1	2					1							2		
Petroicidae	*Melanodryas cucullata*	Hooded Robin																		2							
	Petroica goodenovii	Red-capped Robin	1										1				1					1		2			
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail						1																			
	Rhipidura leucophrys	Willie Wagtail	1		1						1									1							
Psittacidae	*Barnardius zonarius*	Australian Ringneck	2						1		1														1		
		Total	18	3	3	5	18	14	10	5	5	1	17	10	8	8	9	14	4	9	2	5	4	7	15	2	

L.2 AVIFAUNA RECORDS BY SITE FOR NOVEMBER 2019 - SITES 25-48

			Sites																							
Family	Species	Common Name	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Accipitridae	*Accipiter cirrocephalus*	Collared Sparrowhawk																		1						
	Aquila audax	Wedge-tailed Eagle				1																				
Columbidae	*Ocyphaps lophotes*	Crested Pigeon				12																				
	Phaps chalcoptera	Common Bronzewing																			1					
Halcyonidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher																			1					
Meropidae	*Merops ornatus*	Rainbow Bee-eater																		1	2					
Acanthizidae	*Acanthiza*	Inland Thornbill													1	1										
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill		2																						
	Acanthiza robustirostris	Slaty-backed Thornbill	1																							
	Acanthiza uropygialis	Chestnut-rumped Thornbill			3		1	2		3	1	2		2	5	4	1			2	3	2	3	3		
	Aphelocephala leucopsis	Southern Whiteface					2														1					
	Pyrrholaemus brunneus	Redthroat																1								
	Smicrornis brevirostris	Weebill																		1	4					
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		4																				1		
	Cracticus nigrogularis	Pied Butcherbird																								1
Climacteridae	*Climacteris affinis*	White-browed Treecreeper	1									1														
Corvidae	*Corvus orru*	Torresian Crow																							1	
Maluridae	*Malurus leucopterus*	White-winged Fairywren																	3							

			Sites																								
	Malurus splendens	Splendid Fairywren	1		2		5							1	2	1					2						
Meliphagidae	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater																			1						
	Lichenostomus virescens	Singing Honeyeater	1	1		1		1		1			1	2	1	1	1	2		2	1		1		1	1	
	Manorina flavigula	Yellow-throated Miner				1															1		1				
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit																	1								
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella																4									
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush																			1						
	Oreoica gutturalis	Crested Bellbird			1			1	1				1	1					1								
	Pachycephala rufiventris	Rufous Whistler												1		1				1							1
Pardalotidae	*Pardalotus striatus*	Striated Pardalote																			1						
Petroicidae	*Melanodryas cucullata*	Hooded Robin		1																							
	Petroica goodenovii	Red-capped Robin	2				1								1									1			
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler					4																				
Ptilinorhynchidae	*Ptilonorhynchus guttatus*	Western Bowerbird																		1							
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail																									
	Rhipidura leucophrys	Willie Wagtail		1																1	2			1			
Psittacidae	*Barnardius zonarius*	Australian Ringneck											1														
		Total	6	9	6	15	13	4	1	4	1	3	3	7	10	8	2	7	5	10	21	2	5	6	2	3	

L.3 AVIFAUNA RECORDS BY SITE FOR MARCH 2020 - SITES 49-73

			Sites																								
Family	Species	Common Name	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
Accipitridae	*Accipiter fasciatus*	Brown Goshawk																					2				
	Aquila audax	Wedge-tailed Eagle															1										
Columbidae	*Ocyphaps lophotes*	Crested Pigeon				3					3																
	Phaps chalcoptera	Common Bronzewing		1																							
Cuculidae	*Chalcites basalis*	Horsfield's Bronze Cuckoo																			1						
Falconidae	*Falco berigora*	Brown Falcon															1										
Acanthizidae	*Acanthiza*	Inland Thornbill					2																1				
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill						1														2					
	Acanthiza robustirostris	Slaty-backed Thornbill					3								1									1		4	
	Acanthiza uropygialis	Chestnut-rumped Thornbill				1		2	6	1		4			3				2		2		3	2	2	2	4
	Aphelocephala leucopsis	Southern Whiteface					2								1							2		1			
	Gerygone fusca	Western Gerygone																									
	Pyrrholaemus brunneus	Redthroat							1								1				1		1				
Artamidae	*Artamus cinereus*	Black-faced Woodswallow									1																
	Cracticus nigrogularis	Pied Butcherbird																									1
Climacteridae	*Climacteris affinis*	White-browed Treecreeper						2																1			
Corvidae	*Corvus orru*	Torresian Crow	1											1					1						1		
Estrildidae	*Taeniopygia guttata*	Zebra Finch																								1	

			Sites																									
Maluridae	*Malurus splendens*	Splendid Fairywren	1				3	2	2														1	1		3	
Meliphagidae	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater	1				2	1	1	1			1	1	6	1		1			1	1	2	1	2	1	1
	Lichenostomus virescens	Singing Honeyeater	1	2	1	2	1	2		1	2	1	1	1	1	2	1	2	2	1	1	1	1		2	1	2
	Purnella albifrons	White-fronted Honeyeater									1								1					2			
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush	1	1														1								1	
	Oreoica gutturalis	Crested Bellbird	2	2	2		1	1	1	1	1	1	1	1	1	1	1	1	1		1			1	1		1
	Pachycephala rufiventris	Rufous Whistler	2	1	1		1	1					1		1				1		1	2	1	1	1	1	1
Petroicidae	*Melanodryas cucullata*	Hooded Robin						2																	1		
	Petroica goodenovii	Red-capped Robin	1	1		1	2	2	1			1			3	1	1		1			1	1	2		1	
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler			3				2						3				2		3		2				
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail									1					1			1						1		1
Psittacidae	*Barnardius zonarius*	Australian Ringneck	1																								
	Neopsephotus bourkii	Bourke's Parrot		1			1				1												1				
		Total	11	9	7	7	18	16	14	4	10	7	4	4	20	6	6	5	12	1	11	9	16	13	11	15	11

L.4 AVIFAUNA RECORDS BY SITE FOR MARCH 2020 - SITES 74-87

			Sites													
Family	Species	Common Name	74	75	76	77	78	79	80	81	82	83	84	85	86	87
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar										1				
Columbidae	*Phaps chalcoptera*	Common Bronzewing											1			
Meropidae	*Merops ornatus*	Rainbow Bee-eater			2											
Falconidae	*Falco berigora*	Brown Falcon			1											
	Falco cenchroides	Nankeen Kestrel								1						
Acanthizidae	*Acanthiza*	Inland Thornbill			2											
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill			2											
	Acanthiza robustirostris	Slaty-backed Thornbill											1	1		1
	Acanthiza uropygialis	Chestnut-rumped Thornbill	2		2					3				2	1	
	Aphelocephala leucopsis	Southern Whiteface			3	1	2			2			6	1		1
	Gerygone fusca	Western Gerygone			1											
	Smicrornis brevirostris	Weebill			4											
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird			1	2										1
	Gymnorhina tibicen	Australian Magpie			1											
	Strepera versicolor	Grey Currawong				1										
Campephagidae	*Coracina maxima*	Ground Cuckoo-shrike								2						
	Coracina novaehollandiae	Black-faced Cuckoo-shrike								1						
Corvidae	*Corvus orru*	Torresian Crow			1			1								

			Sites													
Estrildidae	*Taeniopygia guttata*	Zebra Finch						2								
Maluridae	*Malurus splendens*	Splendid Fairywren												3		3
Meliphagidae	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater	1			1	1	2	1	2	1	1	1	1	2	2
	Lichenostomus virescens	Singing Honeyeater	1	1	2	2	2	1		1	1	3	1	2	1	2
Monarchidae	*Grallina cyanoleuca*	Magpie-lark			1											
Pachycephalidae	*Oreoica gutturalis*	Crested Bellbird	1	1	1	1	1			1	1	1	1	1	1	1
	Pachycephala rufiventris	Rufous Whistler					1			1			1	1	1	
Pardalotidae	*Pardalotus striatus*	Striated Pardalote			1											
Petroicidae	*Melanodryas cucullata*	Hooded Robin					2						1			
	Petroica goodenovii	Red-capped Robin					1	2	2	1			2	2	2	2
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail														
	Rhipidura leucophrys	Willie Wagtail			1		2	1		1	1	3				
Cacatuidae	*Eolophus roseicapilla*	Galah			2											
Psittacidae	*Barnardius zonarius*	Australian Ringneck			4									1		2
	Neopsephotus bourkii	Bourke's Parrot						2					4			
		Total	5	2	33	8	12	11	3	16	4	9	19	15	8	15

L.5 AVIFAUNA RECORDED AT RAINBOW PIT

Species	Common Name	Number
Anas gracilis	Grey Teal	56
Aythya australis	Hardhead	1
Chenonetta jubata	Australian Wood Duck	4
Cygnus atratus	Black Swan	4
Elseyornis melanops	Black-fronted Dotterel	3
Fulica atra	Eurasian Coot	14
Gavicalis virescens	Singing Honeyeater	2
Grallina cyanoleuca	Magpie-lark	1
Ocyphaps lophotes	Crested Pigeon	2
Oreoica gutturalis	Crested Bellbird	1
Tachybaptus novaehollandiae	Australasian Grebe	3
Tadorna tadornoides	Australian Shelduck	4

Appendix M.
Camera trapping results

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

M.1 CAMERA TRAP RESULTS FOR NOVEMBER 2019(A)

	Camera #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Cow	*Bos taurus*		x		x			x		x	x	x		x	x		x						x	x		x
Cat	*Felis catus*		x																			x				
Emu	*Domanius novaehollandiae*				x																	x				
Red kangaroo	*Osphranter rufus*					x	x	x												x	x				x	
Dog	*Canis lupus*								x				x	x	x				x		x					x
Echidna	*Tachyglossus aculeatus*									x				x												
Raven	*Corvus coronoides*									x		x	x	x				x		x						
Goat	*Carpus hircus*									x																
Lozenge-marked Dragon	*Ctenophorus scutulatus*																	x								
Crested Bellbird	*Oreoica gutturalis*																	x		x	x					
Black-faced Woodswallow	*Artamus cinereus*													x												

M.2 CAMERA TRAP RESULTS FOR NOVEMBER 2019(B)

	Camera #	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Cow	*Bos taurus*			x	x				x			x	x	x	x				x	x					x
Cat	*Felis catus*						x						x			x	x		x			x		x		
Emu	*Domanius novaehollandiae*													x												
Red kangaroo	*Osphranter rufus*						x		x					x	x							x				
Euro	*Osphranter robustus*																	x								
Dog	*Canis lupus*			x	x								x		x	x				x	x		x			
Raven	*Corvus coronoides*											x												x		x
Goat	*Carpus hircus*																			x						
Magpie	*Gymnorhina tibicen*	x																								
Yellow-spotted Goanna	*Varanus panoptes*								x			x						x			x			x		
Red-capped Robin	*Petroica goodenovii*				x																					
Willie Wagtail	*Rhipidura leucophrys*							x																		
Rabbit	*Oryctolagus cuniculus*										x		x												x	
Unknown bird																					x					
Grey bird															x											
Unknown Thornbill															x											
Hooded Robin	*Melanodryas cucullata*														x											

M.3 CAMERA TRAP RESULTS FOR MARCH 2020

	Camera #	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Cow	*Bos taurus*		x	x	x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x		x	x	x
Cat	*Felis catus*	x		x			x	x					x	x		x	x			x			x			
Emu	*Domanius novaehollandiae*													x												
Red kangaroo	*Osphranter rufus*		x		x	x		x			x	x	x	x			x	x					x	x		x
Euro	*Osphranter robustus*	x																								
Dog	*Canis lupus*	x					x								x			x								
Echidna	*Tachyglossus aculeatus*													x												
Raven	*Corvus coronoides*			x				x									x	x	x		x	x		x	x	
Panoptes	*Varanus panoptes*										x															
Rabbit	*Oryctolagus cuniculus*						x	x	x																	
Black-faced Woodswallow	*Artamus cinereus*														x											
Western Bowerbird	*Ptilonorhynchus guttatus*							x										x								
Brown Goshawk	*Accipter fasciatus*																	x								

Appendix N.
Bat records

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

N.1 BAT RECORDS – NOVEMBER 2019

	C. gouldii	*O. kitcheneri*	*O. petersi*	*Nyctophilus sp.*	*S. balstoni*	*V. baverstocki*	*V. finlaysoni*
SM2BAT 7544							
20/11/2019	**P**	—	—	**NC**	**P**	—	—
SM2BAT 7548							
20/11/2019	—	—	—	**NC**	—	**P**	—
SM2BAT 7586							
20/11/2019	—	—	**NC**	**NC**	—	—	—
SM2BAT 10883							
20/11/2019	**P**	**P**	—	**NC**	—	—	**P**
21/11/2019	**P**	**P**		**NC**	**P**	—	**P**
22/11/2019	**P**	—	—	**NC**	**P**	—	**P**
23/11/2019	**P**	**P**	—	**NC**	—	—	**P**
24/11/2019	—	—	—	**NC**	—	—	—

Definition of confidence level codes

— Not detected.

P Unambiguous identification of the species at the site based on measured call characteristics and comparison with available reference material. Greater confidence in this ID would come only after capture and supported by morphological measurements or a DNA sequence.

NC Needs Confirmation. Either call quality was poor, or the species cannot be distinguished reliably from another that makes similar calls. Alternative identifications are indicated in the Comments on identifications section of this report. If this is a species of conservation significance, further survey work might be required to confirm the record.

N.2 BAT RECORDS – MARCH 2020

	C. gouldii	*O. kitcheneri*	*O. petersi*	*Nyctophilus sp.*	*S. balstoni*	*V. baverstocki*	*V. finlaysoni*
SM2BAT 7544							
12/3/2020	**P**	**P**	—	**NC**	**P**	—	**P**
15/3/2020	—	**P**	—	**NC**	**P**	—	—
SM2BAT 7548							
12/3/2020	**P**	**P**	—	NC	—	—	—
13/3/2020	**P**	**P**	—	—	**P**	—	—
14/3/2020	**P**	—	—	**NC**	**P**	—	**P**
15/3/2020	—	—	—	—	**P**	—	**P**
SM2BAT 7586							
13/3/2020	**P**	**P**	—	—	P	—	—
15/3/2020	**P**	**P**	—	**NC**		—	—
SM2 10856							
16/3/2020	—	—	**NC**	**NC**	—	—	—
SM2BAT 10883							—
12/3/2020	**P**	**P**	—	—	**P**	—	—
13/3/2020	**P**	**P**	—	**NC**	**P**	—	—
14/3/2020	—	—	—	—	**P**	—	—

Definition of confidence level codes

— Not detected.

P Unambiguous identification of the species at the site based on measured call characteristics and comparison with available reference material. Greater confidence in this ID would come only after capture and supported by morphological measurements or a DNA sequence.

NC Needs Confirmation. Either call quality was poor, or the species cannot be distinguished reliably from another that makes similar calls. Alternative identifications are indicated in the Comments on identifications section of this report. If this is a species of conservation significance, further survey work might be required to confirm the record.

Appendix O. Vertebrate fauna recorded in biological surveys in the region

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

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

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

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

		Survey	1																										2									
Family	**Species**	**Common Name**	**Site 1E**	**Site 1W**	**Site SS18**	**Site SS21**	**Site SS1**	**Site 1W08**	**Site LL4**	**Site LL5**	**Site SS19**	**Site SS20**	**Site LL3**	**Site LL6**	**Site SS22**	**Site LL1**	**Site LL2**	**Site SS23**	**Site 2**	**Site 3**	**Site 6**	**Site 7**	**Site 8**	**Site 1**	**Site 4**	**Site 5**	**Pundin**	**Wells**	**Site 2**	**Site 10**	**Site 21**	**Site 18**	**Site 21a**	**Site 9**	**Weebo**	**Site 17**	**Opportunistic**
	Ctenotus leonhardii	Leonhardi's Ctenotus		2	5	1					2																2		1	5	16	1	1	2			
	Ctenotus pantherinus	Leopard Skink						1	6				1					1																			
	Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus						2							1															1		5					
	Ctenotus schevilli	Scheville's Ctenotus						2							1																						
	Ctenotus schomburgkii	Schomburgk's Ctenotus							3																						3						
	Egernia depressa	Pygmy Spiny-tailed Skink		1	6	2			3		3	1																2									
	Egernia formosa	Goldfields Crevice-skink		2								1																							2		
	Eremiascincus richardsonii	Broad-banded Sand Swimmer					2																														
	Lerista bipes	North-western Sandslider					1																														
	Lerista desertorum	Central Desert Robust Slider	1							1		1	1			1												4	2				2			5	
	Lerista sp.		4								1	1				1	1										1	4	2					2		1	
	Liopholis inornata	Desert Skink																													1	1					
	Liopholis striata	Nocturnal Desert Skink																													1						
	Menetia greyii	Common Dwarf Skink	2										1			1																	1				
	Morethia butleri	Woodland Morethia Skink	2	3	1		3																												1		
	Tiliqua multifasciata	Centralian Blue-tongued Lizard		2																																	
	Tiliqua occipitalis	Western Blue-tongued Lizard	2			1																															
Typhlopidae	*Anilios hamatus*	Pale-headed Blind Snake					1						1																	1	1	1	1	2			
	Anilios waitii	Waite's Blind Snake																												2							
Varanidae	*Varanus brevicauda*	Short-tailed Pygmy Monitor							1								1																				
	Varanus caudolineatus	Stripe-tailed Monitor	1		2					1		3																			2		1				
	Varanus eremius	Pygmy Desert Monitor																														4					
	Varanus giganteus	Perentie																										1									

		Survey	1																									2									
Family	**Species**	**Common Name**	**Site 1E**	**Site 1W**	**Site SS18**	**Site SS21**	**Site SS1**	**Site 1W08**	**Site LL4**	**Site LL5**	**Site SS19**	**Site SS20**	**Site LL3**	**Site LL6**	**Site SS22**	**Site LL1**	**Site LL2**	**Site SS23**	**Site 2**	**Site 3**	**Site 6**	**Site 7**	**Site 8**	**Site 1**	**Site 4**	**Site 5**	**Pundin**	**Wells**	**Site 2**	**Site 10**	**Site 21**	**Site 18**	**Site 21a**	**Site 9**	**Weebo**	**Site 17**	**Opportunistic**
	Varanus gouldii	Gould's Goanna	1																										1	1						
	Varanus panoptes	Yellow-spotted Monitor					1																				1									
	Varanus tristis	Black-headed Monitor																										1								
Cheluidae	*Chelodina steindachneri*	Steindachner's Turtle																										1								
Birds																																				
Casuariidae	*Dromaius novaehollandiae*	Emu				1							2				1																			1
Anatidae	*Tadorna tadornoides*	Australian Shelduck	1	1																								1	1				7			
	Chenonetta jubata	Australian Wood Duck	1																									37								
	Malacorhynchus membranaceus	Pink-eared Duck	1																																	
	Anas gracilis	Grey Teal	1	1																								41								
	Anas superciliosa	Pacific Black Duck	1																																	
Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe	1																									2								
Columbidae	*Phaps chalcoptera*	Common Bronzewing					3			4																					4					54
	Phaps histrionica	Flock Bronzewing																										22		38	21				33	1
	Ocyphaps lophotes	Crested Pigeon		11	5		17		5	4	2					2																				
	Geopelia cuneata	Diamond Dove								8																										
Podargidae	*Podargus strigoides*	Tawny Frogmouth	1																											2					
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar																											1	2						
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar	1								1																			7	2				1	1
Otididae	*Ardeotis australis*	Australian Bustard	1																																	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant	1																																	
Ardeidae	*Ardea pacifica*	White-necked Heron	1	1																																1
	Egretta novaehollandiae	White-faced Heron	1																									1								1

		Survey	1																									2									
Family	**Species**	**Common Name**	**Site 1E**	**Site 1W**	**Site SS18**	**Site SS21**	**Site SS1**	**Site 1W08**	**Site LL4**	**Site LL5**	**Site SS19**	**Site SS20**	**Site LL3**	**Site LL6**	**Site SS22**	**Site LL1**	**Site LL2**	**Site SS23**	**Site 2**	**Site 3**	**Site 6**	**Site 7**	**Site 8**	**Site 1**	**Site 4**	**Site 5**	**Pundin**	**Wells**	**Site 2**	**Site 10**	**Site 21**	**Site 18**	**Site 21a**	**Site 9**	**Weebo**	**Site 17**	**Opportunistic**
Accipitridae	*Haliastur sphenurus*	Whistling Kite																											6	1							
	Accipiter cirrocephalus	Collared Sparrowhawk					2																						5								
	Circus assimilis	Spotted Harrier	1																																		
	Aquila audax	Wedge-tailed Eagle					2						4			8	3												1			1					1
	Hieraaetus morphnoides	Little Eagle	1																										3								
Falconidae	*Falco cenchroides*	Nankeen Kestrel				3	3			1	1	2				1	2													1				1		1	
	Falco berigora	Brown Falcon			4		2				3		1																					1			
	Falco longipennis	Australian Hobby	1																										2								
	Falco peregrinus	Peregrine Falcon																											1								
Rallidae	*Tribonyx ventralis*	Black-tailed Native-hen	1																																		
	Fulica atra	Eurasian Coot	1																																		
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew		1																																	
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt	1																																		
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover	1																																		
	Elseyornis melanops	Black-fronted Dotterel	1																																		
	Vanellus tricolor	Banded Lapwing	1				2																						1								1
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	1																																		
Turnicidae	*Turnix velox*	Little Button-quail																														1		1			
Cacatuidae	*Eolophus roseicapillus*	Galah					124		26	4	19					10													1	1		9				1	1
	Nymphicus hollandicus	Cockatiel				21	4		15	12						20													9	1	1	1		1			1
Psittacidae	*Barnardius zonarius*	Australian Ringneck			2		5		3	4	2	2	3			2													115		7	13				1	1
	Psephotus varius	Mulga Parrot				4				9																											1
	Melopsittacus undulatus	Budgerigar			16	18	5		6	9	5	29	6			5	8												1	1	1	1	1	1		1	1

		Survey	1																										2									
Family	**Species**	**Common Name**	**Site 1E**	**Site 1W**	**Site SS18**	**Site SS21**	**Site SS1**	**Site 1W08**	**Site LL4**	**Site LL5**	**Site SS19**	**Site SS20**	**Site LL3**	**Site LL6**	**Site SS22**	**Site LL1**	**Site LL2**	**Site SS23**	**Site 2**	**Site 3**	**Site 6**	**Site 7**	**Site 8**	**Site 1**	**Site 4**	**Site 5**	**Pundin**	**Wells**	**Site 2**	**Site 10**	**Site 21**	**Site 18**	**Site 21a**	**Site 9**	**Weebo**	**Site 17**	**Opportunistic**
	Neopsephotus bourkii	Bourke's Parrot			2		3			6																				9						1
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-cuckoo			2	3	1			1																			1	5		1		5			1
	Heteroscenes pallidus	Pallid Cuckoo	1			1					1																		1		3						2
Halcyonidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher	1			1																															1
Climacteridae	*Climacteris affinis*	White-browed Treecreeper	1		9																										3	13				2	
Ptilonorhynchidae	*Ptilonorhynchus maculatus*	Spotted Bowerbird					2																								4					4	1
Maluridae	*Malurus leucopterus*	White-winged Fairy-wren										2	69				57													143				142			1
	Malurus lamberti	Variegated Fairy-wren								2																											
Acanthizidae	*Smicrornis brevirostris*	Weebill					10		8	6																			350			5				71	
	Gerygone fusca	Western Gerygone																											17							1	
	Acanthiza robustirostris	Slaty-backed Thornbill					10																														
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill			11		1			3																			30		2	1					1
	Acanthiza uropygialis	Chestnut-rumped Thornbill		1	40	22	19		3	20	8		3																		37					2	1
	Acanthiza apicalis	Inland Thornbill								8																					2						
	Aphelocephala leucopsis	Southern Whiteface			17		2			9	12																										
Pardalotidae	*Pardalotus striatus*	Striated Pardalote		1												2													188			1				4	
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater			1	3			2	4	1	1																			23	7				20	1
	Gavicalis virescens	Singing Honeyeater			4	4	3			20	1	13	1																1	1		2				6	1
	Lichenostomus penicillatus	White-plumed Honeyeater		1																																	
	Purnella albifrons	White-fronted Honeyeater			2	8	2		33	17		6	40			81	99													1	3	3				2	
	Manorina flavigula	Yellow-throated Miner																											216		9	17				32	1
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater			34	1	11		5	32	2	1	12																1		24	8				23	
	Epthianura tricolor	Crimson Chat				3				11	28	55	43			20														1	47	4		44		1	1

		Survey	1																										2									
Family	**Species**	**Common Name**	**Site 1E**	**Site 1W**	**Site SS18**	**Site SS21**	**Site SS1**	**Site 1W08**	**Site LL4**	**Site LL5**	**Site SS19**	**Site SS20**	**Site LL3**	**Site LL6**	**Site SS22**	**Site LL1**	**Site LL2**	**Site SS23**	**Site 2**	**Site 3**	**Site 6**	**Site 7**	**Site 8**	**Site 1**	**Site 4**	**Site 5**	**Pundin**	**Wells**	**Site 2**	**Site 10**	**Site 21**	**Site 18**	**Site 21a**	**Site 9**	**Weebo**	**Site 17**	**Opportunistic**
	Epthianura aurifrons	Orange Chat																												8				14			
	Sugomel niger	Black Honeyeater	1																																		
	Lichmera indistincta	Brown Honeyeater		1						1																											
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler					34			22		2																			4						
Psophodidae	*Cinclosoma cinnamomeum*	Cinnamon Quail-thrush					1					2																									
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella				12																															
Campephagidae	*Coracina maxima*	Ground Cuckoo-shrike															3																				1
	Coracina novaehollandiae	Black-faced Cuckoo-shrike			1	1							1			2	2												20		12	1				9	1
	Lalage tricolor	White-winged Triller			2	7				1	1	7	11																								
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler			7	11	1		1	18																			7		12	2	2			6	
	Colluricincla harmonica	Grey Shrike-thrush				1	4			1		1																									
	Oreoica gutturalis	Crested Bellbird			3	8	6		2	18	7	1	17																		15	6				7	
Artamidae	*Artamus personatus*	Masked Woodswallow			99	21	43			1		119																		1	2			20		10	
	Artamus superciliosus	White-browed Woodswallow		1																																	
	Artamus cinereus	Black-faced Woodswallow			3	5			1	1	16	9	23			43	1												1	8	37	27		5		18	1
	Cracticus torquatus	Grey Butcherbird							1																				2		1	6		2		1	1
	Cracticus nigrogularis	Pied Butcherbird			1		5		1	3			15			5	2												55	1		2		3		28	1
	Gymnorhina tibicen	Australian Magpie	1																										31								1
	Strepera versicolor	Grey Currawong	1				1																														
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail			1	7	4		1	7	2	1	3			2															5	2	2			2	1
Corvidae	*Corvus bennetti*	Little Crow			7		2										10												231	15	48	14		34		46	1
	Corvus orru	Torresian Crow																											1			1		1			
Monarchidae	*Grallina cyanoleuca*	Magpie-lark	1																										17								1

		Survey	1																									2										
Family	**Species**	**Common Name**	**Site 1E**	**Site 1W**	**Site SS18**	**Site SS21**	**Site SS1**	**Site 1W08**	**Site LL4**	**Site LL5**	**Site SS19**	**Site SS20**	**Site LL3**	**Site LL6**	**Site SS22**	**Site LL1**	**Site LL2**	**Site SS23**	**Site 2**	**Site 3**	**Site 6**	**Site 7**	**Site 8**	**Site 1**	**Site 4**	**Site 5**	**Pundin**	**Wells**	**Site 2**	**Site 10**	**Site 21**	**Site 18**	**Site 21a**	**Site 9**	**Weebo**	**Site 17**	**Opportunistic**
Petroicidae	*Microeca fascinans*	Jacky Winter								3			1																								
	Petroica goodenovii	Red-capped Robin			18	8	11			33	2		12																4	4	22	7		1		4	
	Melanodryas cucullata	Hooded Robin			3	4	3			5	9	6	3																	1	7					4	
Megaluridae	*Cincloramphus mathewsi*	Rufous Songlark	1									1																									
	Cincloramphus cruralis	Brown Songlark	1									1																		23				18			1
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow	1																																		
	Petrochelidon nigricans	Tree Martin	1																																		1
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird				3	1		4	7																			1		1	4				1	
Estrildidae	*Taeniopygia guttata*	Zebra Finch			12		99			22	2	4																	27		16	8		8		6	1
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit			1					2	1	7	5				4													9				43			1
Mammals																																					
Bovidae	*Bos taurus*	Cow		4																								1					1				
	Capra hircus	Goat																									1	1	1	1	1	1	1	1			
	Ovis aries	Sheep		10																							1	1	1	1	1	1	1	1		1	
Camelidae	*Camelus dromedarius*	Dromedary	1		1						1					1																					
Felidae	*Felis catus*	House Cat	2																												1		1				
Molossidae	*Austronomus australis*	White-striped Free-tail Bat																	1	1	1	1	1														
	Ozimops planiceps	Southern Free-tail Bat	2	3															1		1	1		1													
Pteropodidae	*Syconycteris australis*	Common Blossom-bat	2	9																																	
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	5	14			1				1								1	1	1		1	1	1	1	2			5					1		
	Nyctophilus geoffroyi	Lesser Long-eared Bat	5	13						4									1	1	1		1	1			28			4							
	Scotorepens balstoni	Inland Broad-nosed Bat	6	21			1												1	1	1		1	1	1	1											
	Scotorepens greyii	Little Broad-nosed Bat																									10										

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

(1) McKenzie, N. L., Rolfe, J. K. and Youngson, K. (1994) Vertebrate fauna In: The Biological Survey of the Eastern Goldfields of Western Australia Part 10, Sandstone-Sir Samuel and Laverton-Leonara Study Areas. Records of the Western Australian Museum Supplement No. 47:166.

(2) How, R. A. and Dell, J. (1992) Vertebrate fauna. In: The Biological Survey of the Eastern Goldfields of Western Australia Part 7. Duketon - Sir Samuel Study Area. Records of the Western Australian Museum; Supplement 40, 90-109.

O.2 VERTEBRATE FAUNA RECORDED IN BIOLOGICAL SURVEYS IN THE REGION

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

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

		Survey	1										2														3					
Family	**Species**	Common Name	MME1	MME2	MME3	MME4	MME5	MME6	MME7	MME8	MME9	Opportunistic	Site 11	Site 11a	Site 14	Site 14a	Site 14b	Site 17a	Site 19	Site 1a	Site 20a	Site 21	Site 21a	Site 5a	Site 8	Site 9	Site 9a	CM001	CM002	CM003	CM004	CM005	Opportunistic
	Ctenotus schomburgkii	Schomburgk's Ctenotus	1								2	1	3						11		2	3			15	1							
	Ctenotus severus	Stern Ctenotus																6		1													
	Ctenotus uber	Spotted Ctenotus														3		2			6	1	1										
	Egernia depressa	Pygmy Spiny-tailed Skink						1													4	2											
	Egernia formosa	Goldfields Crevice-skink																						3									
	Eremiascincus richardsonii	Broad-banded Sand Swimmer														1		1												1	1		
	Lerista desertorum	Central Desert Robust Slider						1			1	1						6	6		2										5		
	Lerista macropisthopus	Unpatterned Robust Slider																						2									
	Lerista muelleri	Wood Mulch-slider																											1		2		
	Lerista picturata	Southern Robust Slider																						2									
	Lerista sp.							2			1	1						9	1			1			5								
	Liopholis inornata	Desert Skink																				1	1										
	Liopholis striata	Nocturnal Desert Skink																			2												
	Menetia greyii	Common Dwarf Skink	4								1	1										1		4		1					2		
	Morethia butleri	Woodland Morethia Skink		2		4	2	3	1	1	1	1			2			6					2	4									
Typhlopidae	*Anilios hamatus*	Pale-headed Blind Snake														1									1								
	Anilios margaretae	Buff-snouted Blind Snake																															
	Anilios waitii	Waite's Blind Snake														2									1								
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor		1				1								1					6			2		1		1					
	Varanus giganteus	Perentie																						1									
	Varanus gouldii	Gould's Goanna																1				2	2	1		1	1						
	Varanus panoptes	Yellow-spotted Monitor						1			1	1	1			2					1								1	4	2		
Birds																																	

		Survey	1										2																3					
Family	**Species**	Common Name	MME1	MME2	MME3	MME4	MME5	MME6	MME7	MME8	MME9	Opportunistic	Site 11	Site 11a	Site 14	Site 14a	Site 14b	Site 17a	Site 19	Site 1a	Site 20a	Site 21	Site 21a	Site 5a	Site 8	Site 9	Site 9a	CM001	CM002	CM003	CM004	CM005	Opportunistic
Casuariidae	*Dromaius novaehollandiae*	Emu	1	1				1		1	1	1		2		1	5		2				1	2		1				1				
Megapodiidae	*Leipoa ocellata*	Malleefowl										1																						
Phasianidae	*Coturnix pectoralis*	Stubble Quail															1																	
Anatidae	*Cygnus atratus*	Black Swan										1																						
	Tadorna tadornoides	Australian Shelduck										1																						
	Malacorhynchus membranaceus	Pink-eared Duck										1																						
	Anas gracilis	Grey Teal										1																						
	Anas superciliosa	Pacific Black Duck										1																						
Columbidae	*Phaps chalcoptera*	Common Bronzewing										1											1		1									
	Ocyphaps lophotes	Crested Pigeon	2					2			3	1			1	5	2	11			7			6	9	6			2		1			
Podargidae	*Podargus strigoides*	Tawny Frogmouth									2										1													
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar																		2				2										
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar													3	3	2								1									
Otididae	*Ardeotis australis*	Australian Bustard												1		4																		
Ardeidae	*Ardea pacifica*	White-necked Heron										1																						
	Egretta novaehollandiae	White-faced Heron										1																						
Accipitridae	*Haliaeetus albicilla*	White-bellied Sea-eagle	1		2	1	1	1		1		1																						
	Accipiter fasciatus	Brown Goshawk																	3															
	Circus assimilis	Spotted Harrier															1					1												
	Aquila audax	Wedge-tailed Eagle													6	2		2							3				2					
	Hieraaetus morphnoides	Little Eagle		1															3		1													
Falconidae	*Falco cenchroides*	Nankeen Kestrel									1					5		2	3					4	2					1				
	Falco berigora	Brown Falcon									1					3	1	2	5		3				3					2				
	Falco longipennis	Australian Hobby			1						1														1									

		Survey	1										2															3					
Family	**Species**	Common Name	MME1	MME2	MME3	MME4	MME5	MME6	MME7	MME8	MME9	Opportunistic	Site 11	Site 11a	Site 14	Site 14a	Site 14b	Site 17a	Site 19	Site 1a	Site 20a	Site 21	Site 21a	Site 5a	Site 8	Site 9	Site 9a	CM001	CM002	CM003	CM004	CM005	Opportunistic
	Falco peregrinus	Peregrine Falcon		1																													
Rallidae	*Tribonyx ventralis*	Black-tailed Native-hen										1																					
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt										1																					
	Recurvirostra novaehollandiae	Red-necked Avocet										1																					
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover										1																					
	Elseyornis melanops	Black-fronted Dotterel										1																					
	Vanellus tricolor	Banded Lapwing											9				4	4						1									
Turnicidae	*Turnix velox*	Little Button-quail															5				2												
Cacatuidae	*Eolophus roseicapillus*	Galah					15					1		1	44	908	8	2	5		7		62	7	4					3			
	Nymphicus hollandicus	Cockatiel												6		2	4		3				4		35							10	
Psittacidae	*Barnardius zonarius*	Australian Ringneck		1			4	3	2		2	1			25	31	36		16		3	3		1	9	10							
	Psephotus varius	Mulga Parrot			1			5	5			1					11		2		14	2				3							
	Melopsittacus undulatus	Budgerigar												20	11	9	15	2	29		17	38			170						6		
	Neopsephotus bourkii	Bourke's Parrot										1									4												
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-cuckoo												3					3				2		1	1							
	Chalcites osculans	Black-eared Cuckoo																	1		2												
	Heteroscenes pallidus	Pallid Cuckoo										1			2				1		1	4			1					1			
Halcyonidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher															1	6			1												
Meropidae	*Merops ornatus*	Rainbow Bee-eater																	3		3												
Climacteridae	*Climacteris affinis*	White-browed Treecreeper							2			1									4	1	1										
Maluridae	*Malurus splendens*	Splendid Fairy-wren							9			1																					
	Malurus leucopterus	White-winged Fairy-wren	3								8		3	76		1	2								40	17							
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat				1						1					2					2	1		2								
	Smicrornis brevirostris	Weebill					10					1							98		7	2	2										

		Survey	1										2														3					
Family	**Species**	Common Name	MME1	MME2	MME3	MME4	MME5	MME6	MME7	MME8	MME9	Opportunistic	Site 11	Site 11a	Site 14	Site 14a	Site 14b	Site 17a	Site 19	Site 1a	Site 20a	Site 21	Site 21a	Site 5a	Site 8	Site 9	Site 9a	CM001	CM002	CM003	CM004	CM005	Opportunistic
	Acanthiza robustirostris	Slaty-backed Thornbill							2			1							3		6												
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill	5	6		6	17	2	4			1							4		8				9	4							
	Acanthiza uropygialis	Chestnut-rumped Thornbill	8	30	2	10	14	15	50			1				3	5		88		126		10	3	53	27							
	Acanthiza apicalis	Inland Thornbill	2					2	6			1							3		2	1	2										
	Aphelocephala leucopsis	Southern Whiteface				4		6	20			1					8		5		52		12		4								
Pardalotidae	*Pardalotus striatus*	Striated Pardalote					3					1					1		2													
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater												2	2																	
	Gavicalis virescens	Singing Honeyeater		4	2		1	1	1	1	1	1		3	11		3	2	2		3			1	8	4			7	6	2		
	Lichenostomus plumulus	Grey-fronted Honeyeater					7								56				3		2											
	Purnella albifrons	White-fronted Honeyeater	80	100	12	40	8	1	10	6	6	1		1	3		1		4			7	6		2	16							
	Manorina flavigula	Yellow-throated Miner	10	5	7		2	10		2	2	1			10	15	98	1	13		41	3			21	109				1	12		6
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater	25	20		1	6	2	1	1	2	1			11	2	2	5	8		10	6	4	2	9	7				1	2		
	Anthochaera carunculata	Red Wattlebird									3								2		3					1							
	Conopophila whitei	Grey Honeyeater															18						17			1							
	Epthianura tricolor	Crimson Chat												18	154	24		6			29				75								
	Epthianura aurifrons	Orange Chat												5																			
Pomatostomidae	*Pomatostomus temporalis*	Grey-crowned Babbler																													12		
	Pomatostomus superciliosus	White-browed Babbler										1					3						3	2									
Psophodidae	*Cinclosoma castaneothorax*	Chestnut-breasted Quail-thrush												2							3									1			
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella															2		6														
Campephagidae	*Coracina maxima*	Ground Cuckoo-shrike												4		31	2	3															
	Coracina novaehollandiae	Black-faced Cuckoo-shrike		2		1						1			4	5	6	1	9		10				7	3			1				
	Lalage tricolor	White-winged Triller														3	9				34		6		39	2							

		Survey	1										2															3					
Family	**Species**	Common Name	MME1	MME2	MME3	MME4	MME5	MME6	MME7	MME8	MME9	Opportunistic	Site 11	Site 11a	Site 14	Site 14a	Site 14b	Site 17a	Site 19	Site 1a	Site 20a	Site 21	Site 21a	Site 5a	Site 8	Site 9	Site 9a	CM001	CM002	CM003	CM004	CM005	Opportunistic
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler					1	1	1	1		1							8				1										
	Colluricincla harmonica	Grey Shrike-thrush						1	2			1							5				1										
	Oreoica gutturalis	Crested Bellbird	1	3	1	2	1	1	2			1		3	14	5	1		15	2	10		2		6	2			4				
Artamidae	*Artamus personatus*	Masked Woodswallow												2	2		31		2		72											
	Artamus superciliosus	White-browed Woodswallow			4		1	1				1									3											
	Artamus cinereus	Black-faced Woodswallow												7	55	25	6	11			1		1		12				9	2			6
	Cracticus torquatus	Grey Butcherbird	1	1	1		2	1	1		2	1			2	4	7		8		8				4	1			1	1	3		
	Cracticus nigrogularis	Pied Butcherbird	2	1	1						1	1			6	23	1		4	1			2	4	13	14				2	2		
	Gymnorhina tibicen	Australian Magpie	3								3	1				3		9			1					5			1	5		2	
	Strepera versicolor	Grey Currawong			1											2	3		2				1			4							
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail							1																								
	Rhipidura leucophrys	Willie Wagtail	1									1				2	2	1							12	1			1				1
Corvidae	*Corvus bennetti*	Little Crow		2			6		1			1		11	29	50	21	12	24		6			7	36	149				7	4		
	Corvus orru	Torresian Crow		1	2		1	1		2		1		2			2														2		
Monarchidae	*Grallina cyanoleuca*	Magpie-lark		1	2			2			2	1				12	7	2							3								
Petroicidae	*Microeca fascinans*	Jacky Winter														1			22		1												
	Petroica goodenovii	Red-capped Robin	1	2		1		2	6			1			1	5	3	1	29	3	47		4	3	3	4						1	
	Melanodryas cucullata	Hooded Robin			3							1		1	2	1					1		1		2				2				
Megaluridae	*Cincloramphus mathewsi*	Rufous Songlark															3						2										
	Cincloramphus cruralis	Brown Songlark											7	7	3	7		8			1												
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow			2							1						2															
	Hirundo rustica	Barn Swallow						5																									
	Petrochelidon ariel	Fairy Martin																											6				
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird															4					1			5	4							

		Survey	1										2															3					
Family	**Species**	Common Name	MME1	MME2	MME3	MME4	MME5	MME6	MME7	MME8	MME9	Opportunistic	Site 11	Site 11a	Site 14	Site 14a	Site 14b	Site 17a	Site 19	Site 1a	Site 20a	Site 21	Site 21a	Site 5a	Site 8	Site 9	Site 9a	CM001	CM002	CM003	CM004	CM005	Opportunistic
Estrildidae	*Taeniopygia guttata*	Zebra Finch										1		9	12		4		5						36				6				
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit			4							1	7	18		16	1	36								2			4	1			
Mammals																																	
Bovidae	*Capra hircus*	Goat										1			1	1			1					1									
	Ovis aries	Sheep														1			1		1	1				1	1						
Camelidae	*Camelus dromedarius*	Dromedary											1																				
Canidae	*Canis familiaris*	Dog											1																				
	Canis lupus	Dingo										1																					
	Vulpes vulpes	Red Fox										1							1		1		1	1									
Felidae	*Felis catus*	House Cat											1																				
Molossidae	*Austronomus australis*	White-striped Free-tail Bat																						1									
	Ozimops planiceps	Southern Free-tail Bat																						1									
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat														1								3									
	Nyctophilus geoffroyi	Lesser Long-eared Bat														4		9						3									
	Scotorepens balstoni	Inland Broad-nosed Bat														6								1									
Dasyuridae	*Ningaui ridei*	Wongai Ningaui																	5														
	Sminthopsis crassicaudata	Fat-tailed Dunnart	1		1								5								7			1			1						
	Sminthopsis fuliginosus	Grey-bellied Dunnart																															
	Sminthopsis dolichura	Little Long-tailed Dunnart											1			2			1		1	1		1	2								
	Sminthopsis macroura	Stripe-faced Dunnart																											2		2		
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo										1												1	1								
	Osphranter robustus	Euro				1						1						1	1		1	1		1	1								
Leporidae	*Oryctolagus cuniculus*	European Rabbit				1						1	1					1						2	1					1			

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

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

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

(5) Biota Environmental Sciences (2004b) Cosmos Nickel Mine Extension Fauna Survey. Unpublished report for Sir Samuel Mines NL and URS, Perth.

O.3 VERTEBRATE FAUNA RECORDED IN BIOLOGICAL SURVEYS IN THE REGION

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

		Survey	1															2	3																		
Family	**Species**	Common Name	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Opportunistic	Granny Deeps	Agnew Gold	BKBO1	BKBO4	BKBO5	BKBO7	BKBO9	BKBS04	BKBO2	BKBO3	BKBO12	BKBO8	BKBO6	BKBO10	BKBO11	BKBS01	BKBHarp01	BKBS03
Elapidae	*Parasuta monachus*	Monk Snake						1		1																											
	Suta fasciata	Rosen's Snake																					1														
Gekkonidae	*Gehyra variegata*	Tree Dtella		3	2	4		1		3		2	1	2				1																			
	Heteronotia binoei	Bynoe's Prickly Gecko	2				1					1	2	1	5			1																			
	Rhynchoedura ornata	Western Beaked Gecko	3					2			1								11	5		5	3				6	9	3	1						
Pygopodidae	*Pygopus nigriceps*	Western Hooded Scaly-foot																			1															
Scincidae	*Ctenotus leonhardii*	Leonhardi's Ctenotus	2	2					1		5	9	7	16	27				2	3			1		4	4										
	Ctenotus schomburgkii	Schomburgk's Ctenotus																					2		1	2	4	2								
	Ctenotus severus	Stern Ctenotus																																		
	Ctenotus uber	Spotted Ctenotus																				2														
	Egernia depressa	Pygmy Spiny-tailed Skink		1	1	2	2	3	9	6		1																								
	Eremiascincus richardsonii	Broad-banded Sand Swimmer				2									1																					
	Lerista bipes	North-western Sandslider																																		
	Lerista desertorum	Central Desert Robust Slider													2															1		1				
	Lerista distinguenda	Orange-tailed Slider													1																					
	Lerista sp.																							2	1	1	1									
	Menetia greyii	Common Dwarf Skink											1											1												
	Morethia butleri	Woodland Morethia Skink		1		1		2			6	1		3																						
	Tiliqua multifasciata	Centralian Blue-tongued Lizard	1																																	
Typhlopidae	*Anilios australis*	Austral Blind Snake								1	1																									
	Anilios bicolor	Dark-spined Blind Snake			1																															
	Anilios waitii	Waite's Blind Snake																													1					
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor		2		1	3	1	1			1		2							1	3	1		1				1	3					

		Survey	1															2	3																
Family	**Species**	Common Name	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Opportunistic	Granny Deeps	Agnew Gold	BKBO1	BKBO4	BKBO5	BKBO7	BKBO9	BKBS04	BKBO2	BKBO3	BKBO12	BKBO8	BKBO6	BKBO10	BKBO11	BKBS01	BKBHarp01	BKBS03
	Varanus gouldii	Gould's Goanna																1																	
	Varanus panoptes	Yellow-spotted Monitor	4		7		3	2	2			4	2		6							2						2		1					
Birds																																			
Casuariidae	*Dromaius novaehollandiae*	Emu														3		1				1													
Anatidae	*Biziura lobata*	Musk Duck														2																			
	Tadorna tadornoides	Australian Shelduck																1																	
	Chenonetta jubata	Australian Wood Duck														77		1																	
	Malacorhynchus membranaceus	Pink-eared Duck														5																			
	Anas gracilis	Grey Teal														74																			
	Anas superciliosa	Pacific Black Duck														13		1																	
	Aythya australis	Hardhead														2																			
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe																1																	
	Poliocephalus poliocephalus	Hoary-headed Grebe														30		1																	
Columbidae	*Phaps chalcoptera*	Common Bronzewing																1																	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon																1	6			2						9							
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar																1																	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron														2																			
Accipitridae	*Elanus axillaris*	Black-shouldered Kite																1																	
	Haliastur sphenurus	Whistling Kite																							1										
	Accipiter fasciatus	Brown Goshawk																1																	
	Aquila audax	Wedge-tailed Eagle														2		1					3												
Falconidae	*Falco cenchroides*	Nankeen Kestrel														2		1					1						1						
	Falco berigora	Brown Falcon														1																			

		Survey	1															2	3																
Family	**Species**	Common Name	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Opportunistic	Granny Deeps	Agnew Gold	BKBO1	BKBO4	BKBO5	BKBO7	BKBO9	BKBS04	BKBO2	BKBO3	BKBO12	BKBO8	BKBO6	BKBO10	BKBO11	BKBS01	BKBHarp01	BKBS03
Rallidae	*Fulica atra*	Eurasian Coot														21																			
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt														5																			
	Cladorhynchus leucocephalus	Banded Stilt														14																			
Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel														1		1																	
Cacatuidae	*Eolophus roseicapillus*	Galah																											8						
Psittacidae	*Barnardius zonarius*	Australian Ringneck																1	1	2			1					1							
	Psephotus varius	Mulga Parrot														8				2		2													
	Melopsittacus undulatus	Budgerigar																1																	
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-cuckoo																			1					1		1							
	Heteroscenes pallidus	Pallid Cuckoo														2																			
Meropidae	*Merops ornatus*	Rainbow Bee-eater																1																	
Ptilonorhynchidae	*Ptilonorhynchus guttatus*	Western Bowerbird														2	5		1																
Maluridae	*Malurus splendens*	Splendid Fairy-wren															12						8												
	Malurus leucopterus	White-winged Fairy-wren														1	3																		
Maluridae	*Malurus lamberti*	Variegated Fairy-wren																1																	
Acanthizidae	*Gerygone fusca*	Western Gerygone																					2					1							
	Acanthiza robustirostris	Slaty-backed Thornbill															68								2					5					
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill															1				2		3		2										
	Acanthiza uropygialis	Chestnut-rumped Thornbill																	16	7	4	23	11		33		2	11		3	9				
	Acanthiza apicalis	Inland Thornbill															12	1	4			5	11				3			2					
	Aphelocephala leucopsis	Southern Whiteface															13	1	1		1		5		4										
Pardalotidae	*Pardalotus striatus*	Striated Pardalote															1																		
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater															2				4														

		Survey	1															2	3																
Family	**Species**	Common Name	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Opportunistic	Granny Deeps	Agnew Gold	BKBO1	BKBO4	BKBO5	BKBO7	BKBO9	BKBS04	BKBO2	BKBO3	BKBO12	BKBO8	BKBO6	BKBO10	BKBO11	BKBS01	BKBHarp01	BKBS03
	Gavicalis virescens	Singing Honeyeater															68	1	8	9	7	2	1				2	4	3	1				
	Lichenostomus flavicollis	Yellow-throated Honeyeater																	3	4	3	15	4		4		5	9		3	4			
	Manorina flavigula	Yellow-throated Miner														3	38	1																
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater															44	1			2	4			2									
	Epthianura tricolor	Crimson Chat															4				9		1						1					
	Epthianura albifrons	White-fronted Chat																1																
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler															14	1					4											
Psophodidae	*Cinclosoma castanotum*	Chestnut Quail-thrush																	3															
	Cinclosoma castaneothorax	Chestnut-breasted Quail-thrush																			2													
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella																		2														
Campephagidae	*Coracina maxima*	Ground Cuckoo-shrike														2	5												2					
	Coracina novaehollandiae	Black-faced Cuckoo-shrike															7					1						2		1				
	Lalage tricolor	White-winged Triller														4			1															
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler															22		1			1	3		6		1			2				
	Colluricincla harmonica	Grey Shrike-thrush															3	1							1									
	Oreoica gutturalis	Crested Bellbird														1	45	1	6	1	4	2	2		6		1	5	1	4	1			
Artamidae	*Artamus personatus*	Masked Woodswallow														4	23	1																
	Artamus cinereus	Black-faced Woodswallow															6	1	5		9	2	2		1			7	7					
	Artamus minor	Little Woodswallow															2	1																
	Cracticus torquatus	Grey Butcherbird														4	5	1	1											2	1			
	Cracticus nigrogularis	Pied Butcherbird														2	3	1	5		2	1	4					6	1					
	Gymnorhina tibicen	Australian Magpie														1		1										1						
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail														5	5	1	1			1	2											

		Survey	1															2	3																
Family	**Species**	Common Name	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Opportunistic	Granny Deeps	Agnew Gold	BKBO1	BKBO4	BKBO5	BKBO7	BKBO9	BKBS04	BKBO2	BKBO3	BKBO12	BKBO8	BKBO6	BKBO10	BKBO11	BKBS01	BKBHarp01	BKBS03
Corvidae	*Corvus bennetti*	Little Crow														4	1	1			2						1	6		3				
	Corvus orru	Torresian Crow															2	1							3									
Monarchidae	*Grallina cyanoleuca*	Magpie-lark														6	11	1	3	1								1						
Petroicidae	*Petroica goodenovii*	Red-capped Robin															10	1	5	1	2	1	3		8		3	1		1				
	Melanodryas cucullata	Hooded Robin															7	1	2		4									1				
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow														4	2																	
	Hirundo neoxena	Welcome Swallow														2	4	1																
	Petrochelidon nigricans	Tree Martin														1	9	1																
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird														2	2																	
Estrildidae	*Taeniopygia guttata*	Zebra Finch														2		1											2					
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit														6	2	1																
Mammals																																		
Bovidae	*Capra hircus*	Goat																1					1											
Molossidae	*Ozimops planiceps*	Southern Free-tail Bat																1																
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat																1																
	Nyctophilus geoffroyi	Lesser Long-eared Bat																1															2	
	Scotorepens balstoni	Inland Broad-nosed Bat																1																
	Vespadelus baverstocki	Inland Forest Bat																1																
	Vespadelus finlaysoni	Finlayson's Cave Bat																1																
Dasyuridae	*Antechinomys laniger*	Kultarr	2	1			3	3	3	2		2			1																			
	Sminthopsis dolichura	Little Long-tailed Dunnart	1	1	3	7	5	4	13	3	5	3		1	1																			
	Sminthopsis hirtipes	Hairy-footed Dunnart				1																												
	Sminthopsis longicaudata	Long-tailed Dunnart					1	1							1																			

		Survey	1															2	3																		
Family	**Species**	Common Name	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Opportunistic	Granny Deeps	Agnew Gold	BKBO1	BKBO4	BKBO5	BKBO7	BKBO9	BKBS04	BKBO2	BKBO3	BKBO12	BKBO8	BKBO6	BKBO10	BKBO11	BKBS01	BKBHarp01	BKBS03
	Sminthopsis macroura	Stripe-faced Dunnart	2	3		2	1	1	1	1	1	5	5	3	2						3						1	1	2	7				
	Sminthopsis ooldea	Ooldea Dunnart																		1														
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo																1																
	Osphranter robustus	Euro																1				1							1	1				1
	Osphranter rufus	Red Kangaroo																1	4	2		4	1		2				3					
Leporidae	*Oryctolagus cuniculus*	European Rabbit																1																
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna																1					1							1	2			1
Muridae	*Mus musculus*	House Mouse						1					5																					
	Notomys alexis	Spinifex Hopping Mouse	3																															
	Pseudomys desertor	Desert Mouse																		1														
	Pseudomys hermannsburgensis	Sandy Inland Mouse	1	1	1	3				1	2	2	5	6					1		1				1					1				

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

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

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

O.4 VERTEBRATE FAUNA RECORDED IN BIOLOGICAL SURVEYS IN THE REGION

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

		Survey	1																																
Family	**Species**	Common Name	REG Open spinifex 1	REG Open spinifex 2	REG Open spinifex 3	REG Open spinifex 4	REG Shrubs over spinifex 1	REG Shrubs over spinifex 2	REG Shrubs over spinifex 3	REG Shrubs over spinifex 4	REG Dogbolter 2	REG Mulga woodland 1	REG Mulga woodland 4	REG Eucalypt over spinifex 2	REG Eucalypt over spinifex 4	REG Eucalypt over spinifex 1	REG Dogbolter 1	REG Dogbolter 3	REG Dogbolter 4	REG Eucalypt over spinifex 3	REG Mulga woodland 2	REG Mulga woodland 3	REG Opportunistic	REG Open spinifex	REG Mulga woodland	REG Eucalypt over spinifex	REG Shrubs over spinifex	REG Mulga thicket 2	REG Turkeys	REG Mulga thicket 1	REG Dogbolter
	Pseudonaja mengdeni	Gwardar		2																															
	Pseudonaja modesta	Ringed Brown Snake																1																	
	Simoselaps bertholdi	Jan's Banded Snake							1																										
Gekkonidae	*Gehyra purpurascens*	Purplish Dtella		1						2					1																				
	Gehyra variegata	Tree Dtella	2			1			1	2					1	1	2		1	3	1	10													
	Heteronotia binoei	Bynoe's Prickly Gecko						2							1		1				1	3													
	Rhynchoedura ornata	Western Beaked Gecko											1	1			7	4																	
Pygopodidae	*Delma butleri*	Unbanded Delma	1	2	2	1	2	1	3	1		1								1															
	Lialis burtonis	Burton's Snake-lizard												1	2																				
	Pygopus nigriceps	Western Hooded Scaly-foot					1	1							1	3																			
Scincidae	*Ctenotus ariadnae*	Ariadna's Ctenotus	1		4	3	7	4	6	8					2					4														
	Ctenotus dux	Fine Side-lined Ctenotus		2	2		6	2	13	2				4		14				4														
	Ctenotus grandis	Grand Ctenotus	6	8	9	14	1	3	3	4				4	1																				
	Ctenotus greeri	Spotted-necked Ctenotus												9	7	8				6															
	Ctenotus helenae	Clay-soil Ctenotus	1	2			20	23	13	10				20	14	15				26															
	Ctenotus leonhardii	Leonhardi's Ctenotus	1		4	6					11	6	7	37	16	15	11	20	16	25	6	2												
	Ctenotus pantherinus	Leopard Skink	9		6	3	12	11	1	1				9	3	1				13															
	Ctenotus piankai	Coarse Sands Ctenotus	1	4	3	2		1	1	1																									
	Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus	4	12	3	2	19	16	9	5	4			2	3		1		1	9															
	Ctenotus schomburgkii	Schomburgk's Ctenotus				1					7		3				8	16			1														

		Survey	1																															
Family	**Species**	Common Name	REG Open spinifex 1	REG Open spinifex 2	REG Open spinifex 3	REG Open spinifex 4	REG Shrubs over spinifex 1	REG Shrubs over spinifex 2	REG Shrubs over spinifex 3	REG Shrubs over spinifex 4	REG Dogbolter 2	REG Mulga woodland 1	REG Mulga woodland 4	REG Eucalypt over spinifex 2	REG Eucalypt over spinifex 4	REG Eucalypt over spinifex 1	REG Dogbolter 1	REG Dogbolter 3	REG Dogbolter 4	REG Eucalypt over spinifex 3	REG Mulga woodland 2	REG Mulga woodland 3	REG Opportunistic	REG Open spinifex	REG Mulga woodland	REG Eucalypt over spinifex	REG Shrubs over spinifex	REG Mulga thicket 2	REG Turkeys	REG Mulga thicket 1	REG Dogbolter				
	Ctenotus uber	Spotted Ctenotus									2	7	18				1	10	7		8														
	Egernia depressa	Southern Pygmy Spiny-tailed Skink											1	1					1		4	1													
	Egernia formosa	Goldfields Crevice-skink											1	1		1	1					2													
	Eremiascincus richardsonii	Broad-banded Sand Swimmer												2	1							1													
	Lerista bipes	North-western Sandslider	35	37	10	17	5	11	48	56																									
	Lerista desertorum	Central Desert Robust Slider	1	2		1		1		1	1	1	1		3	1				3															
	Lerista muelleri	Wood Mulch-slider										2		1		1		1			1														
	Liopholis inornata	Desert Skink					2	10	14	5																									
	Liopholis striata	Nocturnal Desert Skink	2	2	5	4																													
	Menetia greyii	Common Dwarf Skink	2	4	12	8						2				1		1		2	1														
	Morethia butleri	Woodland Morethia Skink													1					1		1													
	Tiliqua multifasciata	Centralian Blue-tongued Lizard		1	1	1		4																											
Typhlopidae	*Anilios bicolor*	Dark-spined Blind Snake			3					1			1	1	2					1															
	Anilios hamatus	Pale-headed Blind Snake	1	1		2	1		2	1					1	1				2															
	Anilios waitii	Waite's Blind Snake				1		1	1							1				1															
Varanidae	*Varanus brevicauda*	Short-tailed Pygmy Monitor	1	2	3	3		1							1					1															
	Varanus caudolineatus	Stripe-tailed Monitor									2	5		3	1	1	3	7	2		4	9													
	Varanus eremius	Pygmy Desert Monitor	2		6	2		2																											
	Varanus gouldii	Gould's Goanna	6	8	3	1	15	15	12	8		1	1	2	2	1																			

		Survey	1																													
Family	**Species**	Common Name	REG Open spinifex 1	REG Open spinifex 2	REG Open spinifex 3	REG Open spinifex 4	REG Shrubs over spinifex 1	REG Shrubs over spinifex 2	REG Shrubs over spinifex 3	REG Shrubs over spinifex 4	REG Dogbolter 2	REG Mulga woodland 1	REG Mulga woodland 4	REG Eucalypt over spinifex 2	REG Eucalypt over spinifex 4	REG Eucalypt over spinifex 1	REG Dogbolter 1	REG Dogbolter 3	REG Dogbolter 4	REG Eucalypt over spinifex 3	REG Mulga woodland 2	REG Mulga woodland 3	REG Opportunistic	REG Open spinifex	REG Mulga woodland	REG Eucalypt over spinifex	REG Shrubs over spinifex	REG Mulga thicket 2	REG Turkeys	REG Mulga thicket 1	REG Dogbolter
	Varanus panoptes	Yellow-spotted Monitor															4			2		1										
	Varanus tristis	Black-headed Monitor												2																		
Birds																																
Casuariidae	*Dromaius novaehollandiae*	Emu																					5	3								
Columbidae	*Ocyphaps lophotes*	Crested Pigeon																					1		2							
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar																					1									
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar																					1									
Apodidae	*Apus pacificus*	Fork-tailed Swift																							2							
Otididae	*Ardeotis australis*	Australian Bustard																					2									
Accipitridae	*Aquila audax*	Wedge-tailed Eagle																					3	1								
Falconidae	*Falco cenchroides*	Nankeen Kestrel																					2	1								
	Falco berigora	Brown Falcon																						2								
Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel																					2									
Cacatuidae	*Eolophus roseicapillus*	Galah																					2									
Psittacidae	*Barnardius zonarius*	Australian Ringneck																					10			2	5					
	Psephotus varius	Mulga Parrot																					5									
Meropidae	*Merops ornatus*	Rainbow Bee-eater																					1									
Ptilonorhynchidae	*Ptilonorhynchus guttatus*	Western Bowerbird																					3									
Maluridae	*Malurus splendens*	Splendid Fairy-wren																					4	2	8	13		5	10	5		
	Malurus lamberti	Variegated Fairy-wren																									4					

		Survey	1																												
Family	**Species**	Common Name	REG Open spinifex 1	REG Open spinifex 2	REG Open spinifex 3	REG Open spinifex 4	REG Shrubs over spinifex 1	REG Shrubs over spinifex 2	REG Shrubs over spinifex 3	REG Shrubs over spinifex 4	REG Dogbolter 2	REG Mulga woodland 1	REG Mulga woodland 4	REG Eucalypt over spinifex 2	REG Eucalypt over spinifex 4	REG Eucalypt over spinifex 1	REG Dogbolter 1	REG Dogbolter 3	REG Dogbolter 4	REG Eucalypt over spinifex 3	REG Mulga woodland 2	REG Mulga woodland 3	REG Opportunistic	REG Open spinifex	REG Mulga woodland	REG Eucalypt over spinifex	REG Shrubs over spinifex	REG Mulga thicket 2	REG Turkeys	REG Mulga thicket 1	REG Dogbolter
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat																							1						
	Smicrornis brevirostris	Weebill																					3			13	5				
	Gerygone fusca	Western Gerygone																													1
	Acanthiza robustirostris	Slaty-backed Thornbill																							4				2		6
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill																							2				1		6
	Acanthiza uropygialis	Chestnut-rumped Thornbill																					1		7	5	3		3		8
	Acanthiza apicalis	Inland Thornbill																							8		1	6		6	4
	Aphelocephala leucopsis	Southern Whiteface																							3			2	1	2	2
Meliphagidae	*Gavicalis virescens*	Singing Honeyeater																					1	2	3	5	1	2	2	2	1
	Manorina flavigula	Yellow-throated Miner																					3	12	5	5	8	7	3	7	
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler																					3						2		
Psophodidae	*Cinclosoma castaneothorax*	Chestnut-breasted Quail-thrush																										1		1	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike																						2		3			2		
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler																							4	3		3		3	2
	Pachycephala rufiventris	Rufous Whistler																													
	Colluricincla harmonica	Grey Shrike-thrush																								1	1				
	Oreoica gutturalis	Crested Bellbird																						3	3	5	4	1	1	1	3
Artamidae	*Artamus cinereus*	Black-faced Woodswallow																					3								
	Cracticus torquatus	Grey Butcherbird																					3	3	1	2	2	2		2	
	Cracticus nigrogularis	Pied Butcherbird																					2	4	2	2	4	1		1	2

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

		Survey	1																																
Family	**Species**	Common Name	REG Open spinifex 1	REG Open spinifex 2	REG Open spinifex 3	REG Open spinifex 4	REG Shrubs over spinifex 1	REG Shrubs over spinifex 2	REG Shrubs over spinifex 3	REG Shrubs over spinifex 4	REG Dogbolter 2	REG Mulga woodland 1	REG Mulga woodland 4	REG Eucalypt over spinifex 2	REG Eucalypt over spinifex 4	REG Eucalypt over spinifex 1	REG Dogbolter 1	REG Dogbolter 3	REG Dogbolter 4	REG Eucalypt over spinifex 3	REG Mulga woodland 2	REG Mulga woodland 3	REG Opportunistic	REG Open spinifex	REG Mulga woodland	REG Eucalypt over spinifex	REG Shrubs over spinifex	REG Mulga thicket 2	REG Turkeys	REG Mulga thicket 1	REG Dogbolter
	Sminthopsis macroura	Stripe-faced Dunnart		1								2	1					1																	
Muridae	*Mus musculus*	House Mouse	7	1	3		2	1		1																									
	Notomys alexis	Spinifex Hopping Mouse		1			1		4				1																						
	Pseudomys desertor	Desert Mouse	1				1	3		1								1	1	1															
	Pseudomys hermannsburgensis	Sandy Inland Mouse	1		2						1				2						2													

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

O.5 VERTEBRATE FAUNA RECORDED IN BIOLOGICAL SURVEYS IN THE REGION

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

		Survey	1							2																
Family	**Species**	Common Name	Site 1	Site 2	Site 7	Site 5	Site 6	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Opportunistic	Birds
	Ctenotus uber	Spotted Ctenotus				1				3	1		8	4		2				1		1	2	2		
	Egernia depressa	Pygmy Spiny-tailed Skink			1		1	1	1				1				1				1	1		3		
	Egernia formosa	Goldfields Crevice-skink			1					1	1	1					2	2	4				1			
	Eremiascincus richardsonii	Broad-banded Sand Swimmer	1	1								2				1							1			
	Lerista desertorum	Central Desert Robust Slider		1												1		6	2	5		1	2			
	Lerista muelleri	Wood Mulch-slider								2						5				1	1		5	4		
	Lerista sp.					1	1		1																	
	Liopholis striata	Nocturnal Desert Skink					1																			
	Menetia greyii	Common Dwarf Skink	1	1		1										1							1			
	Morethia butleri	Woodland Morethia Skink								1							2	2		2	1	1	1	1		
Typhlopidae	*Anilios australis*	Austral Blind Snake																						1		
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor		1						4		3		3			2		1	1			1			
	Varanus panoptes	Yellow-spotted Monitor													1		1						1			
	Varanus panoptes rubidus	Yellow-spotted Monitor	1	1	1	1	1	1	1																	
Cheluidae	*Chelodina steindachneri*	Steindachner's Turtle	1																							
Birds																										
Casuariidae	*Dromaius novaehollandiae*	Emu	1	1	1	1	1	1	1																1	
Columbidae	*Phaps chalcoptera*	Common Bronzewing	1	1		1	1		1																1	3
Columbidae	*Ocyphaps lophotes*	Crested Pigeon	1	1	1	1	1	1																	1	14
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar																								1

		Survey	1							2																	
Family	**Species**	Common Name	Site 1	Site 2	Site 7	Site 5	Site 6	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Opportunistic	Birds
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar						1																		
Otididae	*Ardeotis australis*	Australian Bustard		1																						
Accipitridae	*Accipiter fasciatus*	Brown Goshawk	1																							
	Aquila audax	Wedge-tailed Eagle					1																			
	Hieraaetus morphnoides	Little Eagle		1																						
Falconidae	*Falco cenchroides*	Nankeen Kestrel		1	1	1		1	1																1	
	Falco berigora	Brown Falcon	1	1			1																			
Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel	1																							
Charadriidae	*Vanellus tricolor*	Banded Lapwing					1																			
Turnicidae	*Turnix velox*	Little Button-quail							1																	
Cacatuidae	*Eolophus roseicapillus*	Galah	1	1	1	1	1	1																	1	1
Psittacidae	*Barnardius zonarius*	Australian Ringneck	1			1	1	1																		12
	Psephotus varius	Mulga Parrot	1			1	1																		1	3
	Melopsittacus undulatus	Budgerigar	1	1		1	1	1	1																	
	Neopsephotus bourkii	Bourke's Parrot				1	1																			
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-cuckoo	1	1			1		1																	
	Chalcites osculans	Black-eared Cuckoo		1			1																			
	Heteroscenes pallidus	Pallid Cuckoo	1					1	1																	
Halcyonidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher		1				1	1																	
Meropidae	*Merops ornatus*	Rainbow Bee-eater	1					1																		

		Survey	1							2																
Family	**Species**	Common Name	Site 1	Site 2	Site 7	Site 5	Site 6	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Opportunistic	Birds
Climacteridae	*Climacteris affinis*	White-browed Treecreeper				1	1	1	1																1	1
Ptilonorhynchidae	*Ptilonorhynchus maculatus*	Spotted Bowerbird	1					1																		
	Ptilonorhynchus guttatus	Western Bowerbird																							1	3
Maluridae	*Malurus splendens*	Splendid Fairy-wren	1	1			1																			19
	Malurus leucopterus	White-winged Fairy-wren		1				1																		3
	Malurus lamberti	Variegated Fairy-wren	1	1			1																			
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat		1																						
	Smicrornis brevirostris	Weebill		1																						3
	Gerygone fusca	Western Gerygone	1	1																						
	Acanthiza robustirostris	Slaty-backed Thornbill	1		1	1	1	1	1																	34
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill	1		1	1	1	1	1																	1
	Acanthiza uropygialis	Chestnut-rumped Thornbill	1		1	1	1	1	1																	8
	Acanthiza apicalis	Inland Thornbill	1	1	1			1	1																	30
	Aphelocephala leucopsis	Southern Whiteface	1	1	1	1	1	1																		7
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater	1	1		1			1																	
	Gavicalis virescens	Singing Honeyeater	1	1	1	1	1	1	1																	24
	Purnella albifrons	White-fronted Honeyeater	1	1					1																	
	Manorina flavigula	Yellow-throated Miner	1	1	1	1	1	1	1																1	10
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater	1	1		1	1	1	1																	13
	Epthianura tricolor	Crimson Chat		1		1	1	1	1																	

		Survey	1							2																	
Family	**Species**	Common Name	Site 1	Site 2	Site 7	Site 5	Site 6	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Opportunistic	Birds
	Sugomel niger	Black Honeyeater							1																	
	Lichmera indistincta	Brown Honeyeater		1																						
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler	1				1																		1	8
Psophodidae	*Cinclosoma castaneothorax*	Chestnut-breasted Quail-thrush				1	1	1	1																	
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella			1																					
Campephagidae	*Coracina maxima*	Ground Cuckoo-shrike	1	1				1																		
	Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	1		1		1	1																	2
	Lalage tricolor	White-winged Triller		1			1																			
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler	1	1	1	1	1	1	1																	22
	Colluricincla harmonica	Grey Shrike-thrush	1	1	1	1	1	1	1																	13
	Oreoica gutturalis	Crested Bellbird	1	1	1	1	1	1	1																	40
Artamidae	*Artamus cinereus*	Black-faced Woodswallow	1	1		1		1	1																2	3
	Cracticus torquatus	Grey Butcherbird	1	1	1	1	1	1	1																	
	Cracticus nigrogularis	Pied Butcherbird	1	1	1	1	1	1	1																1	2
	Gymnorhina tibicen	Australian Magpie	1		1		1																			
	Strepera versicolor	Grey Currawong	1																							
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	1	1			1		1																	
Corvidae	*Corvus bennetti*	Little Crow			1	1	1		1																	14
	Corvus orru	Torresian Crow	1	1	1		1	1	1																1	
Monarchidae	*Grallina cyanoleuca*	Magpie-lark	1	1																					1	

		Survey	1							2																
Family	**Species**	Common Name	Site 1	Site 2	Site 7	Site 5	Site 6	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Opportunistic	Birds
Petroicidae	*Petroica goodenovii*	Red-capped Robin	1	1	1	1	1	1	1																	14
	Melanodryas cucullata	Hooded Robin	1	1	1		1	1	1																	3
Megaluridae	*Cincloramphus mathewsi*	Rufous Songlark		1				1																		
Hirundinidae	*Hirundo neoxena*	Welcome Swallow	1				1	1	1																	
	Petrochelidon ariel	Fairy Martin							1																	
	Petrochelidon nigricans	Tree Martin						1	1																	
Estrildidae	*Taeniopygia guttata*	Zebra Finch	1	1	1	1		1	1																	
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit		1				1																	1	
Mammals																										
Bovidae	*Bos taurus*	Cow	1	1	1	1	1	1	1																	
	Capra hircus	Goat	1	1																						
Canidae	*Canis lupus*	Dingo	1																							
	Vulpes vulpes	Red Fox	1																							
Felidae	*Felis catus*	House Cat	1	1																						
Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat																					4			
Dasyuridae	*Sminthopsis crassicaudata*	Fat-tailed Dunnart		1																						
	Sminthopsis dolichura	Little Long-tailed Dunnart								1	5		1	4	4	2			1		1	1	3	2		
	Sminthopsis macroura	Stripe-faced Dunnart				1					1	1			1	3	1		1							
Macropodidae	*Osphranter robustus*	Euro			1																					
	Osphranter rufus	Red Kangaroo	1	1				1																		

		Survey	1							2																	
Family	**Species**	Common Name	Site 1	Site 2	Site 7	Site 5	Site 6	Site 3	Site 4	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Opportunistic	Birds
Leporidae	*Oryctolagus cuniculus*	European Rabbit	1			1																				
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna			1																					
Equidae	*Equus caballus*	Domestic Horse		1				1																		
Muridae	*Mus musculus*	House Mouse	1	1		1		1	1																	

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

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

O.6 VERTEBRATE FAUNA RECORDED IN BIOLOGICAL SURVEYS IN THE REGION

		Survey	1									
Family	**Species**	Common Name	**TM1**	**JS2**	**WM2**	**WS2**	**WM1**	**WS1**	**JS3**	**JS1**	**JS4**	**HB1**
Frogs												
Limnodynastidae	*Neobatrachus wilsmorei*	Goldfields Bullfrog	3	1								
Reptiles												
Agamidae	*Ctenophorus inermis*	Military Dragon			1							
	Ctenophorus maculatus	Spotted Dragon				2						
	Ctenophorus reticulatus	Western Netted Dragon					1					
	Ctenophorus salinarum	Saltpan Dragon				2		1				
	Pogona minor	Dwarf Bearded Dragon	1		2				2	1	1	
Carphodactylidae	*Nephrurus vertebralis*	Midline Knob-tail					1		1			
Diplodactylidae	*Lucasium squarrosum*	Mottled Ground Gecko	2	1	5	2	1					2
	Strophurus elderi	Jewelled Gecko		1					1	2		
Elapidae	*Simoselaps bertholdi*	Jan's Banded Snake	1									
Gekkonidae	*Gehyra xenopus*	Crocodile-faced Dtella		1			1			1	1	
	Heteronotia binoei	Bynoe's Prickly Gecko	1				2				2	3
Pygopodidae	*Delma nasuta*	Sharp-snouted Delma									1	
	Pygopus nigriceps	Western Hooded Scaly-foot									1	
Scincidae	*Ctenotus helenae*	Clay-soil Ctenotus		2					2	1		
	Ctenotus leonhardii	Leonhardi's Ctenotus	6	3	3	6	7				2	4
	Lerista desertorum	Central Desert Robust Slider	4	1	1				1	2	1	
	Lerista kingi	King's Slider					1					
	Menetia greyii	Common Dwarf Skink				1	1					
Typhlopidae	*Anilios hamatus*	Pale-headed Blind Snake					1				1	
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor			1							
	Varanus gouldii	Gould's Goanna					1		1			
Dasyuridae	*Ningaui ridei*	Wongai Ningaui							1			
Muridae	*Notomys alexis*	Spinifex Hopping Mouse							1			

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

Appendix P.
Species lists from regional survey data

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

P.1 BIRDS POTENTIALLY FOUND NEAR THE PROJECT AREA

Family	Species	Common Name
Accipitridae	*Accipiter cirrocephalus*	Collared Sparrowhawk
	Accipiter fasciatus	Brown Goshawk
	Aquila audax	Wedge-tailed Eagle
	Aviceda subcristata	Pacific Baza
	Circus approximans	Swamp Harrier
	Elanus axillaris	Black-shouldered Kite
	Haliastur sphenurus	Whistling Kite
	Hamirostra melanosternon	Black-breasted Buzzard
	Hieraaetus morphnoides	Little Eagle
	Lophoictinia isura	Square-tailed Kite
	Milvus migrans	Black Kite
Anatidae	*Anas gracilis*	Grey Teal
	Anas superciliosa	Pacific Black Duck
	Aythya australis	Hardhead
	Chenonetta jubata	Australian Wood Duck
	Cygnus atratus	Black Swan
	Dendrocygna eytoni	Plumed Whistling-duck
	Malacorhynchus membranaceus	Pink-eared Duck
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar
Podargidae	*Podargus strigoides*	Tawny Frogmouth
Casuariidae	*Dromaius novaehollandiae*	Emu
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover
	Charadrius veredus	Oriental Plover
	Elseyornis melanops	Black-fronted Dotterel
	Erythrogonys cinctus	Red-kneed Dotterel
	Vanellus tricolor	Banded Lapwing
Glareolidae	*Glareola maldivarum*	Oriental Pratincole
Laridae	*Chlidonias hybrida*	Whiskered Tern
	Gelochelidon macrotarsa	Australian Gull-billed Tern
Recurvirostridae	*Cladorhynchus leucocephalus*	Banded Stilt
	Himantopus leucocephalus	Pied Stilt
	Recurvirostra novaehollandiae	Red-necked Avocet
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper
	Calidris alba	Sanderling
	Calidris melanotos	Pectoral Sandpiper
	Calidris ruficollis	Red-necked Stint
	Calidris subminuta	Long-toed Stint

Family	Species	Common Name
	Tringa glareola	Wood Sandpiper
	Tringa nebularia	Common Greenshank
Turnicidae	*Turnix velox*	Little Button-quail
Ardeidae	*Ardea alba*	Great Egret
	Ardea pacifica	White-necked Heron
	Egretta novaehollandiae	White-faced Heron
	Pelecanus conspicillatus	Australian Pelican
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill
Columbidae	*Geopelia cuneata*	Diamond Dove
	Ocyphaps lophotes	Crested Pigeon
	Phaps chalcoptera	Common Bronzewing
Halcyonidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher
	Todiramphus sanctus	Sacred Kingfisher
Meropidae	*Merops ornatus*	Rainbow Bee-eater
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-cuckoo
	Chalcites osculans	Black-eared Cuckoo
	Heteroscenes pallidus	Pallid Cuckoo
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar
Falconidae	*Falco berigora*	Brown Falcon
	Falco cenchroides	Nankeen Kestrel
	Falco longipennis	Australian Hobby

Family	Species	Common Name
Megapodiidae	*Leipoa ocellata*	Malleefowl
Phasianidae	*Coturnix pectoralis*	Stubble Quail
Otididae	*Ardeotis australis*	Australian Bustard
Rallidae	*Fulica atra*	Eurasian Coot
	Tribonyx ventralis	Black-tailed Nativehen
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill
	Acanthiza robustirostris	Slaty-backed Thornbill
	Acanthiza uropygialis	Chestnut-rumped Thornbill
	Aphelocephala leucopsis	Southern Whiteface
	Aphelocephala nigricincta	Banded Whiteface
	Calamanthus fuliginosus	Striated Fieldwren
	Gerygone fusca	Western Gerygone
	Pyrrholaemus brunneus	Redthroat
	Sericornis magnirostra	Large-billed Scrubwren
	Smicrornis brevirostris	Weebill
Artamidae	*Artamus cinereus*	Black-faced Woodswallow
	Artamus cyanopterus	Dusky Woodswallow
	Artamus minor	Little Woodswallow
	Artamus personatus	Masked Woodswallow
	Artamus superciliosus	White-browed Woodswallow

Family	Species	Common Name
	Cracticus nigrogularis	Pied Butcherbird
	Cracticus torquatus	Grey Butcherbird
	Gymnorhina tibicen	Australian Magpie
	Strepera versicolor	Grey Currawong
Campephagidae	*Coracina maxima*	Ground Cuckoo-shrike
	Coracina novaehollandiae	Black-faced Cuckoo-shrike
	Coracina novaehollandiae	Black-faced Cuckoo-shrike
	Lalage tricolor	White-winged Triller
Cisticolidae	*Cisticola exilis*	Golden-headed Cisticola
	Cisticola juncidis	Zitting Cisticola
Climacteridae	*Climacteris affinis*	White-browed Treecreeper
Corvidae	*Corvus bennetti*	Little Crow
	Corvus orru	Torresian Crow
Estrildidae	*Lonchura castaneothorax*	Chestnut-breasted Mannikin
	Taeniopygia guttata	Zebra Finch
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow
	Hirundo neoxena	Welcome Swallow
	Petrochelidon ariel	Fairy Martin
	Petrochelidon nigricans	Tree Martin
Maluridae	*Amytornis striatus*	Striated Grasswren
	Malurus lamberti	Variegated Fairy-wren

Family	Species	Common Name
	Malurus leucopterus	White-winged Fairy-wren
	Malurus splendens	Splendid Fairy-wren
	Stipiturus ruficeps	Rufous-crowned Emu-wren
Megaluridae	*Cincloramphus cruralis*	Brown Songlark
	Megalurus timoriensis	Tawny Grassbird
Meliphagidae	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater
	Certhionyx variegatus	Pied Honeyeater
	Conopophila whitei	Grey Honeyeater
	Epthianura aurifrons	Orange Chat
	Epthianura tricolor	Crimson Chat
	Gavicalis virescens	Singing Honeyeater
	Lichenostomus flavicollis	Yellow-throated Honeyeater
	Lichenostomus leucotis	White-eared Honeyeater
	Lichenostomus ornatus	Yellow-plumed Honeyeater
	Lichenostomus plumulus	Grey-fronted Honeyeater
	Lichmera indistincta	Brown Honeyeater
	Manorina flavigula	Yellow-throated Miner
	Ptilotula keartlandi	Grey-headed Honeyeater
	Ptilotula penicillata	White-plumed Honeyeater
	Purnella albifrons	White-fronted Honeyeater
	Sugomel nigrum	Black Honeyeater

Family	Species	Common Name
Monarchidae	*Grallina cyanoleuca*	Magpie-lark
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush
	Colluricincla harmonica	Grey Shrike-thrush
	Oreoica gutturalis	Crested Bellbird
	Pachycephala rufiventris	Rufous Whistler
Pardalotidae	*Pardalotus rubricatus*	Red-browed Pardalote
	Pardalotus striatus	Striated Pardalote
Petroicidae	*Melanodryas cucullata*	Hooded Robin
	Microeca fascinans	Jacky Winter
	Petroica goodenovii	Red-capped Robin
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler
	Pomatostomus temporalis	Grey-crowned Babbler
Psophodidae	*Cinclosoma castaneothorax*	Chestnut-breasted Quail-thrush
Psophodidae	*Cinclosoma castanotum*	Chestnut Quail-thrush
	Cinclosoma cinnamomeum	Cinnamon Quail-thrush
	Cinclosoma marginatum	Western Quail-thrush
	Psophodes occidentalis	Chiming Wedgebill
Ptilonorhynchidae	*Ptilonorhynchus guttatus*	Western Bowerbird
	Ptilonorhynchus maculatus	Spotted Bowerbird
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail
	Rhipidura leucophrys	Willie Wagtail
Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant
	Phalacrocorax varius	Pied Cormorant
Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe
Cacatuidae	*Cacatua sanguinea*	Little Corella
	Eolophus roseicapilla	Galah
	Nymphicus hollandicus	Cockatiel
Psittacidae	*Barnardius zonarius*	Australian Ringneck
	Melopsittacus undulatus	Budgerigar
	Neopsephotus bourkii	Bourke's Parrot
	Psephotus varius	Mulga Parrot
Strigidae	*Ninox boobook*	Southern Boobook

P.2 AMPHIBIANS POTENTIALLY FOUND NEAR THE PROJECT AREA

Family	Species	Common Name
Hylidae	*Cyclorana maini*	Main's Frog
	Cyclorana occidentalis	Western Water-holding Frog
	Litoria rubella	Desert Tree Frog

P.3 MAMMALS POTENTIALLY FOUND NEAR THE PROJECT AREA

Family	Species	Common Name
Bovidae	*Bos taurus*	Cow
	Capra hircus	Goat
Camelidae	*Camelus dromedarius*	Dromedary
Canidae	*Canis lupus*	Dingo
	Vulpes vulpes	Red Fox
Felidae	*Felis catus*	Cat
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheath-tail Bat
Emballonuridae	*Taphozous hilli*	Hill's Sheathtail Bat
Molossidae	*Austronomus australis*	White-striped Freetail Bat
	Mormopterus lumsdenae	Northern Free-tail Bat
	Mormopterus planiceps	Southern Free-tail Bat
Pteropodidae	*Syconycteris australis*	Common Blossom-bat
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat
	Nyctophilus geoffroyi	Lesser Long-eared Bat
	Nyctophilus major	Greater Long-eared Bat
	Scotorepens balstoni	Inland Broad-nosed Bat
	Vespadelus baverstocki	Inland Forest Bat
	Vespadelus finlaysoni	Finlayson's Cave Bat
Dasyuridae	*Antechinomys laniger*	Kultarr
	Dasycercus blythi	Brush-tailed Mulgara
	Dasycercus cristicauda	Crest-tailed Mulgara
	Ningaui ridei	Wongai Ningaui
	Pseudantechinus woolleyae	Woolley's False Antechinus
	Sminthopsis crassicaudata	Fat-tailed Dunnart
	Sminthopsis dolichura	Little Long-tailed Dunnart
	Sminthopsis hirtipes	Hairy-footed Dunnart
	Sminthopsis longicaudata	Long-tailed Dunnart
	Sminthopsis macroura	Stripe-faced Dunnart
	Sminthopsis ooldea	Ooldea Dunnart
	Sminthopsis youngsoni	Lesser Hairy-footed Dunnart
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo
	Osphranter robustus	Euro
	Osphranter rufus	Red Kangaroo
Potoroidae	*Bettongia lesueur*	Burrowing Bettong
Leporidae	*Oryctolagus cuniculus*	Rabbit
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna
Thylacomyidae	*Macrotis lagotis*	Bilby
Equidae	*Equus asinus*	Donkey

Family	Species	Common Name
	Equus caballus	Horse
Muridae	*Mus musculus*	House Mouse
	Notomys alexis	Spinifex Hopping Mouse

Family	Species	Common Name
	Notomys mitchellii	Mitchell's Hopping Mouse
	Pseudomys desertor	Desert Mouse
	Pseudomys hermannsburgensis	Sandy Inland Mouse

P.4 REPTILES POTENTIALLY FOUND NEAR THE PROJECT AREA

Family	Species	Common Name
Agamidae	*Ctenophorus caudicinctus*	Ring-tailed Dragon
	Ctenophorus chapmani	Chapman's Dragon
	Ctenophorus graafi	Ring-tailed Dragon
	Ctenophorus inermis	Military Dragon
	Ctenophorus isolepis	Central Military Dragon
	Ctenophorus isolepis	Military Dragon
	Ctenophorus nuchalis	Central Netted Dragon
	Ctenophorus reticulatus	Western Netted Dragon
	Ctenophorus salinarum	Saltpan Dragon
	Ctenophorus scutulatus	Lozenge-marked Dragon
	Diporiphora amphiboluroides	Mulga Dragon
	Diporiphora paraconvergens	Grey-striped Western Desert Dragon
	Diporiphora winneckei	Canegrass Dragon
	Gowidon longirostris	Long-nosed Dragon
	Moloch horridus	Thorny Devil
	Pogona minor	Western Bearded Dragon
	Tympanocryptis cephalus	Pebble Dragon
Carphodactylidae	*Nephrurus laevissimus*	Smooth Knob-tail
	Nephrurus vertebralis	Midline Knob-tail
	Nephrurus wheeleri	Banded Knob-tail
	Underwoodisaurus milii	Barking Gecko
Diplodactylidae	*Diplodactylus conspicillatus*	Fat-tailed Gecko
	Diplodactylus granariensis	Wheatbelt Stone Gecko
	Diplodactylus pulcher	Beautiful Gecko
	Diplodactylus vittata	Wood Gecko
	Lucasium damaeum	Beaded Gecko
	Lucasium squarrosum	Mottled Ground Gecko
	Lucasium stenodactylum	Crowned Gecko
	Rhynchoedura ornata	Beaked Gecko
	Strophurus assimilis	Goldfields Spiny-tailed Gecko
	Strophurus ciliaris	Spiny-tailed Gecko
	Strophurus elderi	Jewelled Gecko
	Strophurus strophurus	Western Spiny-tailed Gecko
	Strophurus wellingtonae	Western Shield Spiny-tailed Gecko
Elapidae	*Brachyurophis approximans*	North-western Shovel-nosed Snake
	Brachyurophis fasciolata	Narrow-banded Burrowing Snake
	Brachyurophis semifasciata	Half-girdled Snake
	Demansia psammophis	Yellow-faced Whipsnake
	Furina ornata	Orange-naped Snake
	Parasuta monachus	Hooded Snake
	Pseudechis australis	Mulga Snake
	Pseudonaja mengdeni	Western Brown Snake
	Pseudonaja modesta	Ringed Brown Snake
	Simoselaps bertholdi	Jan's Banded Snake

Family	Species	Common Name
	Suta fasciata	Rosen's Snake
Gekkonidae	*Gehyra purpurascens*	
	Gehyra variegata	Tree Dtella
	Heteronotia binoei	Bynoe's Gecko
Pygopodidae	*Aprasia picturata*	Black-headed Worm-lizard
	Delma butleri	Unbanded Delma
	Delma nasuta	Sharp-snouted Delma
	Lialis burtonis	Burton's Legless Lizard
	Pygopus nigriceps	Western Hooded Scaly-foot
Pythonidae	*Antaresia perthensis*	Pygmy Python
	Antaresia stimsoni	Stimson's Python
Scincidae	*Cryptoblepharus buchananii*	Buchanan's Snake-eyed Skink
	Cryptoblepharus pulcher	Elegant Snake-eyed Skink
	Ctenotus ariadnae	Ariadna's Ctenotus
	Ctenotus atlas	Southern Mallee Ctenotus
	Ctenotus calurus	Blue-tailed Finesnout Ctenotus
	Ctenotus dux	Fine Side-lined Ctenotus
	Ctenotus grandis	Grand Ctenotus
	Ctenotus halysis	Chained Ctenotus
	Ctenotus hebetior	Stout Ctenotus
	Ctenotus helenae	Clay-soil Ctenotus
	Ctenotus leonhardii	Leonhardi's Ctenotus
	Ctenotus pantherinus	Leopard Ctenotus
	Ctenotus pantherinus	Leopard Skink

Family	Species	Common Name
	Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus
	Ctenotus schomburgkii	Barred Wedgesnout Ctenotus
	Ctenotus severus	Stern Ctenotus
	Ctenotus uber	Spotted Ctenotus
	Egernia depressa	Southern Pygmy Spiny-tailed Skink
	Egernia formosa	Goldfields Crevice Skink
	Eremiascincus richardsonii	Broad-banded Sand-swimmer
	Lerista bipes	North-western Sandslider
	Lerista desertorum	Central Desert Robust Slider
	Lerista muelleri	Wood Mulch-slider
	Lerista rhodonoides	
	Lerista timida	Timid Slider
	Liopholis inornata	Desert Skink
	Liopholis striata	Nocturnal Desert Skink
	Menetia greyii	Common Dwarf Skink
	Morethia butleri	Woodland Morethia Skink
	Morethia ruficauda	Lined Fire-tailed Skink
	Tiliqua multifasciata	Central Blue-tongue
	Tiliqua occipitalis	Western Blue-tongued Lizard
Typhlopidae	*Anilios bituberculatus*	Prong-snouted Blind Snake
	Anilios hamatus	Pale-headed Blind Snake
	Anilios waitii	Waite's Blind Snake
Varanidae	*Varanus brevicauda*	Short-tailed Pygmy Monitor
	Varanus caudolineatus	Stripe-tailed Monitor

Family	Species	Common Name
	Varanus eremius	Pygmy Desert Monitor
	Varanus giganteus	Perentie
	Varanus gouldii	Gould's Goanna
	Varanus panoptes	Yellow-spotted Monitor
	Varanus tristis	Black-headed Monitor
Chelidae	*Chelodina steindachneri*	Flat-shelled Turtle

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

Level 2 Vertebrate Fauna Assessment
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Q.1 DEFINITIONS OF SIGNIFICANT FAUNA UNDER THE WA BIODIVERSITY CONSERVATION ACT 2016

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

T Threatened Species

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

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

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

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

CR Critically endangered species

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

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

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

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

EN Endangered species

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

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

VU Vulnerable species

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

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

Extinct Species

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

EX Extinct species

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

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

EW Extinct in the wild species

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

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

Specially Protected Species

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

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

MI Migratory birds protected under an international agreement

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

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

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

CD Species of special conservation interest (conservation dependant fauna)

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

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

OS Other specially protected species

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

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

P Priority species

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

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

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

P1 Priority 1: Poorly-known species

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

P2 Priority 2: Poorly-known species

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

P3 Priority 3: Poorly-known species

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

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

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

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

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

Appendix R. Acoustic analysis and bat call identification from near Laverton, Western Australia

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

Acoustic analysis and bat call identification from near Laverton, Western Australia

Prepared for **Terrestrial Ecosystems Pty Ltd**

Version **14 April 2020**

SZ project reference **SZ527**

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This report should be included as an appendix in any larger submission to Government, and cited as:

Specialised Zoological (2020). Acoustic analysis and bat call identification from near Laverton, Western Australia. Unpublished report by Specialised Zoological for Terrestrial Ecosystems Pty Ltd, 14 April 2020, project reference SZ527.

Summary

Bat identifications from acoustic recordings are provided from near Laverton, Western Australia. The identification of bat species from full spectrum WAV-format recordings of their echolocation calls was based on measurements of characteristic frequency, observation of pulse shape, and the pattern of harmonics. At least seven species of bat were identified as being present across two survey periods (**Tables 1 – 3**). Representative echolocation calls for each identification are illustrated (**Figure 1**), as recommended by the Australasian Bat Society (ABS 2006). Further details are available should verification be required.

Methods

The data provided were recorded in full spectrum WAV format with Wildlife Acoustics Song Meter SM2BAT+ bat detectors (sampling rate 384 kHz, set to turn on automatically at sunset and off at sunrise).

A multi-step acoustic analysis procedure developed to process large full spectrum echolocation recording datasets from insectivorous bats (Armstrong and Aplin 2014; Armstrong et al. 2016) was applied to the recordings made on the survey. Firstly, the WAV files were scanned for bat echolocation calls using several parameter sets in the software SCAN'R version 1.8.3 (Binary Acoustic Technology), which also provides measurements (SCAN'R parameters) from each putative bat pulse.

The outputs were then used to determine if putative bat pulses measured in SCAN'R could be identified to species. This was done using a custom [R] language script that performed three tasks: 1. undertook a Discriminant Function Analysis on training data from representative calls from southern Australia; 2. from the measurements of each putative bat pulse from SCAN'R, calculated values for the first two Discriminant Functions that could separate the echolocation call types derived from the analysis of training data, and plotted these resulting coordinates over confidence regions for the defined call types; and 3. facilitated an inspection in a spectrogram of multiple examples of each call type for each recording night by opening the original WAV files containing pulses of interest in Adobe Audition CS6 version 5.0.2.

Species were identified based on information in Churchill (2008) and the author's own unpublished material; and nomenclature follows Jackson and Groves (2015).

Comments on ambiguous identifications

Most species were identified unambiguously, but some call types have more than one possibility for their source. It is difficult to make an unambiguous species-level identification of long-eared bats *Nyctophilus* spp., and call sequences attributable to this genus in the present dataset could have derived from either the Lesser Long-eared Bat *Nyctophilus geoffroyi*, or the Central Long-eared Bat *Nyctophilus major tor*. Short broadband calls typical of *Nyctophilus* spp. were reasonably common in the recordings, and most of those observed had a characteristic frequency of c. 40 kHz, suggestive of the larger species (*N. m. tor*). Several examples had pulses more than 5 kHz higher, suggestive of either *N. geoffroyi* or clutter calls of the Inland Forest Bat *Vespdaelus baverstocki*.

A few sequences had characteristics typical of the Inland Free-tailed Bat *Ozimops petersi*, but alternatively, they might have instead derived from Gould's Wattled Bat *Chalinolobus gouldii*.

Limitations

The identifications presented in this report have been made within the following context:

1. The identifications made herein were based on the ultrasonic acoustic data recorded and provided by a 'third party' (the client named on the front of this report).
2. The scope of this report extended to providing information on the identification of bat species in bulk ultrasonic recordings. Further comment on these species and the possible impacts of a planned project on bat species were not part of the scope.
3. In the case of the present report, the recording equipment was not set up and supplied by Specialised Zoological. The equipment was operated by the third party during the survey.
4. Other than the general location of the study area, Specialised Zoological has not been provided with detailed information of the survey area, has not made a visit to observe the habitats available for bats, nor have we visited the specific project areas on a previous occasion.
5. Specialised Zoological has had no input into the overall design and timing of this bat survey, recording site placement, nor the degree of recording site replication.
6. While Specialised Zoological has made identifications to the best of our ability given the available materials, and reserves the right to re-examine the data and revise any identification following a query, it is the client's and / or proponent's responsibility to provide supporting evidence for any identification, which might require follow-up trapping effort or non-invasive methods such as video recordings. Specialised Zoological bears no liability for any follow-up work that may be required to support an identification based initially on the analysis of acoustic recordings undertaken and reported on here.
7. There are a variety of factors that affect the 'detectability' of each bat species, given the frequency, power and shape characteristics of their calls. Further information on the analysis and the various factors that can impinge on the reliability of identifications can be provided upon request.
8. The analysis of ultrasonic recordings is one of several methods that can be used to survey for bats, and comprehensive surveys typically employ more than one method. If an identification in the present report is ambiguous or in question, a trapping programme would help to resolve the presence of the possibilities in the project area.

References

ABS (2006). Recommendations of the Australasian Bat Society Inc for reporting standards for insectivorous bat surveys using bat detectors. *The Australasian Bat Society Newsletter* 27: 6–9. [ISSN 1448-5877]

Armstrong, K.N. and Aplin, K.P. (2014). Identifying bats in an unknown acoustic realm using a semi-automated approach to the analysis of large full spectrum datasets. Oral presentation at the 16th Australasian Bat Society Conference 22–25 April 2014, Townsville, Queensland. *The Australasian Bat Society Newsletter* 42: 35–36.

Armstrong, K.N., Aplin, K.P. and Crotty, S. (2016). A pipeline and app for massive filtering, and assisted inspection of enormous acoustic datasets. Poster presentation at the 17th Australasian Bat Society Conference, 29 March-1 April 2016, Hobart, Tasmania, Australia. *The Australasian Bat Society Newsletter* 46: 51.

Churchill, S.K. (2008). *Australian bats.* 2nd ed. Allen and Unwin, Crows Nest, NSW.

Jackson, S.M. and Groves, C.P. (2015). *Taxonomy of Australian mammals*. CSIRO Publishing, Victoria.

Table 1. Species identified in the present survey from all sites combined.

VESPERTILIONIDAE	
Gould's Wattled Bat	*Chalinolobus gouldii*
Inland Broad-nosed Bat	*Scotorepens balstoni*
Inland Forest Bat	*Vespadelus baverstocki*
Finlayson's Cave Bat	*Vespadelus finlaysoni*
Ambiguous identifications	
Unidentified long-eared bat	*Nyctophilus* sp.
MOLOSSIDAE	
Western Free-tailed Bat	*Ozimops kitcheneri*
Inland Free-tailed Bat	*Ozimops petersi*

Table 2. Species identifications from November 2019, with the degree of confidence indicated by a code. Date and recording unit number correlates with site; see *Table 1* for full species names. Note that dates for which recordings failed are not listed.

	C. gouldii	*O. kitcheneri*	*O. petersi*	*Nyctophilus* sp.	*S. balstoni*	*V. baverstocki*	*V. finlaysoni*
SM2BAT 7544							
20/11/2019	◆	—	—	NC	◆	—	—
SM2BAT 7548							
20/11/2019	—	—	—	NC	—	◆	—
SM2BAT 7586							
20/11/2019	—	—	—	—	—	—	—
SM2BAT 10856							
20/11/2019	—	—	NC	NC	—	—	—
SM2BAT 10883							
20/11/2019	◆	◆	—	NC	—	—	◆
21/11/2019	◆	◆	NC	NC	◆	—	◆
22/11/2019	◆	—	—	NC	◆	—	◆
23/11/2019	◆	◆	—	NC	—	—	◆
24/11/2019	—	—	—	NC	—	—	—

Definition of confidence level codes

— Not detected.

◆ Unambiguous identification of the species at the site based on measured call characteristics and comparison with available reference material. Greater confidence in this ID would come only after capture and supported by morphological measurements or a DNA sequence.

NC Needs Confirmation. Either call quality was poor, or the species cannot be distinguished reliably from another that makes similar calls. Alternative identifications are indicated in the *Comments on identifications* section of this report. If this is a species of conservation significance, further survey work might be required to confirm the record.

Table 3. Species identifications from March 2020, with the degree of confidence indicated by a code. Date and recording unit number correlates with site; see *Table 1* for full species names. Note that dates for which recordings failed or did not contain bats are not listed. See *Table 2* for confidence level codes.

	C. gouldii	*O. kitcheneri*	*O. petersi*	*Nyctophilus* sp.	*S. balstoni*	*V. baverstocki*	*V. finlaysoni*
SM2BAT 7544							
12/03/2020	◆	◆	—	NC	◆	—	◆
15/03/2020	—	◆	—	NC	◆	—	—
SM2BAT 7548							
12/03/2020	◆	◆	—	NC	—	—	—
13/03/2020	◆	◆	—	—	◆	—	—
14/03/2020	◆	—	—	NC	◆	—	◆
15/03/2020	—	—	—	—	◆	—	◆
SM2BAT 7586							
13/03/2020	◆	◆	—	—	◆	—	—
15/03/2020	◆	◆	—	NC	—	—	—
SM2BAT 10856							
16/03/2020	—	—	NC	NC	—	—	—
SM2BAT 10883							
12/03/2020	◆	◆	—	—	◆	—	—
13/03/2020	◆	◆	—	NC	◆	—	—
14/03/2020	—	—	—	—	◆	—	—

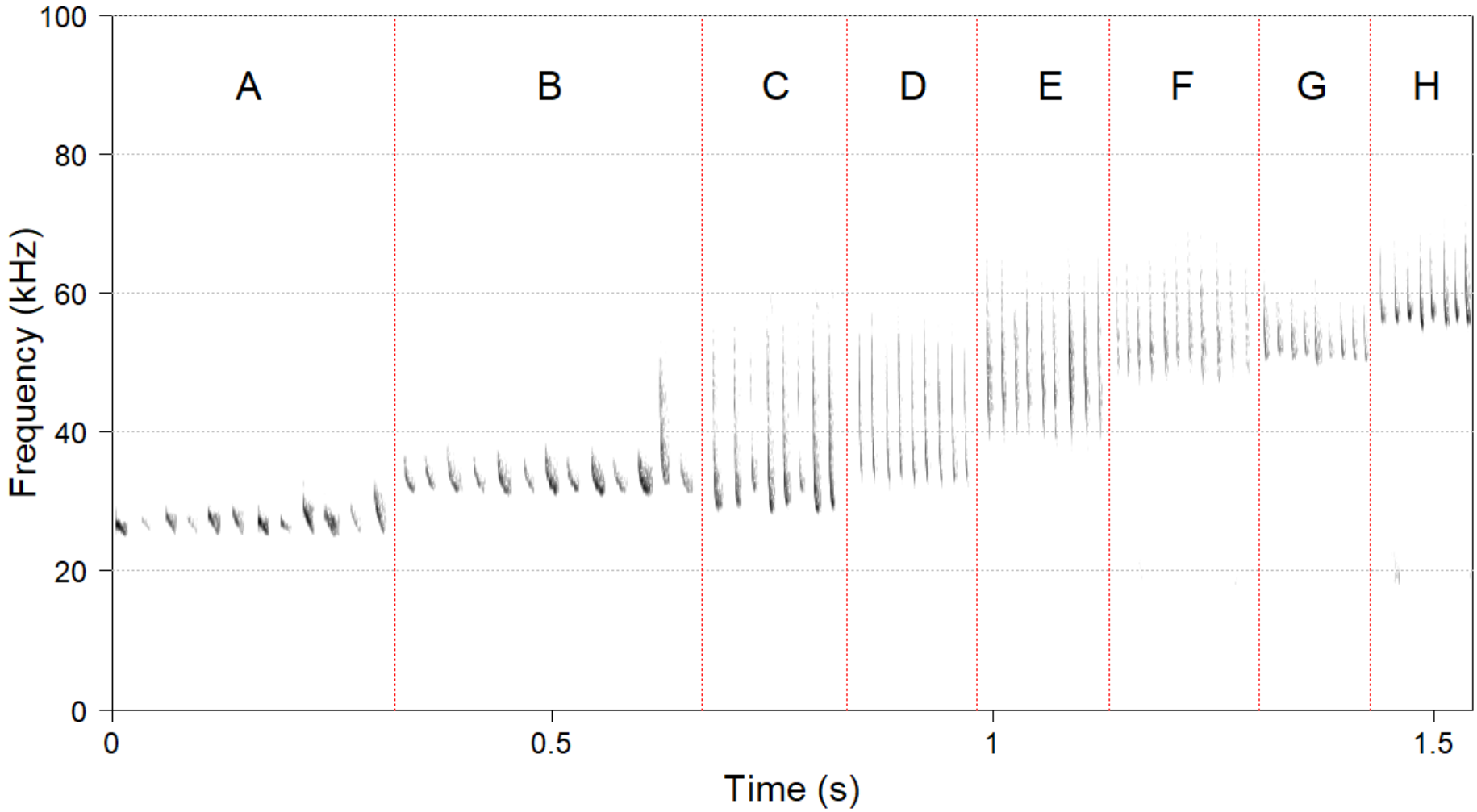


Figure 1. Representative echolocation call sequence portions of the species identified (**A**: *Ozimops kitcheneri*; **B**: *Ozimops petersi?*; **C**: *Chalinolobus gouldii*; **D**: *Scotorepens balstoni*; **E**: *Nyctophilus* sp. (40 kHz example); **F**: *Nyctophilus* sp. (45 kHz example); **G**: *Vespadelus baverstocki* ; **H**: *Vespadelus finlaysoni*; time between pulses has been compressed).

Appendix S.
Rapid habitat assessment locations

Level 2 Vertebrate Fauna Assessment
King of the Hills Project

Date: 22/11/2019	Habitat Assessment #: 1	Observer: ST & JMS
Zone: 51J	Easting: 316698 mE	Northing: 6837900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 2	Observer: ST & JMS
Zone: 51J	Easting: 317198 mE	Northing: 6837900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 3	Observer: ST & JMS
Zone: 51J	Easting: 315198 mE	Northing: 6837400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 4	Observer: ST & JMS
Zone: 51J	Easting: 315698 mE	Northing: 6837400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 5	Observer: ST & JMS
Zone: 51J	Easting: 316198 mE	Northing: 6837400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 6	Observer: ST & JMS
Zone: 51J	Easting: 316698 mE	Northing: 6837400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 7	Observer: ST & JMS
Zone: 51J	Easting: 317198 mE	Northing: 6837400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 8	Observer: ST & JMS
Zone: 51J	Easting: 315198 mE	Northing: 6836900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 9	Observer: ST & JMS
Zone: 51J	Easting: 315698 mE	Northing: 6836900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 10	Observer: ST & JMS
Zone: 51J	Easting: 316198 mE	Northing: 6836900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 11	Observer: ST & JMS
Zone: 51J	Easting: 316698 mE	Northing: 6836900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 12	Observer: ST & JMS
Zone: 51J	Easting: 317198 mE	Northing: 6836900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 13 Observer: ST & JMS

Zone: 51J Easting: 315198 mE Northing: 6836400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 14	Observer: ST & JMS
Zone: 51J	Easting: 315698 mE	Northing: 6836400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 15	Observer: ST & JMS
Zone: 51J	Easting: 316198 mE	Northing: 6836400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 16	Observer: ST & JMS
Zone: 51J	Easting: 316698 mE	Northing: 6836400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 17	Observer: ST & JMS
Zone: 51J	Easting: 317198 mE	Northing: 6836400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 18	Observer: ST & JMS
Zone: 51J	Easting: 315198 mE	Northing: 6835900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 19	Observer: ST & JMS
Zone: 51J	Easting: 315698 mE	Northing: 6835900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 20	Observer: ST & JMS
Zone: 51J	Easting: 316198 mE	Northing: 6835900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 21	Observer: ST & JMS
Zone: 51J	Easting: 316698 mE	Northing: 6835900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 22	Observer: ST & JMS
Zone: 51J	Easting: 317198 mE	Northing: 6835900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 23	Observer: ST & JMS
Zone: 51J	Easting: 315198 mE	Northing: 6835400 mN
Fire History: >5 years	Landform: Rocky rise	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 24 Observer: ST & JMS

Zone: 51J Easting: 315698 mE Northing: 6835400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 25	Observer: ST & JMS
Zone: 51J	Easting: 316198 mE	Northing: 6835400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 26 Observer: ST & JMS

Zone: 51J Easting: 316698 mE Northing: 6835400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 27	Observer: ST & JMS
Zone: 51J	Easting: 317200 mE	Northing: 6835400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 28 Observer: ST & JMS

Zone: 51J Easting: 315198 mE Northing: 6834900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 29	Observer: ST & JMS
Zone: 51J	Easting: 315698 mE	Northing: 6834900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 30	Observer: ST & JMS
Zone: 51J	Easting: 316198 mE	Northing: 6834900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 31 Observer: ST & JMS

Zone: 51J Easting: 316698 mE Northing: 6834900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 32 Observer: ST & JMS

Zone: 51J Easting: 317200 mE Northing: 6834900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 33	Observer: ST & JMS
Zone: 51J	Easting: 317700 mE	Northing: 6834900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020 Habitat Assessment #: 34 Observer: RT & GF

Zone: 51J Easting: 318200 mE Northing: 6834900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 35	Observer: RT & GF
Zone: 51J	Easting: 318700 mE	Northing: 6834900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 36	Observer: RT & GF
Zone: 51J	Easting: 319200 mE	Northing: 6834900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 37	Observer: ST & JMS
Zone: 51J	Easting: 315200 mE	Northing: 6834400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 38	Observer: ST & JMS
Zone: 51J	Easting: 315698 mE	Northing: 6834400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 39	Observer: ST & JMS
Zone: 51J	Easting: 316198 mE	Northing: 6834400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 40 Observer: ST & JMS

Zone: 51J Easting: 316698 mE Northing: 6834400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 41	Observer: ST & JMS
Zone: 51J	Easting: 317200 mE	Northing: 6834400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

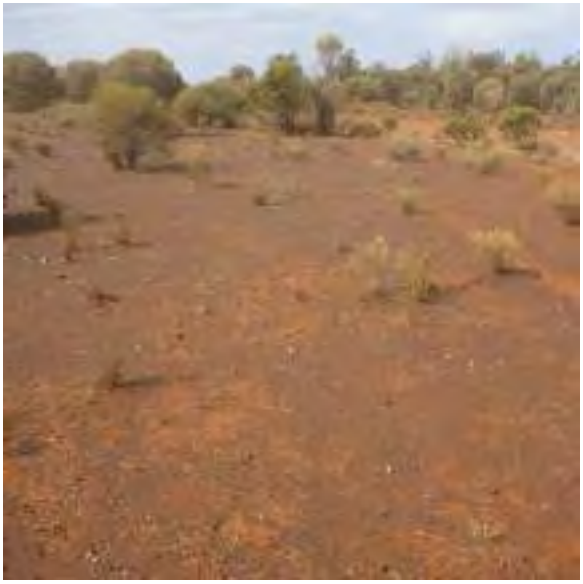
Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 42	Observer: ST & JMS
Zone: 51J	Easting: 317700 mE	Northing: 6834400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles



TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 43	Observer: RT & GF
Zone: 51J	Easting: 318200 mE	Northing: 6834400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 44	Observer: RT & GF
Zone: 51J	Easting: 318700 mE	Northing: 6834400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 45	Observer: RT & GF
Zone: 51J	Easting: 319198 mE	Northing: 6834400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020 Habitat Assessment #: 46 Observer: RT & GF

Zone: 51J Easting: 319698 mE Northing: 6834400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 47	Observer: RT & GF
Zone: 51J	Easting: 320198 mE	Northing: 6834400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 48	Observer: ST & CS
Zone: 51J	Easting: 320700 mE	Northing: 6834400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 49 Observer: ST & CS

Zone: 51J Easting: 321200 mE Northing: 6834400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 50	Observer: RT & JMS
Zone: 51J	Easting: 311700 mE	Northing: 6833900 mN
Fire History: >5 years	Landform: Flat//Undulatng	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Stones

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 51	Observer: RT & JMS
Zone: 51J	Easting: 312198 mE	Northing: 6833900 mN
Fire History: >5 years	Landform: Rocky rise	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 52 Observer: RT & JMS

Zone: 51J Easting: 312698 mE Northing: 6833900 mN

Fire History: >5 years Landform: Flat//Undulatng Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 53	Observer: RT & JMS
Zone: 51J	Easting: 313198 mE	Northing: 6833900 mN
Fire History: >5 years	Landform: Flat//Undulatng	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 54	Observer: RT & JMS
Zone: 51J	Easting: 313698 mE	Northing: 6833900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 55 Observer: RT & JMS

Zone: 51J Easting: 314200 mE Northing: 6833900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 56 Observer: ST & JMS

Zone: 51J Easting: 316198 mE Northing: 6833900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 57	Observer: ST & JMS
Zone: 51J	Easting: 316698 mE	Northing: 6833900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 58 Observer: ST & JMS

Zone: 51J Easting: 317200 mE Northing: 6833900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 59	Observer: ST & JMS
Zone: 51J	Easting: 317700 mE	Northing: 6833900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 60	Observer: RT & GF
Zone: 51J	Easting: 318200 mE	Northing: 6833900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 61	Observer: RT & GF
Zone: 51J	Easting: 318699 mE	Northing: 6833900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 62	Observer: RT & GF
Zone: 51J	Easting: 319198 mE	Northing: 6833900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 63	Observer: RT & GF
Zone: 51J	Easting: 319698 mE	Northing: 6833900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020 Habitat Assessment #: 64 Observer: RT & GF

Zone: 51J Easting: 320200 mE Northing: 6833900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 65	Observer: ST & CS
Zone: 51J	Easting: 320700 mE	Northing: 6833900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 66 Observer: ST & CS

Zone: 51J Easting: 321200 mE Northing: 6833900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 67	Observer: RT & JMS
Zone: 51J	Easting: 311700 mE	Northing: 6833400 mN
Fire History: >5 years	Landform: Flat//Undulatng	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 68 Observer: RT & JMS

Zone: 51J Easting: 312200 mE Northing: 6833400 mN

Fire History: >5 years Landform: Flat/Gentle Slope Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 69	Observer: RT & JMS
Zone: 51J	Easting: 312700 mE	Northing: 6833400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 70	Observer: RT & JMS
Zone: 51J	Easting: 313198 mE	Northing: 6833400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 71	Observer: RT & JMS
Zone: 51J	Easting: 313698 mE	Northing: 6833400 mN
Fire History: >5 years	Landform: Flat//Undulatng	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 72	Observer: RT & JMS
Zone: 51J	Easting: 314198 mE	Northing: 6833400 mN
Fire History: >5 years	Landform: Rocky rise	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 73	Observer: ST & JMS
Zone: 51J	Easting: 316198 mE	Northing: 6833400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 74 Observer: ST & JMS

Zone: 51J Easting: 316698 mE Northing: 6833400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 75 Observer: ST & JMS

Zone: 51J Easting: 317200 mE Northing: 6833400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 76	Observer: ST & JMS
Zone: 51J	Easting: 317700 mE	Northing: 6833400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 77	Observer: RT & GF
Zone: 51J	Easting: 318200 mE	Northing: 6833400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 78	Observer: RT & GF
Zone: 51J	Easting: 318698 mE	Northing: 6833400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 79	Observer: RT & GF
Zone: 51J	Easting: 319198 mE	Northing: 6833400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 80	Observer: RT & GF
Zone: 51J	Easting: 319698 mE	Northing: 6833400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 81	Observer: RT & GF
Zone: 51J	Easting: 320200 mE	Northing: 6833400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 82	Observer: ST & CS
Zone: 51J	Easting: 320700 mE	Northing: 6833400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 83	Observer: ST & CS
Zone: 51J	Easting: 321198 mE	Northing: 6833400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 | Habitat Assessment #: 84 | Observer: ST & JMS

Zone: 51J | Easting: 313200 mE | Northing: 6832900 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 85 Observer: ST & JMS

Zone: 51J Easting: 313698 mE Northing: 6832900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 86 Observer: ST & JMS

Zone: 51J Easting: 314198 mE Northing: 6832900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 87	Observer: ST & JMS
Zone: 51J	Easting: 316198 mE	Northing: 6832900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 88	Observer: ST & JMS
Zone: 51J	Easting: 316698 mE	Northing: 6832900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 89 Observer: ST & RT

Zone: 51J Easting: 317200 mE Northing: 6832900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 90	Observer: ST & CS
Zone: 51J	Easting: 317700 mE	Northing: 6832900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 91	Observer: RT & GF
Zone: 51J	Easting: 318200 mE	Northing: 6832900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 92	Observer: RT & GF
Zone: 51J	Easting: 318698 mE	Northing: 6832900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 93	Observer: RT & GF
Zone: 51J	Easting: 319198 mE	Northing: 6832900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 94	Observer: RT & GF
Zone: 51J	Easting: 319700 mE	Northing: 6832900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 95	Observer: RT & GF
Zone: 51J	Easting: 320200 mE	Northing: 6832900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 96	Observer: ST & CS
Zone: 51J	Easting: 320699 mE	Northing: 6832900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 97 Observer: ST & CS

Zone: 51J Easting: 321198 mE Northing: 6832900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 98 Observer: ST & JMS

Zone: 51J Easting: 313200 mE Northing: 6832400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 99	Observer: ST & JMS
Zone: 51J	Easting: 313698 mE	Northing: 6832400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 100	Observer: ST & JMS
Zone: 51J	Easting: 314198 mE	Northing: 6832400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 101	Observer: ST & JMS
Zone: 51J	Easting: 316198 mE	Northing: 6832400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 102	Observer: ST & JMS
Zone: 51J	Easting: 316698 mE	Northing: 6832400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 103 Observer: ST & RT

Zone: 51J Easting: 317200 mE Northing: 6832400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 104 Observer: ST & CS

Zone: 51J Easting: 317700 mE Northing: 6832400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 105	Observer: RT & GF
Zone: 51J	Easting: 318198 mE	Northing: 6832400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 106	Observer: RT & GF
Zone: 51J	Easting: 318698 mE	Northing: 6832400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 107	Observer: RT & GF
Zone: 51J	Easting: 319198 mE	Northing: 6832400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 108	Observer: RT & GF
Zone: 51J	Easting: 319700 mE	Northing: 6832400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020 Habitat Assessment #: 109 Observer: RT & GF

Zone: 51J Easting: 320200 mE Northing: 6832400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 110 Observer: ST & CS

Zone: 51J Easting: 320698 mE Northing: 6832400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 111 Observer: ST & CS

Zone: 51J Easting: 321198 mE Northing: 6832400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 112	Observer: RT & JMS
Zone: 51J	Easting: 309698 mE	Northing: 6831900 mN
Fire History: >5 years	Landform: Rocky rise	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 113	Observer: ST & JMS
Zone: 51J	Easting: 313200 mE	Northing: 6831900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 114	Observer: ST & JMS
Zone: 51J	Easting: 313700 mE	Northing: 6831900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 115 Observer: ST & JMS

Zone: 51J Easting: 314198 mE Northing: 6831900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 | Habitat Assessment #: 116 | Observer: ST & JMS

Zone: 51J | Easting: 316198 mE | Northing: 6831900 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

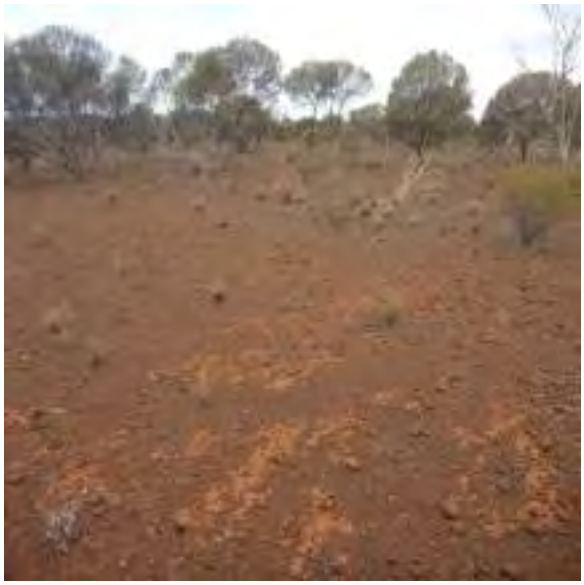
Date: 22/11/2019 Habitat Assessment #: 117 Observer: ST & JMS

Zone: 51J Easting: 316698 mE Northing: 6831900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles



TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 | Habitat Assessment #: 118 | Observer: ST & RT

Zone: 51J | Easting: 317200 mE | Northing: 6831900 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Highly disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 119 Observer: ST & CS

Zone: 51J Easting: 317700 mE Northing: 6831900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 120	Observer: RT & GF
Zone: 51J	Easting: 318198 mE	Northing: 6831900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 121	Observer: RT & GF
Zone: 51J	Easting: 318698 mE	Northing: 6831900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 122	Observer: RT & GF
Zone: 51J	Easting: 319200 mE	Northing: 6831900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 123	Observer: RT & GF
Zone: 51J	Easting: 319700 mE	Northing: 6831900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 124	Observer: RT & GF
Zone: 51J	Easting: 320198 mE	Northing: 6831900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 125 Observer: ST & CS

Zone: 51J Easting: 320698 mE Northing: 6831900 mN

Fire History: >5 years Landform: Rocky rise Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Stones

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 126 Observer: ST & CS

Zone: 51J Easting: 321200 mE Northing: 6831900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Stones

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 127	Observer: RT & JMS
Zone: 51J	Easting: 309700 mE	Northing: 6831400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 128 Observer: ST & JMS

Zone: 51J Easting: 313198 mE Northing: 6831400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 129 Observer: ST & JMS

Zone: 51J Easting: 313700 mE Northing: 6831400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 130 Observer: ST & JMS

Zone: 51J Easting: 314200 mE Northing: 6831400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 131	Observer: ST & JMS
Zone: 51J	Easting: 316198 mE	Northing: 6831400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 | Habitat Assessment #: 132 | Observer: ST & JMS

Zone: 51J | Easting: 316698 mE | Northing: 6831400 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay | Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 133	Observer: ST & RT
Zone: 51J	Easting: 317200 mE	Northing: 6831400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 134	Observer: ST & CS
Zone: 51J	Easting: 317700 mE	Northing: 6831400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 135	Observer: RT & GF
Zone: 51J	Easting: 318198 mE	Northing: 6831400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 136	Observer: RT & GF
Zone: 51J	Easting: 318698 mE	Northing: 6831400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 137	Observer: RT & GF
Zone: 51J	Easting: 319200 mE	Northing: 6831400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 138	Observer: RT & GF
Zone: 51J	Easting: 319700 mE	Northing: 6831400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 139	Observer: RT & GF
Zone: 51J	Easting: 320198 mE	Northing: 6831400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 140 Observer: ST & CS

Zone: 51J Easting: 320700 mE Northing: 6831400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 141 Observer: ST & CS

Zone: 51J Easting: 321200 mE Northing: 6831400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 142	Observer: RT & JMS
Zone: 51J	Easting: 309698 mE	Northing: 6830900 mN
Fire History: >5 years	Landform: Flat//Undulatng	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 143	Observer: RT & JMS
Zone: 51J	Easting: 310200 mE	Northing: 6830900 mN
Fire History: >5 years	Landform: Flat//Undulatng	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 144 Observer: RT & JMS

Zone: 51J Easting: 310700 mE Northing: 6830900 mN

Fire History: >5 years Landform: Rocky rise Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 145	Observer: RT & JMS
Zone: 51J	Easting: 313198 mE	Northing: 6830900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 146 Observer: RT & JMS

Zone: 51J Easting: 313700 mE Northing: 6830900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 147 Observer: RT & JMS

Zone: 51J Easting: 314200 mE Northing: 6830900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 148 Observer: ST & JMS

Zone: 51J Easting: 314698 mE Northing: 6830900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 149 Observer: ST & JMS

Zone: 51J Easting: 315198 mE Northing: 6830900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 150	Observer: ST & JMS
Zone: 51J	Easting: 315700 mE	Northing: 6830900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 151	Observer: ST & JMS
Zone: 51J	Easting: 316200 mE	Northing: 6830900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 152	Observer: ST & JMS
Zone: 51J	Easting: 316698 mE	Northing: 6830900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 153	Observer: ST & RT
Zone: 51J	Easting: 317200 mE	Northing: 6830900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 154	Observer: ST & CS
Zone: 51J	Easting: 317700 mE	Northing: 6830900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 155	Observer: RT & GF
Zone: 51J	Easting: 318198 mE	Northing: 6830900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 156	Observer: RT & GF
Zone: 51J	Easting: 318698 mE	Northing: 6830900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 157	Observer: RT & GF
Zone: 51J	Easting: 319200 mE	Northing: 6830900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 158	Observer: RT & GF
Zone: 51J	Easting: 319698 mE	Northing: 6830900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 159	Observer: RT & GF
Zone: 51J	Easting: 320198 mE	Northing: 6830900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 160 Observer: ST & CS

Zone: 51J Easting: 320700 mE Northing: 6830900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 161	Observer: ST & CS
Zone: 51J	Easting: 321200 mE	Northing: 6830900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 162 Observer: RT & JMS

Zone: 51J Easting: 309700 mE Northing: 6830430 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 163	Observer: RT & JMS
Zone: 51J	Easting: 310200 mE	Northing: 6830430 mN
Fire History: >5 years	Landform: Flat//Undulatng	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 164 Observer: RT & JMS

Zone: 51J Easting: 310698 mE Northing: 6830430 mN

Fire History: >5 years Landform: Rocky rise Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 165 Observer: RT & JMS

Zone: 51J Easting: 314200 mE Northing: 6830400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 166	Observer: RT & JMS
Zone: 51J	Easting: 314699 mE	Northing: 6830400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 167	Observer: RT & JMS
Zone: 51J	Easting: 315198 mE	Northing: 6830400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 168 Observer: RT & JMS

Zone: 51J Easting: 315700 mE Northing: 6830400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 169 Observer: RT & JMS

Zone: 51J Easting: 316200 mE Northing: 6830400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 170	Observer: ST & JMS
Zone: 51J	Easting: 316698 mE	Northing: 6830400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 | Habitat Assessment #: 171 | Observer: ST & RT

Zone: 51J | Easting: 317200 mE | Northing: 6830400 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 172	Observer: ST & CS
Zone: 51J	Easting: 317700 mE	Northing: 6830400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 173	Observer: RT & GF
Zone: 51J	Easting: 318198 mE	Northing: 6830400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 174	Observer: RT & GF
Zone: 51J	Easting: 318700 mE	Northing: 6830400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 175	Observer: RT & GF
Zone: 51J	Easting: 319200 mE	Northing: 6830400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 176	Observer: RT & GF
Zone: 51J	Easting: 319698 mE	Northing: 6830400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 177	Observer: RT & GF
Zone: 51J	Easting: 320198 mE	Northing: 6830400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 178 Observer: ST & CS

Zone: 51J Easting: 320700 mE Northing: 6830400 mN

Fire History: >5 years Landform: Flat//Undulatng Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 179 Observer: ST & CS

Zone: 51J Easting: 321198 mE Northing: 6830400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 180 Observer: ST & CS

Zone: 51J Easting: 321698 mE Northing: 6830400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 181 Observer: RT & JMS

Zone: 51J Easting: 314200 mE Northing: 6829900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 182	Observer: RT & JMS
Zone: 51J	Easting: 314700 mE	Northing: 6829900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 183 Observer: RT & JMS

Zone: 51J Easting: 315198 mE Northing: 6829900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 184	Observer: RT & JMS
Zone: 51J	Easting: 315700 mE	Northing: 6829900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 185	Observer: RT & JMS
Zone: 51J	Easting: 316200 mE	Northing: 6829900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 186	Observer: ST & JMS
Zone: 51J	Easting: 316698 mE	Northing: 6829900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 187 Observer: ST & RT

Zone: 51J Easting: 317200 mE Northing: 6829900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 188	Observer: ST & CS
Zone: 51J	Easting: 317700 mE	Northing: 6829900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 189	Observer: RT & GF
Zone: 51J	Easting: 318198 mE	Northing: 6829900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 190	Observer: RT & GF
Zone: 51J	Easting: 318700 mE	Northing: 6829900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 191	Observer: RT & GF
Zone: 51J	Easting: 319200 mE	Northing: 6829900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020	Habitat Assessment #: 192	Observer: RT & GF
Zone: 51J	Easting: 319698 mE	Northing: 6829900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 13/03/2020 Habitat Assessment #: 193 Observer: RT & GF

Zone: 51J Easting: 320200 mE Northing: 6829900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 194	Observer: ST & CS
Zone: 51J	Easting: 320700 mE	Northing: 6829900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 195	Observer: ST & CS
Zone: 51J	Easting: 321198 mE	Northing: 6829900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 196	Observer: ST & CS
Zone: 51J	Easting: 321700 mE	Northing: 6829900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Stones

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 197 Observer: ST & CS

Zone: 51J Easting: 322199 mE Northing: 6829900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 198	Observer: ST & CS
Zone: 51J	Easting: 323698 mE	Northing: 6829900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Stones

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 199 Observer: ST & CS

Zone: 51J Easting: 324198 mE Northing: 6829900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 200	Observer: RT & JMS
Zone: 51J	Easting: 314198 mE	Northing: 6829400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 201	Observer: RT & JMS
Zone: 51J	Easting: 314700 mE	Northing: 6829400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 202 Observer: RT & JMS

Zone: 51J Easting: 315198 mE Northing: 6829400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Highly disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 203	Observer: RT & JMS
Zone: 51J	Easting: 315698 mE	Northing: 6829400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 204	Observer: RT & JMS
Zone: 51J	Easting: 316200 mE	Northing: 6829400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 Habitat Assessment #: 205 Observer: ST & JMS

Zone: 51J Easting: 316698 mE Northing: 6829400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 206	Observer: ST & RT
Zone: 51J	Easting: 317200 mE	Northing: 6829400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 207	Observer: ST & CS
Zone: 51J	Easting: 317700 mE	Northing: 6829400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 208	Observer: ST & CS
Zone: 51J	Easting: 318198 mE	Northing: 6829400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 209	Observer: ST & CS
Zone: 51J	Easting: 318700 mE	Northing: 6829400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 210	Observer: ST & CS
Zone: 51J	Easting: 319199 mE	Northing: 6829400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 211	Observer: ST & CS
Zone: 51J	Easting: 319698 mE	Northing: 6829400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 212	Observer: ST & CS
Zone: 51J	Easting: 320200 mE	Northing: 6829400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 213	Observer: ST & CS
Zone: 51J	Easting: 320698 mE	Northing: 6829400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 214 Observer: ST & CS

Zone: 51J Easting: 321198 mE Northing: 6829400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 215 Observer: ST & CS

Zone: 51J Easting: 321700 mE Northing: 6829400 mN

Fire History: >5 years Landform: Rocky rise Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Stones

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 216	Observer: ST & CS
Zone: 51J	Easting: 322198 mE	Northing: 6829400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 217 Observer: ST & CS

Zone: 51J Easting: 322700 mE Northing: 6829400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 218	Observer: ST & CS
Zone: 51J	Easting: 323200 mE	Northing: 6829400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 219	Observer: ST & CS
Zone: 51J	Easting: 323698 mE	Northing: 6829400 mN
Fire History: >5 years	Landform: Rocky rise	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Stones

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 220	Observer: ST & CS
Zone: 51J	Easting: 324200 mE	Northing: 6829400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 221	Observer: RT & JMS
Zone: 51J	Easting: 313200 mE	Northing: 6828900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 222	Observer: RT & JMS
Zone: 51J	Easting: 314198 mE	Northing: 6828900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 223	Observer: RT & JMS
Zone: 51J	Easting: 314700 mE	Northing: 6828900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 224	Observer: RT & JMS
Zone: 51J	Easting: 315198 mE	Northing: 6828900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 225 Observer: RT & JMS

Zone: 51J Easting: 315698 mE Northing: 6828900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 226 Observer: RT & JMS

Zone: 51J Easting: 316200 mE Northing: 6828900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 227	Observer: ST & JMS
Zone: 51J	Easting: 316698 mE	Northing: 6828900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 228 Observer: ST & RT

Zone: 51J Easting: 317200 mE Northing: 6828900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 229	Observer: ST & RT
Zone: 51J	Easting: 317700 mE	Northing: 6828900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 230	Observer: ST & CS
Zone: 51J	Easting: 318198 mE	Northing: 6828900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 231	Observer: ST & CS
Zone: 51J	Easting: 318700 mE	Northing: 6828900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 232	Observer: ST & CS
Zone: 51J	Easting: 319198 mE	Northing: 6828900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 233	Observer: ST & CS
Zone: 51J	Easting: 319698 mE	Northing: 6828900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 234	Observer: ST & CS
Zone: 51J	Easting: 320200 mE	Northing: 6828900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Stones

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 235 Observer: ST & CS

Zone: 51J Easting: 320698 mE Northing: 6828900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 236	Observer: ST & CS
Zone: 51J	Easting: 321200 mE	Northing: 6828900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Stones

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 237	Observer: ST & CS
Zone: 51J	Easting: 321698 mE	Northing: 6828900 mN
Fire History: >5 years	Landform: Rocky rise	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Stones

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 238 Observer: ST & CS

Zone: 51J Easting: 322198 mE Northing: 6828900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Stones

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 239	Observer: ST & CS
Zone: 51J	Easting: 322700 mE	Northing: 6828900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 240	Observer: ST & CS
Zone: 51J	Easting: 323198 mE	Northing: 6828900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 241 Observer: ST & CS

Zone: 51J Easting: 323700 mE Northing: 6828900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 242 Observer: ST & CS

Zone: 51J Easting: 324198 mE Northing: 6828900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Stones

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 243	Observer: ST & CS
Zone: 51J	Easting: 324698 mE	Northing: 6828900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 244 Observer: RT & JMS

Zone: 51J Easting: 313198 mE Northing: 6828400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 245	Observer: RT & JMS
Zone: 51J	Easting: 313650 mE	Northing: 6828400 mN
Fire History: >5 years	Landform: Flat//Undulatng	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 246	Observer: RT & JMS
Zone: 51J	Easting: 314700 mE	Northing: 6828400 mN
Fire History: >5 years	Landform: Flat/Gentle Slope	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 247 Observer: RT & JMS

Zone: 51J Easting: 315200 mE Northing: 6828400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019 Habitat Assessment #: 248 Observer: RT & JMS

Zone: 51J Easting: 315698 mE Northing: 6828400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 249	Observer: RT & JMS
Zone: 51J	Easting: 316200 mE	Northing: 6828400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 250	Observer: ST & JMS
Zone: 51J	Easting: 316698 mE	Northing: 6828400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019	Habitat Assessment #: 251	Observer: ST & JMS
Zone: 51J	Easting: 317200 mE	Northing: 6828400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 252 Observer: ST & RT

Zone: 51J Easting: 317700 mE Northing: 6828400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 253	Observer: ST & CS
Zone: 51J	Easting: 318198 mE	Northing: 6828400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 254	Observer: ST & CS
Zone: 51J	Easting: 318700 mE	Northing: 6828400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 255	Observer: ST & CS
Zone: 51J	Easting: 319198 mE	Northing: 6828400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 256 Observer: ST & CS

Zone: 51J Easting: 319700 mE Northing: 6828400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 257 Observer: ST & CS

Zone: 51J Easting: 320200 mE Northing: 6828400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 258	Observer: ST & CS
Zone: 51J	Easting: 322698 mE	Northing: 6828400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 259	Observer: ST & CS
Zone: 51J	Easting: 323198 mE	Northing: 6828400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 260 Observer: ST & CS

Zone: 51J Easting: 323700 mE Northing: 6828400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 261 Observer: ST & CS

Zone: 51J Easting: 324198 mE Northing: 6828400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Stones

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 262 Observer: ST & CS

Zone: 51J Easting: 324700 mE Northing: 6828400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Stones

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 263	Observer: RT & JMS
Zone: 51J	Easting: 313198 mE	Northing: 6827900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 264	Observer: RT & JMS
Zone: 51J	Easting: 313700 mE	Northing: 6827900 mN
Fire History: >5 years	Landform: Rocky rise	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 265 Observer: ST & RT

Zone: 51J Easting: 314698 mE Northing: 6827900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 266	Observer: ST & RT
Zone: 51J	Easting: 315200 mE	Northing: 6827900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 267	Observer: ST & RT
Zone: 51J	Easting: 315698 mE	Northing: 6827900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 268 Observer: ST & RT

Zone: 51J Easting: 316200 mE Northing: 6827900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 269 Observer: ST & RT

Zone: 51J Easting: 316698 mE Northing: 6827900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 270 Observer: ST & RT

Zone: 51J Easting: 317200 mE Northing: 6827900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 271 Observer: ST & RT

Zone: 51J Easting: 317700 mE Northing: 6827900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 272 Observer: ST & CS

Zone: 51J Easting: 318198 mE Northing: 6827900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020	Habitat Assessment #: 273	Observer: ST & CS
Zone: 51J	Easting: 318700 mE	Northing: 6827900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 12/03/2020 Habitat Assessment #: 274 Observer: ST & CS

Zone: 51J Easting: 319198 mE Northing: 6827900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 275 Observer: ST & GF

Zone: 51J Easting: 323200 mE Northing: 6827900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 276 Observer: ST & GF

Zone: 51J Easting: 323698 mE Northing: 6827900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Very good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 277	Observer: ST & GF
Zone: 51J	Easting: 324200 mE	Northing: 6827900 mN
Fire History: >5 years	Landform: Flat/Gentle Slope	Habitat Quality: Very good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 278 Observer: ST & GF

Zone: 51J Easting: 324698 mE Northing: 6827900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 279 Observer: ST & GF

Zone: 51J Easting: 325200 mE Northing: 6827900 mN

Fire History: >5 years Landform: Rocky rise Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 280	Observer: RT & JMS
Zone: 51J	Easting: 313199 mE	Northing: 6827400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 20/11/2019	Habitat Assessment #: 281	Observer: RT & JMS
Zone: 51J	Easting: 313698 mE	Northing: 6827400 mN
Fire History: >5 years	Landform: Rocky rise	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Stones

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 282 Observer: ST & RT

Zone: 51J Easting: 315200 mE Northing: 6827400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 283	Observer: ST & RT
Zone: 51J	Easting: 315698 mE	Northing: 6827400 mN
Fire History: >5 years	Landform: Flat//Undulatng	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 | Habitat Assessment #: 284 | Observer: ST & RT

Zone: 51J | Easting: 316200 mE | Northing: 6827400 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Highly disturbed

Habitat Structure: Disturbed habitat

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 285	Observer: ST & RT
Zone: 51J	Easting: 316698 mE	Northing: 6827400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 286 Observer: ST & RT

Zone: 51J Easting: 317200 mE Northing: 6827400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 287	Observer: ST & RT
Zone: 51J	Easting: 317700 mE	Northing: 6827400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 288	Observer: ST & RT
Zone: 51J	Easting: 318198 mE	Northing: 6827400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 289 Observer: ST & GF

Zone: 51J Easting: 323698 mE Northing: 6827400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 290	Observer: ST & GF
Zone: 51J	Easting: 324200 mE	Northing: 6827400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 291 Observer: ST & GF

Zone: 51J Easting: 324698 mE Northing: 6827400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 292	Observer: ST & GF
Zone: 51J	Easting: 325200 mE	Northing: 6827400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 293	Observer: ST & RT
Zone: 51J	Easting: 315200 mE	Northing: 6826900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 294	Observer: ST & RT
Zone: 51J	Easting: 315698 mE	Northing: 6826900 mN
Fire History: >5 years	Landform: Flat//Undulatng	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 295 Observer: ST & RT

Zone: 51J Easting: 316200 mE Northing: 6826900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 296 Observer: ST & RT

Zone: 51J Easting: 316699 mE Northing: 6826900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 297 Observer: ST & RT

Zone: 51J Easting: 317199 mE Northing: 6826900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 298 Observer: ST & RT

Zone: 51J Easting: 317700 mE Northing: 6826900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Highly disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 299 Observer: ST & RT

Zone: 51J Easting: 318198 mE Northing: 6826900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Rock Soil surface: Rock

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 300	Observer: ST & RT
Zone: 51J	Easting: 318700 mE	Northing: 6826900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 301	Observer: ST & GF
Zone: 51J	Easting: 323198 mE	Northing: 6826900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Very good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 302	Observer: ST & GF
Zone: 51J	Easting: 323700 mE	Northing: 6826900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Disturbed

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 303	Observer: ST & GF
Zone: 51J	Easting: 324198 mE	Northing: 6826900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 304 Observer: ST & GF

Zone: 51J Easting: 324700 mE Northing: 6826900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 305 Observer: ST & GF

Zone: 51J Easting: 325198 mE Northing: 6826900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 306	Observer: ST & GF
Zone: 51J	Easting: 325700 mE	Northing: 6826900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 307	Observer: ST & RT
Zone: 51J	Easting: 315200 mE	Northing: 6826400 mN
Fire History: >5 years	Landform: Flat//Undulatng	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 308 Observer: ST & RT

Zone: 51J Easting: 315699 mE Northing: 6826400 mN

Fire History: >5 years Landform: Flat//Undulatng Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 309	Observer: ST & RT
Zone: 51J	Easting: 316200 mE	Northing: 6826400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 310	Observer: ST & RT
Zone: 51J	Easting: 316699 mE	Northing: 6826400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 311	Observer: ST & RT
Zone: 51J	Easting: 317198 mE	Northing: 6826400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 312	Observer: ST & RT
Zone: 51J	Easting: 317700 mE	Northing: 6826400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 313 Observer: ST & RT

Zone: 51J Easting: 318198 mE Northing: 6826400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 314 Observer: ST & RT

Zone: 51J Easting: 318700 mE Northing: 6826400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Disturbed

Habitat Structure: Disturbed habitat

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 315	Observer: ST & GF
Zone: 51J	Easting: 323198 mE	Northing: 6826400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 316	Observer: ST & GF
Zone: 51J	Easting: 323699 mE	Northing: 6826400 mN
Fire History: >5 years	Landform: Flat//Undulatng	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 317	Observer: ST & GF
Zone: 51J	Easting: 324200 mE	Northing: 6826400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 318	Observer: ST & GF
Zone: 51J	Easting: 324699 mE	Northing: 6826400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

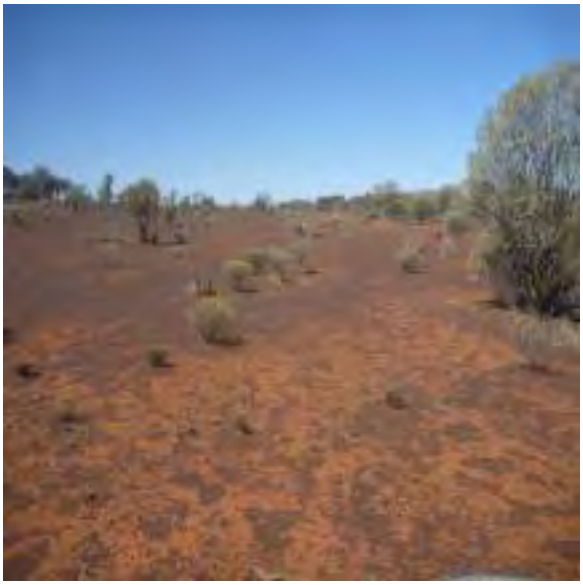
Date: 21/11/2019 Habitat Assessment #: 319 Observer: ST & GF

Zone: 51J Easting: 325200 mE Northing: 6826400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles



TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 320 Observer: ST & RT

Zone: 51J Easting: 315198 mE Northing: 6825950 mN

Fire History: >5 years Landform: Flat//Undulatng Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 321	Observer: ST & RT
Zone: 51J	Easting: 317198 mE	Northing: 6825900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 322	Observer: ST & RT
Zone: 51J	Easting: 317700 mE	Northing: 6825900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 323 Observer: ST & RT

Zone: 51J Easting: 318198 mE Northing: 6825900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 324	Observer: ST & RT
Zone: 51J	Easting: 318699 mE	Northing: 6825900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 325	Observer: ST & JMS
Zone: 51J	Easting: 320698 mE	Northing: 6825900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 | Habitat Assessment #: 326 | Observer: ST & JMS

Zone: 51J | Easting: 321200 mE | Northing: 6825900 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Highly disturbed

Habitat Structure: Disturbed habitat

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 | Habitat Assessment #: 327 | Observer: ST & JMS

Zone: 51J | Easting: 321698 mE | Northing: 6825900 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Highly disturbed

Habitat Structure: Disturbed habitat

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 | Habitat Assessment #: 328 | Observer: ST & JMS

Zone: 51J | Easting: 322200 mE | Northing: 6825900 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Highly disturbed

Habitat Structure: Disturbed habitat

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 329	Observer: ST & JMS
Zone: 51J	Easting: 322698 mE	Northing: 6825900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 330	Observer: ST & GF
Zone: 51J	Easting: 323200 mE	Northing: 6825900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 331 Observer: ST & GF

Zone: 51J Easting: 323698 mE Northing: 6825900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 332 Observer: ST & GF

Zone: 51J Easting: 324200 mE Northing: 6825900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 333 Observer: ST & GF

Zone: 51J Easting: 324698 mE Northing: 6825900 mN

Fire History: >5 years Landform: Flat/Gentle Slope Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 334	Observer: ST & RT
Zone: 51J	Easting: 317198 mE	Northing: 6825400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 335 Observer: ST & RT

Zone: 51J Easting: 317700 mE Northing: 6825400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 336	Observer: ST & JMS
Zone: 51J	Easting: 318200 mE	Northing: 6825400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 337	Observer: ST & JMS
Zone: 51J	Easting: 318698 mE	Northing: 6825400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 338	Observer: ST & JMS
Zone: 51J	Easting: 319200 mE	Northing: 6825400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 339	Observer: ST & JMS
Zone: 51J	Easting: 319698 mE	Northing: 6825400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 340	Observer: ST & JMS
Zone: 51J	Easting: 320200 mE	Northing: 6825400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 341	Observer: ST & JMS
Zone: 51J	Easting: 320698 mE	Northing: 6825400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 342	Observer: ST & JMS
Zone: 51J	Easting: 321200 mE	Northing: 6825400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 Habitat Assessment #: 343 Observer: ST & JMS

Zone: 51J Easting: 321698 mE Northing: 6825400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 Habitat Assessment #: 344 Observer: ST & JMS

Zone: 51J Easting: 322200 mE Northing: 6825400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 Habitat Assessment #: 345 Observer: ST & JMS

Zone: 51J Easting: 322698 mE Northing: 6825400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 346	Observer: ST & GF
Zone: 51J	Easting: 323200 mE	Northing: 6825400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Very good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 347	Observer: ST & GF
Zone: 51J	Easting: 323700 mE	Northing: 6825400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 348	Observer: ST & GF
Zone: 51J	Easting: 324198 mE	Northing: 6825400 mN
Fire History: >5 years	Landform: Rocky rise	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 349 Observer: ST & GF

Zone: 51J Easting: 324700 mE Northing: 6825400 mN

Fire History: >5 years Landform: Flat/Gentle Slope Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 350 Observer: ST & RT

Zone: 51J Easting: 317198 mE Northing: 6824900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019	Habitat Assessment #: 351	Observer: ST & RT
Zone: 51J	Easting: 317700 mE	Northing: 6824900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 352	Observer: ST & JMS
Zone: 51J	Easting: 318200 mE	Northing: 6824900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 353	Observer: ST & JMS
Zone: 51J	Easting: 318698 mE	Northing: 6824900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 | Habitat Assessment #: 354 | Observer: ST & JMS

Zone: 51J | Easting: 319200 mE | Northing: 6824900 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 355	Observer: ST & JMS
Zone: 51J	Easting: 319698 mE	Northing: 6824900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 356	Observer: ST & JMS
Zone: 51J	Easting: 320200 mE	Northing: 6824900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 357	Observer: ST & JMS
Zone: 51J	Easting: 320698 mE	Northing: 6824900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 358	Observer: ST & JMS
Zone: 51J	Easting: 321200 mE	Northing: 6824900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 359	Observer: ST & JMS
Zone: 51J	Easting: 321698 mE	Northing: 6824900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 Habitat Assessment #: 360 Observer: ST & JMS

Zone: 51J Easting: 322198 mE Northing: 6824900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 361	Observer: ST & JMS
Zone: 51J	Easting: 322700 mE	Northing: 6824900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 362 Observer: ST & GF

Zone: 51J Easting: 323198 mE Northing: 6824900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 363 Observer: ST & GF

Zone: 51J Easting: 323700 mE Northing: 6824900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 364	Observer: ST & GF
Zone: 51J	Easting: 324198 mE	Northing: 6824900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 365 Observer: ST & GF

Zone: 51J Easting: 324700 mE Northing: 6824900 mN

Fire History: >5 years Landform: Flat/Gentle Slope Habitat Quality: Disturbed

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 366	Observer: ST & JMS
Zone: 51J	Easting: 316700 mE	Northing: 6824400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 367	Observer: ST & JMS
Zone: 51J	Easting: 317198 mE	Northing: 6824400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 368	Observer: ST & JMS
Zone: 51J	Easting: 317700 mE	Northing: 6824400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 369	Observer: ST & JMS
Zone: 51J	Easting: 318200 mE	Northing: 6824400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 | Habitat Assessment #: 370 | Observer: ST & JMS

Zone: 51J | Easting: 318698 mE | Northing: 6824400 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 371	Observer: ST & JMS
Zone: 51J	Easting: 319200 mE	Northing: 6824400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 372	Observer: ST & GF
Zone: 51J	Easting: 319698 mE	Northing: 6824400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 373	Observer: ST & GF
Zone: 51J	Easting: 320200 mE	Northing: 6824400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 374	Observer: ST & GF
Zone: 51J	Easting: 320698 mE	Northing: 6824400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 375 Observer: ST & GF

Zone: 51J Easting: 321198 mE Northing: 6824400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 | Habitat Assessment #: 376 | Observer: ST & GF

Zone: 51J | Easting: 321700 mE | Northing: 6824400 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Highly disturbed

Habitat Structure: Disturbed habitat

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 377 Observer: ST & GF

Zone: 51J Easting: 322198 mE Northing: 6824400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 378 Observer: ST & GF

Zone: 51J Easting: 322700 mE Northing: 6824400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 379	Observer: ST & GF
Zone: 51J	Easting: 323198 mE	Northing: 6824400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 380	Observer: ST & GF
Zone: 51J	Easting: 323698 mE	Northing: 6824400 mN
Fire History: >5 years	Landform: Rocky rise	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 381 Observer: ST & GF

Zone: 51J Easting: 324200 mE Northing: 6824400 mN

Fire History: >5 years Landform: Flat/Gentle Slope Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 | Habitat Assessment #: 382 | Observer: ST & JMS

Zone: 51J | Easting: 316700 mE | Northing: 6823900 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 383	Observer: ST & JMS
Zone: 51J	Easting: 317198 mE	Northing: 6823900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 | Habitat Assessment #: 384 | Observer: ST & JMS

Zone: 51J | Easting: 317700 mE | Northing: 6823900 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Highly disturbed

Habitat Structure: Claypan

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 | Habitat Assessment #: 385 | Observer: ST & JMS

Zone: 51J | Easting: 318200 mE | Northing: 6823900 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 | Habitat Assessment #: 386 | Observer: ST & JMS

Zone: 51J | Easting: 318698 mE | Northing: 6823900 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 387	Observer: ST & JMS
Zone: 51J	Easting: 319200 mE	Northing: 6823900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 388	Observer: ST & GF
Zone: 51J	Easting: 319698 mE	Northing: 6823900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 389	Observer: ST & GF
Zone: 51J	Easting: 320199 mE	Northing: 6823900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 390	Observer: ST & GF
Zone: 51J	Easting: 320700 mE	Northing: 6823900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 391	Observer: ST & GF
Zone: 51J	Easting: 321198 mE	Northing: 6823900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 392 Observer: ST & GF

Zone: 51J Easting: 321700 mE Northing: 6823900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 393 Observer: ST & GF

Zone: 51J Easting: 322198 mE Northing: 6823900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Very good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 394 Observer: ST & GF

Zone: 51J Easting: 322698 mE Northing: 6823900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 395	Observer: ST & GF
Zone: 51J	Easting: 323200 mE	Northing: 6823900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 396 Observer: ST & GF

Zone: 51J Easting: 323698 mE Northing: 6823900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Very good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 397 Observer: ST & GF

Zone: 51J Easting: 324200 mE Northing: 6823900 mN

Fire History: >5 years Landform: Flat/Gentle Slope Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 398 Observer: ST & GF

Zone: 51J Easting: 324700 mE Northing: 6823900 mN

Fire History: >5 years Landform: Flat/Gentle Slope Habitat Quality: Disturbed

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 399	Observer: ST & JMS
Zone: 51J	Easting: 316700 mE	Northing: 6823400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 400	Observer: ST & JMS
Zone: 51J	Easting: 317198 mE	Northing: 6823400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 401	Observer: ST & JMS
Zone: 51J	Easting: 317700 mE	Northing: 6823400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 Habitat Assessment #: 402 Observer: ST & JMS

Zone: 51J Easting: 318200 mE Northing: 6823400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 403	Observer: ST & JMS
Zone: 51J	Easting: 318698 mE	Northing: 6823400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 404	Observer: ST & JMS
Zone: 51J	Easting: 319200 mE	Northing: 6823400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 405	Observer: ST & GF
Zone: 51J	Easting: 319698 mE	Northing: 6823400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 406	Observer: ST & GF
Zone: 51J	Easting: 320198 mE	Northing: 6823400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 407	Observer: ST & GF
Zone: 51J	Easting: 320700 mE	Northing: 6823400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Very good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 408	Observer: ST & GF
Zone: 51J	Easting: 322200 mE	Northing: 6823400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 409	Observer: ST & GF
Zone: 51J	Easting: 322698 mE	Northing: 6823400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 410	Observer: ST & GF
Zone: 51J	Easting: 324700 mE	Northing: 6823400 mN
Fire History: >5 years	Landform: Flat/Gentle Slope	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 411 Observer: ST & GF

Zone: 51J Easting: 325200 mE Northing: 6823400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 412	Observer: ST & JMS
Zone: 51J	Easting: 316700 mE	Northing: 6822900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 413	Observer: ST & JMS
Zone: 51J	Easting: 317200 mE	Northing: 6822900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 414	Observer: ST & JMS
Zone: 51J	Easting: 317700 mE	Northing: 6822900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 Habitat Assessment #: 415 Observer: ST & JMS

Zone: 51J Easting: 318200 mE Northing: 6822900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Highly disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 Habitat Assessment #: 416 Observer: ST & JMS

Zone: 51J Easting: 318698 mE Northing: 6822900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 417	Observer: ST & JMS
Zone: 51J	Easting: 319200 mE	Northing: 6822900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 418 Observer: ST & GF

Zone: 51J Easting: 319700 mE Northing: 6822900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 419	Observer: ST & GF
Zone: 51J	Easting: 320198 mE	Northing: 6822900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 420	Observer: ST & GF
Zone: 51J	Easting: 320700 mE	Northing: 6822900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 421 Observer: ST & GF

Zone: 51J Easting: 321178 mE Northing: 6822900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Very good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 422	Observer: ST & GF
Zone: 51J	Easting: 322200 mE	Northing: 6822900 mN
Fire History: >5 years	Landform: Flat/Gentle Slope	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 423	Observer: ST & GF
Zone: 51J	Easting: 325398 mE	Northing: 6822900 mN
Fire History: >5 years	Landform: Rocky rise	Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Stones

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 | Habitat Assessment #: 424 | Observer: ST & JMS

Zone: 51J | Easting: 317200 mE | Northing: 6822400 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 425	Observer: ST & JMS
Zone: 51J	Easting: 317700 mE	Northing: 6822400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019	Habitat Assessment #: 426	Observer: ST & JMS
Zone: 51J	Easting: 320700 mE	Northing: 6821400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 427 Observer: ST & GF

Zone: 51J Easting: 321200 mE Northing: 6821400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 428	Observer: ST & GF
Zone: 51J	Easting: 321699 mE	Northing: 6821400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 429 Observer: ST & GF

Zone: 51J Easting: 321198 mE Northing: 6820900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 430 Observer: ST & GF

Zone: 51J Easting: 318200 mE Northing: 6822400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 431 Observer: ST & GF

Zone: 51J Easting: 319200 mE Northing: 6822400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 432	Observer: ST & GF
Zone: 51J	Easting: 319700 mE	Northing: 6822400 mN
Fire History: >5 years	Landform: Flat/Gentle Slope	Habitat Quality: Very good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 433 Observer: ST & GF

Zone: 51J Easting: 320198 mE Northing: 6822400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Very good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019	Habitat Assessment #: 434	Observer: ST & GF
Zone: 51J	Easting: 320700 mE	Northing: 6822400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 435 Observer: ST & GF

Zone: 51J Easting: 321178 mE Northing: 6822400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 436 Observer: ST & GF

Zone: 51J Easting: 319700 mE Northing: 6821900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 437 Observer: ST & GF

Zone: 51J Easting: 320198 mE Northing: 6821900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 438 Observer: ST & GF

Zone: 51J Easting: 320700 mE Northing: 6821900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 21/11/2019 Habitat Assessment #: 439 Observer: ST & GF

Zone: 51J Easting: 321178 mE Northing: 6821900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 | Habitat Assessment #: 440 | Observer: ST & JMS

Zone: 51J | Easting: 318629 mE | Northing: 6822596 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 | Habitat Assessment #: 441 | Observer: ST & JMS

Zone: 51J | Easting: 318467 mE | Northing: 6822900 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 | Habitat Assessment #: 442 | Observer: ST & JMS

Zone: 51J | Easting: 318277 mE | Northing: 6823400 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 | Habitat Assessment #: 443 | Observer: ST & JMS

Zone: 51J | Easting: 318391 mE | Northing: 6823900 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 | Habitat Assessment #: 444 | Observer: ST & JMS

Zone: 51J | Easting: 318464 mE | Northing: 6824400 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 | Habitat Assessment #: 445 | Observer: ST & JMS

Zone: 51J | Easting: 318615 mE | Northing: 6824900 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 24/11/2019 | Habitat Assessment #: 446 | Observer: ST & JMS

Zone: 51J | Easting: 318455 mE | Northing: 6825400 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 | Habitat Assessment #: 447 | Observer: ST & RT

Zone: 51J | Easting: 318450 mE | Northing: 6825900 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 | Habitat Assessment #: 448 | Observer: ST & RT

Zone: 51J | Easting: 318395 mE | Northing: 6826400 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 | Habitat Assessment #: 449 | Observer: ST & RT

Zone: 51J | Easting: 318226 mE | Northing: 6826900 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 | Habitat Assessment #: 450 | Observer: ST & RT

Zone: 51J | Easting: 318098 mE | Northing: 6827400 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 | Habitat Assessment #: 451 | Observer: ST & RT

Zone: 51J | Easting: 317889 mE | Northing: 6827900 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 | Habitat Assessment #: 452 | Observer: ST & RT

Zone: 51J | Easting: 317955 mE | Northing: 6828400 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 | Habitat Assessment #: 453 | Observer: ST & RT

Zone: 51J | Easting: 317819 mE | Northing: 6828900 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 | Habitat Assessment #: 454 | Observer: ST & RT

Zone: 51J | Easting: 317676 mE | Northing: 6829400 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 | Habitat Assessment #: 455 | Observer: ST & RT

Zone: 51J | Easting: 317321 mE | Northing: 6829900 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 | Habitat Assessment #: 456 | Observer: ST & RT

Zone: 51J | Easting: 317420 mE | Northing: 6830400 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 Habitat Assessment #: 457 Observer: ST & RT

Zone: 51J Easting: 317508 mE Northing: 6830900 mN

Fire History: >5 years Landform: Riverbed Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 | Habitat Assessment #: 458 | Observer: ST & RT

Zone: 51J | Easting: 317325 mE | Northing: 6831400 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 | Habitat Assessment #: 459 | Observer: ST & RT

Zone: 51J | Easting: 317461 mE | Northing: 6831900 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 | Habitat Assessment #: 460 | Observer: ST & RT

Zone: 51J | Easting: 317633 mE | Northing: 6832400 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 23/11/2019 | Habitat Assessment #: 461 | Observer: ST & RT

Zone: 51J | Easting: 317544 mE | Northing: 6832900 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 | Habitat Assessment #: 462 | Observer: ST & JMS

Zone: 51J | Easting: 317730 mE | Northing: 6833400 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 | Habitat Assessment #: 463 | Observer: ST & JMS

Zone: 51J | Easting: 317981 mE | Northing: 6833900 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 | Habitat Assessment #: 464 | Observer: ST & JMS

Zone: 51J | Easting: 318062 mE | Northing: 6834400 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 22/11/2019 | Habitat Assessment #: 465 | Observer: ST & JMS

Zone: 51J | Easting: 317999 mE | Northing: 6834900 mN

Fire History: >5 years | Landform: Riverbed | Habitat Quality: Good

Habitat Structure: Sullivan Creek

Soil Type: Riversand | Soil surface: Riversand and Rock

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 466	Observer: RT & CS
Zone: 51J	Easting: 316200 mE	Northing: 6822900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 467	Observer: ST & RT
Zone: 51J	Easting: 315700 mE	Northing: 6822400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 468	Observer: RT & CS
Zone: 51J	Easting: 316200 mE	Northing: 6822400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 469	Observer: RT & CS
Zone: 51J	Easting: 316700 mE	Northing: 6822400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 470	Observer: RT & CS
Zone: 51J	Easting: 318700 mE	Northing: 6822400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 471	Observer: RT & CS
Zone: 51J	Easting: 314700 mE	Northing: 6821900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 472	Observer: RT & CS
Zone: 51J	Easting: 315200 mE	Northing: 6821900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 473	Observer: ST & RT
Zone: 51J	Easting: 315700 mE	Northing: 6821900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020 | Habitat Assessment #: 474 | Observer: ST & GF

Zone: 51J | Easting: 316200 mE | Northing: 6821900 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020	Habitat Assessment #: 475	Observer: ST & GF
Zone: 51J	Easting: 316700 mE	Northing: 6821900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020	Habitat Assessment #: 476	Observer: ST & GF
Zone: 51J	Easting: 317200 mE	Northing: 6821900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 477	Observer: RT & CS
Zone: 51J	Easting: 317700 mE	Northing: 6821900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 478	Observer: RT & CS
Zone: 51J	Easting: 318200 mE	Northing: 6821900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 479	Observer: RT & CS
Zone: 51J	Easting: 313700 mE	Northing: 6821400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 480	Observer: RT & CS
Zone: 51J	Easting: 314200 mE	Northing: 6821400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 481	Observer: RT & CS
Zone: 51J	Easting: 314700 mE	Northing: 6821400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 482	Observer: RT & CS
Zone: 51J	Easting: 315200 mE	Northing: 6821400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 483	Observer: ST & RT
Zone: 51J	Easting: 315700 mE	Northing: 6821400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020	Habitat Assessment #: 484	Observer: ST & GF
Zone: 51J	Easting: 316200 mE	Northing: 6821400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020	Habitat Assessment #: 485	Observer: ST & GF
Zone: 51J	Easting: 316700 mE	Northing: 6821400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020	Habitat Assessment #: 486	Observer: ST & GF
Zone: 51J	Easting: 317200 mE	Northing: 6821400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020 Habitat Assessment #: 487 Observer: ST & GF

Zone: 51J Easting: 317700 mE Northing: 6821400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 488	Observer: RT & CS
Zone: 51J	Easting: 313200 mE	Northing: 6820900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 489	Observer: RT & CS
Zone: 51J	Easting: 313700 mE	Northing: 6820900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 490	Observer: RT & CS
Zone: 51J	Easting: 314200 mE	Northing: 6820900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 491	Observer: RT & CS
Zone: 51J	Easting: 314700 mE	Northing: 6820900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 492	Observer: RT & CS
Zone: 51J	Easting: 315200 mE	Northing: 6820900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 493	Observer: ST & RT
Zone: 51J	Easting: 315700 mE	Northing: 6820900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020	Habitat Assessment #: 494	Observer: ST & GF
Zone: 51J	Easting: 316200 mE	Northing: 6820900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020	Habitat Assessment #: 495	Observer: ST & GF
Zone: 51J	Easting: 316700 mE	Northing: 6820900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020 | Habitat Assessment #: 496 | Observer: ST & GF

Zone: 51J | Easting: 317200 mE | Northing: 6820900 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020 Habitat Assessment #: 497 Observer: ST & GF

Zone: 51J Easting: 317700 mE Northing: 6820900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020 Habitat Assessment #: 498 Observer: RT & CS

Zone: 51J Easting: 312200 mE Northing: 6820400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Stones

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 499	Observer: RT & CS
Zone: 51J	Easting: 312700 mE	Northing: 6820400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 500	Observer: RT & CS
Zone: 51J	Easting: 313200 mE	Northing: 6820400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020 Habitat Assessment #: 501 Observer: RT & CS

Zone: 51J Easting: 313700 mE Northing: 6820400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020 Habitat Assessment #: 502 Observer: RT & CS

Zone: 51J Easting: 314200 mE Northing: 6820400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020 Habitat Assessment #: 503 Observer: RT & CS

Zone: 51J Easting: 314700 mE Northing: 6820400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 504	Observer: RT & CS
Zone: 51J	Easting: 315200 mE	Northing: 6820400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 505	Observer: ST & RT
Zone: 51J	Easting: 315700 mE	Northing: 6820400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020 Habitat Assessment #: 506 Observer: ST & GF

Zone: 51J Easting: 316200 mE Northing: 6820400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020	Habitat Assessment #: 507	Observer: ST & GF
Zone: 51J	Easting: 316700 mE	Northing: 6820400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020	Habitat Assessment #: 508	Observer: ST & GF
Zone: 51J	Easting: 317200 mE	Northing: 6820400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 509	Observer: RT & GF
Zone: 51J	Easting: 311200 mE	Northing: 6819900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 510	Observer: RT & GF
Zone: 51J	Easting: 311700 mE	Northing: 6819900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 511	Observer: RT & CS
Zone: 51J	Easting: 312200 mE	Northing: 6819900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020 Habitat Assessment #: 512 Observer: RT & CS

Zone: 51J Easting: 312700 mE Northing: 6819900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 513	Observer: RT & CS
Zone: 51J	Easting: 313200 mE	Northing: 6819900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 514	Observer: RT & CS
Zone: 51J	Easting: 313700 mE	Northing: 6819900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 515	Observer: RT & CS
Zone: 51J	Easting: 314200 mE	Northing: 6819900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020 Habitat Assessment #: 516 Observer: RT & CS

Zone: 51J Easting: 314700 mE Northing: 6819900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 517	Observer: RT & CS
Zone: 51J	Easting: 315200 mE	Northing: 6819900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020 Habitat Assessment #: 518 Observer: ST & RT

Zone: 51J Easting: 315700 mE Northing: 6819900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020	Habitat Assessment #: 519	Observer: ST & GF
Zone: 51J	Easting: 316200 mE	Northing: 6819900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020 Habitat Assessment #: 520 Observer: ST & GF

Zone: 51J Easting: 316700 mE Northing: 6819900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 521	Observer: RT & GF
Zone: 51J	Easting: 310700 mE	Northing: 6819400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020 Habitat Assessment #: 522 Observer: RT & GF

Zone: 51J Easting: 311200 mE Northing: 6819400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 523	Observer: RT & GF
Zone: 51J	Easting: 311700 mE	Northing: 6819400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 524	Observer: RT & CS
Zone: 51J	Easting: 312200 mE	Northing: 6819400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 525	Observer: RT & CS
Zone: 51J	Easting: 312700 mE	Northing: 6819400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Cobbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 526	Observer: RT & CS
Zone: 51J	Easting: 313200 mE	Northing: 6819400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 527	Observer: RT & CS
Zone: 51J	Easting: 313700 mE	Northing: 6819400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020 Habitat Assessment #: 528 Observer: RT & CS

Zone: 51J Easting: 314200 mE Northing: 6819400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 529	Observer: RT & CS
Zone: 51J	Easting: 314700 mE	Northing: 6819400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 530	Observer: RT & CS
Zone: 51J	Easting: 315200 mE	Northing: 6819400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 531	Observer: ST & RT
Zone: 51J	Easting: 315700 mE	Northing: 6819400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020	Habitat Assessment #: 532	Observer: ST & GF
Zone: 51J	Easting: 316200 mE	Northing: 6819400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020	Habitat Assessment #: 533	Observer: ST & GF
Zone: 51J	Easting: 316700 mE	Northing: 6819400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020 Habitat Assessment #: 534 Observer: RT & GF

Zone: 51J Easting: 309700 mE Northing: 6818900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 535	Observer: RT & GF
Zone: 51J	Easting: 310200 mE	Northing: 6818900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 536	Observer: RT & GF
Zone: 51J	Easting: 310700 mE	Northing: 6818900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 537	Observer: RT & GF
Zone: 51J	Easting: 311200 mE	Northing: 6818900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 538	Observer: RT & GF
Zone: 51J	Easting: 311700 mE	Northing: 6818900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020 Habitat Assessment #: 539 Observer: RT & CS

Zone: 51J Easting: 312200 mE Northing: 6818900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020 Habitat Assessment #: 540 Observer: RT & CS

Zone: 51J Easting: 312700 mE Northing: 6818900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 541	Observer: RT & CS
Zone: 51J	Easting: 313200 mE	Northing: 6818900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 542	Observer: RT & CS
Zone: 51J	Easting: 313700 mE	Northing: 6818900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 543	Observer: RT & CS
Zone: 51J	Easting: 314200 mE	Northing: 6818900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 544	Observer: RT & CS
Zone: 51J	Easting: 314700 mE	Northing: 6818900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 16/03/2020	Habitat Assessment #: 545	Observer: RT & CS
Zone: 51J	Easting: 315200 mE	Northing: 6818900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 546	Observer: ST & RT
Zone: 51J	Easting: 315700 mE	Northing: 6818900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 17/03/2020	Habitat Assessment #: 547	Observer: ST & GF
Zone: 51J	Easting: 316200 mE	Northing: 6818900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 548	Observer: RT & GF
Zone: 51J	Easting: 308700 mE	Northing: 6818400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 549	Observer: RT & GF
Zone: 51J	Easting: 309200 mE	Northing: 6818400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020 Habitat Assessment #: 550 Observer: RT & GF

Zone: 51J Easting: 309700 mE Northing: 6818400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020 Habitat Assessment #: 551 Observer: RT & GF

Zone: 51J Easting: 310200 mE Northing: 6818400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Disturbed

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 552	Observer: RT & GF
Zone: 51J	Easting: 310700 mE	Northing: 6818400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 553	Observer: RT & GF
Zone: 51J	Easting: 311200 mE	Northing: 6818400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020 Habitat Assessment #: 554 Observer: ST & RT

Zone: 51J Easting: 311700 mE Northing: 6818400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020 Habitat Assessment #: 555 Observer: ST & RT

Zone: 51J Easting: 312200 mE Northing: 6818400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 556	Observer: ST & RT
Zone: 51J	Easting: 312700 mE	Northing: 6818400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 557	Observer: ST & RT
Zone: 51J	Easting: 313200 mE	Northing: 6818400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 558	Observer: ST & RT
Zone: 51J	Easting: 313700 mE	Northing: 6818400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 559	Observer: ST & RT
Zone: 51J	Easting: 314200 mE	Northing: 6818400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 560	Observer: ST & RT
Zone: 51J	Easting: 314700 mE	Northing: 6818400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 561	Observer: ST & RT
Zone: 51J	Easting: 315200 mE	Northing: 6818400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020 Habitat Assessment #: 562 Observer: ST & RT

Zone: 51J Easting: 315700 mE Northing: 6818400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020 Habitat Assessment #: 563 Observer: RT & GF

Zone: 51J Easting: 308700 mE Northing: 6817900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Disturbed

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020 Habitat Assessment #: 564 Observer: RT & GF

Zone: 51J Easting: 309200 mE Northing: 6817900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Disturbed

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020 Habitat Assessment #: 565 Observer: RT & GF

Zone: 51J Easting: 309700 mE Northing: 6817900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020 Habitat Assessment #: 566 Observer: RT & GF

Zone: 51J Easting: 310200 mE Northing: 6817900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 567	Observer: RT & GF
Zone: 51J	Easting: 310700 mE	Northing: 6817900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 568	Observer: RT & GF
Zone: 51J	Easting: 311200 mE	Northing: 6817900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020 Habitat Assessment #: 569 Observer: ST & RT

Zone: 51J Easting: 311700 mE Northing: 6817900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 570	Observer: ST & RT
Zone: 51J	Easting: 312200 mE	Northing: 6817900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 571	Observer: ST & RT
Zone: 51J	Easting: 312700 mE	Northing: 6817900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 572	Observer: ST & RT
Zone: 51J	Easting: 313200 mE	Northing: 6817900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 573	Observer: ST & RT
Zone: 51J	Easting: 313700 mE	Northing: 6817900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 574	Observer: ST & RT
Zone: 51J	Easting: 314200 mE	Northing: 6817900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 575	Observer: ST & RT
Zone: 51J	Easting: 314700 mE	Northing: 6817900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 576	Observer: ST & RT
Zone: 51J	Easting: 315200 mE	Northing: 6817900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 577	Observer: RT & GF
Zone: 51J	Easting: 309700 mE	Northing: 6817400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 578	Observer: RT & GF
Zone: 51J	Easting: 310200 mE	Northing: 6817400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020 Habitat Assessment #: 579 Observer: RT & GF

Zone: 51J Easting: 310700 mE Northing: 6817400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 580	Observer: RT & GF
Zone: 51J	Easting: 311200 mE	Northing: 6817400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020 Habitat Assessment #: 581 Observer: ST & RT

Zone: 51J Easting: 311700 mE Northing: 6817400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: Pebbles

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020 Habitat Assessment #: 582 Observer: ST & RT

Zone: 51J Easting: 312200 mE Northing: 6817400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 583	Observer: ST & RT
Zone: 51J	Easting: 312700 mE	Northing: 6817400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 584	Observer: ST & RT
Zone: 51J	Easting: 313200 mE	Northing: 6817400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 585	Observer: ST & RT
Zone: 51J	Easting: 313700 mE	Northing: 6817400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 586	Observer: ST & RT
Zone: 51J	Easting: 314200 mE	Northing: 6817400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 587	Observer: ST & RT
Zone: 51J	Easting: 314700 mE	Northing: 6817400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 588	Observer: ST & RT
Zone: 51J	Easting: 315200 mE	Northing: 6817400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 589	Observer: RT & GF
Zone: 51J	Easting: 310200 mE	Northing: 6816900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020 Habitat Assessment #: 590 Observer: RT & GF

Zone: 51J Easting: 310700 mE Northing: 6816900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 591	Observer: RT & GF
Zone: 51J	Easting: 311200 mE	Northing: 6816900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020 Habitat Assessment #: 592 Observer: ST & RT

Zone: 51J Easting: 311700 mE Northing: 6816900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020 | Habitat Assessment #: 593 | Observer: ST & RT

Zone: 51J | Easting: 312200 mE | Northing: 6816900 mN

Fire History: >5 years | Landform: Flat Plain | Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay | Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 594	Observer: ST & RT
Zone: 51J	Easting: 312700 mE	Northing: 6816900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020 Habitat Assessment #: 595 Observer: ST & RT

Zone: 51J Easting: 313200 mE Northing: 6816900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020 Habitat Assessment #: 596 Observer: ST & RT

Zone: 51J Easting: 313700 mE Northing: 6816900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 597	Observer: ST & RT
Zone: 51J	Easting: 314200 mE	Northing: 6816900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 598	Observer: ST & RT
Zone: 51J	Easting: 314700 mE	Northing: 6816900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 14/03/2020	Habitat Assessment #: 599	Observer: RT & GF
Zone: 51J	Easting: 311200 mE	Northing: 6816400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 600	Observer: ST & RT
Zone: 51J	Easting: 311700 mE	Northing: 6816400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 601	Observer: ST & RT
Zone: 51J	Easting: 312200 mE	Northing: 6816400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 602	Observer: ST & RT
Zone: 51J	Easting: 312700 mE	Northing: 6816400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 603	Observer: ST & RT
Zone: 51J	Easting: 313200 mE	Northing: 6816400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 604	Observer: ST & RT
Zone: 51J	Easting: 313700 mE	Northing: 6816400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 605	Observer: ST & RT
Zone: 51J	Easting: 314200 mE	Northing: 6816400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 606	Observer: ST & RT
Zone: 51J	Easting: 311700 mE	Northing: 6815900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 607	Observer: ST & RT
Zone: 51J	Easting: 312200 mE	Northing: 6815900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 608	Observer: ST & RT
Zone: 51J	Easting: 312700 mE	Northing: 6815900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020 Habitat Assessment #: 609 Observer: ST & RT

Zone: 51J Easting: 313200 mE Northing: 6815900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 610	Observer: ST & RT
Zone: 51J	Easting: 313700 mE	Northing: 6815900 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020 Habitat Assessment #: 611 Observer: ST & RT

Zone: 51J Easting: 312700 mE Northing: 6815400 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 612	Observer: ST & RT
Zone: 51J	Easting: 313200 mE	Northing: 6815400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Open Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020	Habitat Assessment #: 613	Observer: ST & RT
Zone: 51J	Easting: 313700 mE	Northing: 6815400 mN
Fire History: >5 years	Landform: Flat Plain	Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS

Date: 15/03/2020 Habitat Assessment #: 614 Observer: ST & RT

Zone: 51J Easting: 313200 mE Northing: 6814900 mN

Fire History: >5 years Landform: Flat Plain Habitat Quality: Good

Habitat Structure: Mulga woodland over mixed shrubland and scattered grasses

Soil Type: Sandy clay Soil surface: No pebbles or rocks

TERRESTRIAL ECOSYSTEMS


DETECTION DOG