Level 1 Vertebrate Fauna Risk Assessment for the Fairplay Pit and Waste Landform Expansion and Development

Version 2. July 2015

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EXECUTIVE SUMMARY

Native Vegetation Solutions (NVS) commissioned Terrestrial Ecosystems on behalf of Metals X Limited to complete a Level 1 fauna risk assessment of 177ha of vegetation ('Fairplay project' and 'project area') near the current Higginsville Mining Operations.

Metals X Limited is the 100% owner of subsidiary Avoca Mining Pty Ltd, which operate the Higginsville Gold Operation (HGO). HGO proposes to expand current pit and waste landform areas as well as develop a new pit and waste landform area for the Fairplay project in the Higginsville area. These proposed areas fall within tenements M15/031, M15/231, M15/348, M15/352, M15/375, M15/610 and M15/748. A mining proposal is currently being prepared, and will be submitted with the inclusion of this report.

The Fairplay project is approximately 45km southeast of Widgiemooltha and 50km north of Norseman in Western Australia and is just east of the Coolgardie Esperance Highway near Higginsville.

Fauna survey data from other projects in the bioregion provide an adequate indication of the fauna assemblages likely to be encountered in the project area. These data are adequate to assess potential impacts on the vertebrate fauna potentially found in the project area.

The project area has been degraded by previous exploration and mining activity and has numerous exploration tracks. The project area had a single fauna habitat of mixed eucalyptus woodland over mixed sclerophyll shrubland with or without chenopods with a sparse understory that was assessed as in poor to good condition.

No conservation significant vertebrate fauna were assessed as likely to be significantly impacted by vegetation clearing within the project area. There is a very low possibility that the area supports Carpet Pythons, Southern Death Adder, Major Mitchell's Cockatoo, Western Rosella, Peregrine Falcon, Bush Stone-curlew, Australian Bustard, Malleefowl, Fork-tailed Swift, Great Egret and Cattle Egret, so any potential impacts are assessed as low. Crested Bellbird, Shy Heathwren and Rainbow Bee-eater may be in the project area, but will readily move once vegetation clearing commences, so any impacts would be insignificant. All other avian species potentially found in the project area are mobile and will readily move to adjacent areas if disturbed.

1 INTRODUCTION

1.1 Background

Native Vegetation Solutions (NVS) commissioned Terrestrial Ecosystems on behalf of Metals X Limited to complete a Level 1 fauna risk assessment of 177ha of vegetation ('Fairplay project' and 'project area') near the current Higginsville Mining Operations(Figures 1 and 2).

Metals X Limited is the 100% owner of subsidiary Avoca Mining Pty Ltd, which operate the Higginsville Gold Operation (HGO). HGO proposes to expand current pit and waste landform areas as well as develop a new pit and waste landform area for the Fairplay project in the Higginsville area. These proposed areas fall within tenements M15/031, M15/231, M15/348, M15/352, M15/375, M15/610 and M15/748. A mining proposal is currently being prepared, and will be submitted with the inclusion of this report.

The Fairplay project is approximately 45km southeast of Widgiemooltha and 45km north of Norseman in Western Australia and is just east of the Coolgardie Esperance Highway near Higginsville.

1.2 Project objectives

The purpose of this fauna assessment was to provide information to enable an assessment of potential impacts on the vertebrate fauna assemblage during potential exploration and mining program. The methodology broadly follows that described in the Environmental Protection Authority (EPA) Position Statement No. 3: *Terrestrial Biological Surveys as an Element of Biodiversity Protection* (EPA 2002), Guidance Statement No. 56: *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004) and the *Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA / DEC 2010).

The objectives of this fauna assessment were to:

- provide an indication of the vertebrate fauna assemblage (reptiles, amphibians, small mammals and birds) on and in the vicinity of the project area so that potential impacts on the fauna might be adequately assessed;
- assess whether the project area supports active Malleefowl mounds and/or other conservation significant species;
- determine if any additional surveys are required to assess the potential impact on fauna assemblages in the project area, in particular, impacts on species of conservation significance; and
- assess the impact and environmental risks associated with the proposed development on the fauna assemblage.

2 EXISTING ENVIRONMENT

2.1 Eastern Goldfield IBRA subregion

The project area is located in the Coolgardie (COO3 – Eastern Goldfield) IBRA sub-region. The relief is subdued and comprise of gently undulating plains interrupted in the west with low hills and ridges of Archaean greenstones and in the east by a horst of Proterozoic basic granulite. The subregion supports large playa lakes in the western half which are remnants of an ancient major drainage system (Cowan 2002).

The vegetation is a Mallees, Acacia thickets and shrub heath on sand plains. Diverse eucalypt woodlands occur around salt lakes, on ranges and in valleys. Salt lakes support dwarf shrublands of samphire. Woodlands and *Dodonaea* shrubland occur on basic graninulites of the Fraser Range (Cowan 2002). The area is rich in endemic Acacias.

2.2 Climate

Chart 1 shows the average mean monthly maximum and minimum temperatures and rainfall for Coolgardie, the closest weather station (71km north-north-west). Temperatures are highest in December – February and most rain comes in winter. Winter rain is the result of low pressure cells that move in an easterly direction from the south-west of the state, whereas, summer rain is often from thunderstorms that move in from either the west or the north-west.

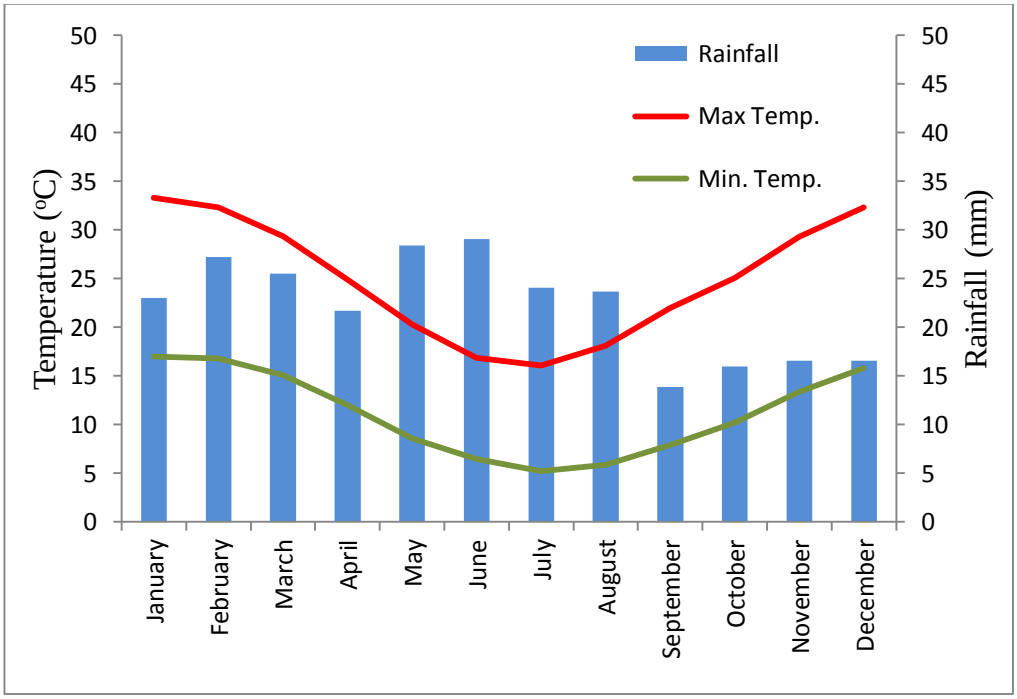

Chart 1. Mean monthly maximum and minimum temperatures and rainfall for Coolgardie

2.3 Land use history

The dominant land uses in this bioregion are pastoralism, crown reserves and mining. Mining is evident in many areas around Kambalda, Higginsville, Widgiemooltha and Norseman, with numerous small abandoned and operational mines scattered throughout the landscape.

Many of the larger trees in the bioregion were removed decades ago to support the mining and power generation industries and these trees have often not been replaced by replanting programs.

2.4 Great Western Woodlands

The Fairplay project area is part of the Great Western Woodlands (Watson et al. 2008, pp. vi) that is being promoted by the Wilderness Society because the area contains the 'largest and healthiest temperate woodland remaining on our planet'. The Wilderness Society argued that the fauna and flora diversity in the area has evolved with the landscape during an unbroken biological lineage stretching back 250 million years.

There is pressure from numerous conservation groups for the preservation of the Great Western Woodlands, and it is likely that the Department of Parks and Wildlife (DPaW) will progressively become more involved in the protection of this areas.

3 EXISTING FERTERBATE FAUNA DATA AND PREVIOUS BIOLOGICAL SURVEYS IN THE REGION

The frogs, reptiles, mammals and birds in the Eastern Goldfields IBRA subregion have been previously surveyed, mostly for Level 2 vertebrate fauna assessments. The trapping fauna surveys or assessments completed in the vicinity of the project area which contain fauna assemblage data and were reviewed as part of this assessment include:

ATA Environmental (2006) *Vertebrate Fauna Assessment St Ives Gold Min*e. Unpublished report for Jim's Seeds, Weeds and Trees, Ltd, Kalgoorlie.

Bamford Consulting Ecologists (2010) *Gold Fields St Ives Gold Mine, Kambalda. Fauna Assessment: impacts of water discharge and general mining activity on vertebrate fauna*. Unpublished report to Gold Fields St Ives Gold Mine, Perth.

Chapman A; Kealley I; McMillan D; McMillan and Rolland; G (1991). Biological Surveys of Four Goldfields Reserves. *Landnote* 1/91;1-238

Dames and Moore (1999) *Public Environmental Review Gold Mine Development on Lake Lefroy*. Unpublished report for St Ives Gold Mine; Kalgoorlie.

Dell, J and How, R. (1984) Vertebrate fauna. In The Biological Survey of the Eastern Goldfields of Western Australia, *Records of the Western Australian Museum*, Supplement No 18;57-89.

Halpern Glick Maunsell (1998) *Lake Lefroy Environmental Assessment. Report ES4490C*. Unpublished Report commissioned by WMC Resources Ltd.

Handley, M.A. (1991). *The Biota of Inland Salt Lakes of the Kambalda Region, and Coastal Salt Lakes of Esperance, Western Australia. A Comparative Study*. Unpublished Honours Thesis, Curtin University of Technology.

Keith Lindbeck and Associates (2007) *St. Ives Gold Mining Company Tailings Storage Facility (No. 4) Spring Fauna Survey*. Unpublished report for St. Ives Gold Mining Company.

McKenzie, N.L., Rolfe, J.K., Hall, N.J. and Youngson, W.K. (1993) Vertebrate Fauna. In Hall, N.J. and McKenzie N.L. The Biological Survey of the Eastern Goldfields of Western Australia Part 9. Norseman - Balladonia. *Records of the Western Australian Museum*, Supplement No 42;33-55.

Newby, K.R., Dell, J., How, R.A. and Hnatiuk, R.J. (1984) The Biological Survey of the Eastern Goldfields of Western Australia - Part 2: Widgiemooltha – Zanthus Study Area. *Records of the Western Australian Museum, Supplement* 18:21–158.

Ninox Wildlife Consulting (1995) *Assessment of the Vertebrate Fauna within Rehabilitation and a Comparison with Native Vegetation in a Range of Nickel Leases near Widgiemooltha*. Unpublished Report Commissioned by KCGM Western Mining Corporation Pty. Ltd.

Ninox Wildlife Consulting (1998) *A Vertebrate Fauna Survey of the Randell Timber Reserve (1997 & 1998)*. Unpublished report for Mt Monger Gold Project Pty Ltd, Perth.

Ninox Wildlife Consulting (2004b) *St Ives Gold Mine Vertebrate Fauna Assessment 2004*. Unpublished report for St Ives Gold Mining Co Pty Ltd, Kalgoorlie.

Ninox Wildlife Consulting (2004a) *St Ives Gold Delta Island Vertebrate Fauna Assessment*. Unpublished Report Commissioned by St Ives Gold Mining Company Pty. Ltd.

Western Wildlife (2006) *St Ives Gold Fauna Survey; Spring 2005*. Unpublished report for Jim's Seeds, Weeds and Trees, Kalgoorlie.

and the Western Australian Museum (WAM) collection.

The most relevant fauna survey data come from the Western Australian Museum (WAM)/Department of Environment Conservation (DEC) eastern Goldfields survey of the Widgiemooltha-Zanthus survey area, the ATA Environmental (2006), Bamford Consulting Ecologists (2010), Dames and Moore (1999), Keith Lindbeck and Associates (2007), Ninox Wildlife Consulting (2004b) and Western Wildlife (2006) which are reports for projects on the western side of Lake Lefroy. The McKenzie, et al. (1993) report is part of the WAM/DEC's Eastern Goldfields survey undertaken in the mid 1980's and the Chapman et al. (1991) report is the results of fauna surveys of four timber reserves that are all west of Lake Lefroy.

The trapping effort employed during some of these surveys is now considered inadequate to assess species richness or assemblage structure; however, they provide useful contextual information concerning the project area.

In addition, Terrestrial Ecosystems has in excess of 120,000 trap-nights of data on the small vertebrate fauna for similar habitat north of the project area. These surveys have been undertaken in eleven of the major fauna habitat types in the region that are typical of the Goldfields and are represented in the Fairplay project area.

These surveys commenced in 2000 and are part of an ongoing fauna investigation for the bioregion and have been undertaken on multiple occasions in each season (Thompson and Thompson 2002, Thompson et al. 2003a, Thompson et al. 2003b, Thompson et al. 2003c, Thompson and Thompson 2005a, Thompson and Thompson 2005b, Thompson et al. 2005a, Thompson et al. 2005b). Data from these investigations underpin this Level 2 fauna assessment.

Taxonomy and nomenclature for fauna species used in this report are generally based on the Atlas of Living Australia except for bats, which follow (Churchill 2008). Terrestrial Ecosystems has presumed that the identifications referred to in the appendices or in reports used to provide local and regional comparative data were correct and we have only corrected obvious records where the nomenclature was known to be incorrect.

4 ASSESSMENT METHOD

4.1 Database searches

Several databases were consulted in the preparation of the potential fauna lists. A review of the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act 1999*) list of protected species was undertaken to identify species of conservation interest to the Commonwealth Government. A search was undertaken of a 50km area buffered around the linear search coordinates of 31.79503ºS 121.85873ºE through to 31.757672ºS 121.709384ºE (Appendix C). In addition, a desktop search of the Terrestrial Ecosystems' fauna survey database was used to develop an appreciation of the vertebrate fauna assemblages in the relevant section of the Eastern Goldfields IBRA subregion. The Department of Parks and Wildlife (DPaW) threatened and priority species database was searched via the records in NatureMap.

Other more general texts were also used to provide supplementary information on vertebrates in the bioregion, including Tyler *et al.* (2000) for frogs; Storr *et al.* (1983, 1990, 1999, 2002) and Thompson and Thompson (2006) for reptiles; Johnstone and Storr (1998, 2004) for birds; and Van Dyck and Strahan (2008) for mammals.

Collectively these sources of information were used to create lists of species expected to utilise the project area and broader bioregion. It should be noted that these lists will include species that have been recorded in the general region but are possibly vagrants and they will not generally be found in the project area due to a lack of suitable habitat (e.g. fresh water wetland 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 project area. Also, the ecology of many of these species is often not well understood and it can sometimes be difficult to indicate those species whose specific habitat requirements are not present in the project area. 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 mis-identification of individuals, taxonomic name changes and incorrect coordinates being entered in to the database. Terrestrial Ecosystems was unable to verify the primary records, so it has used the information provided. Readers should therefore appreciate that species lists and fauna surveys reported in the appendices may include these errors.

4.2 Reconnaissance survey

The project area was searched on foot and by 4WD vehicle for evidence of malleefowl and other conservation significant fauna. The reconnaissance survey was also used to record fauna habitat types and their condition.

4.3 Fauna habitat assessment

The fauna habitat assessment was undertaken for the entire project area. This field assessment had two foci:

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

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

Observer's name
Coordinates of the location as UTM (WGS 84)
Fire history – options
> 5 years
1-5 years
< 1 year
Landform – options

Beach	Lake / lake edge
Clay plain	Lower slope

Cliff	Mid slope
Creek line	Ridge
Dam	River
Drainage line	Rocky outcrop / breakaway
Dune crest	Salt lake
Dune slope	Sand dune
Dune swale	Sand plain
Escarpment	Stony plain
Flat	Swamp
Gorge	Undulating
Gully	Upper slope
Intertidal / mangrove	Wetland
	Water hole

Habitat quality – options

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

*Habitat structur*e - options

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	Clay loam
Loamy sand	Silty clay loam
Clayey sand	Clay
Sandy loam	Rock
Loam	Peat / organic
Silty loam	Stony
Sandy clay loam	
Soil Colour –options	
Black	Red
Brown	White
Grey	Yellow
Orange	
Surface stones - options	
None	Boulders (>250mm)
Pebbles (0-50mm)	Rocks
Cobbles (51-250mm)	
Potential for conservation significant species to be found in the area	
Yes	
No	
Impact of clearing on conservation significant species – options	
Low	Moderate - high
Low - moderate	High
Moderate	Extreme
Translocation of conservation significant fauna required:	
No	
Yes	

4.3.1 Survey and reporting staff

Dr Scott Thompson undertook the reconnaissance survey and fauna habitat assessment with the assistance of Eren Reid (Native Vegetation Solutions) on 13 May 2015. Dr Scott Thompson prepared the report and Dr Graham Thompson reviewed the report before it was sent to the client. Both senior scientists have appropriate relevant post-graduate qualifications, extensive experience in conducting fauna assessments in the Goldfields, have published research articles on biodiversity, fauna assemblages, conservation significant species, trapping techniques and temporal variations in trapped fauna assemblages based on Goldfields surveys and are therefore appropriately trained and experienced for the task of preparing this assessment.

4.4 Limitations

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

Lists of species potentially in and around the project area have been compiled from records in NatureMap, the Western Australian Museum records and reports of fauna surveys undertaken in the bioregion. It should be appreciated that some records in NatureMap and the Western Australian Museum are very old and those species are no longer present in the area. Terrestrial Ecosystems has not been able to see the primary data and is therefore not able to vouch for the accuracy of these records. All of these sources of data are known to contain errors, and this should be taken into account when reading this assessment.

The EPA *Guidance for Assessment of Environmental Factors: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia, No. 56* (2004) suggested that fauna surveys may be limited by many variables. Limitations associated with each of these variables are assessed in Table 1.

Table 1. Fauna assessment 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 zoologists that undertook the field survey and prepared this assessment are familiar with the vertebrate fauna of this bioregion and are experienced in these types of assessments.
Scope	No	All aspects of the scope of works have been addressed.
Proportion of fauna identified, recorded and/or collected	No	Not applicable.
Accuracy of previous survey work	Yes, negligible	Terrestrial Ecosystems has reported fauna survey data recorded by various authors, but is not in a position to vouch for the accuracy of this information. It is acknowledged that the taxonomy of Western Australian vertebrates is continually being revised and the nomenclature of some of the species listed in the appendices may have changed since publication by the authors.
Sources of information	Yes, negligible	Vertebrate fauna information was available from on-line databases and unpublished and published reports of surveys conducted in the bioregion in a variety of habitat types. Many of these surveys employed a low level of trapping effort which significantly impacts on the capacity of these data to represent the fauna assemblages in the areas surveyed.
Timing/weather/ season/ cycle	No	Weather was suitable for a reconnaissance survey.
Disturbances which affected results of the survey	No	The project area contained numerous tracks and there was evidence of recent and historical exploration activity in some areas. This minor level of disturbance has been taken into account in this assessment.
Intensity of survey effort	No	Not applicable.
Resources	No	Adequate resources were available.
Remoteness and/or access problems	No	There was vehicle track access to the majority of the project area. Access was not a limitation or constraint.
Availability of contextual information on the region	No	There is a reasonable quantity of fauna survey data available for this IBRA subregion.

Negligible = less than 20%.

5 RESULTS

5.1 Fauna habitats

The project area was visually assessed on 13 May 2015. The purpose of the reconnaissance survey was to determine fauna habitats and habitat condition and to identify any conservation significant species that may inhabit the area. The fauna habitat assessment was also undertaken during this reconnaissance survey.

The project are contains an oval-shaped, deep, disused mining pit near the centre and a linear pit in the northern section (Figure 2). The area around both pits has been cleared, with well used tracks leading to and from each pit. There is a rehabilitated area east of the large pit and other smaller areas. In addition, there are numerous exploration tracks that criss-cross the entire project area.

The project area had one broad fauna habitat of mixed eucalyptus woodland over mixed sclerophyll shrubland with or without chenopods with a sparse understory. The density of vegetation varies across the project area. Plates 1-4 provide an indication of the habitat types available and Appendix D contains additional images of the project area.

Plate 1. Mixed eucalypt woodland over mixed sclerophyll shrubland with a sparse understory

Plate 2. Mixed eucalypt woodland over mixed sclerophyll shrubland with a sparse understory

Plate 3. Mixed eucalypt woodland over mixed sclerophyll shrubland with a sparse understory

Plate 4. Mixed eucalypt woodland over mixed sclerophyll shrubland with a sparse understory

5.2 Fauna habitat condition

The project area contains numerous vehicle tracks and there has been historical and recent exploration drilling and associated rehabilitation. The rehabilitation is of varying quality and age. Other than the areas disturbed by mining, exploration and associated rehabilitation, fauna habitat condition for most of the project area is poor to good. There are no areas which had high quality fauna habitat.

Appendix D provides the results of the fauna habitat assessment. These data and images indicate the range of fauna habitats present in the project area.

5.3 Bioregional vertebrate fauna

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

Tables 2-5 provide a list of vertebrate species potentially found in the vicinity of the project area that have been compiled based on the fauna survey reports listed in section 3.

Table 2. Birds potentially found in the vicinity of the project area

Family	Species	Common Name
Accipitridae	*Lophoictinia isura*	Square-tailed Kite
	Haliastur sphenurus	Whistling Kite
	Accipiter fasciatus	Brown Goshawk
	Accipiter cirrocephalus	Collared Sparrowhawk
	Aquila audax	Wedge-tailed Eagle
	Hieraaetus morphnoides	Little Eagle
Anatidae	*Cygnus atratus*	Black Swan
	Tadorna tadornoides	Australian Shelduck
	Chenonetta jubata	Australian Wood Duck
	Anas gracilis	Grey Teal
	Anas superciliosa	Pacific Black Duck
	Aythya australis	Hardhead
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar
Podargidae	*Podargus strigoides*	Tawny Frogmouth
Casuariidae	*Dromaius novaehollandiae*	Emu
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover
	Charadrius australis	Inland Dotterel
	Elseyornis melanops	Black-fronted Dotterel
	Erythrogonys cinctus	Red-kneed Dotterel
	Vanellus tricolor	Banded Lapwing
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull
Recurvirostridae	*Recurvirostra novaehollandiae*	Red-necked Avocet
	Cladorhynchus leucocephalus	Banded Stilt
Scolopacidae	*Tringa nebularia*	Common Greenshank
Columbidae	*Streptopelia senegalensis*	Laughing Dove
	Phaps chalcoptera	Common Bronzewing
	Phaps elegans	Brush Bronzewing
	Ocyphaps lophotes	Crested Pigeon
Alcedinidae	*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
	Chalcites lucidus	Shining Bronze-Cuckoo
	Cacomantis pallidus	Pallid Cuckoo
	Cacomantis flabelliformis	Fan-tailed Cuckoo
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar
Falconidae	*Falco cenchroides*	Nankeen Kestrel
	Falco berigora	Brown Falcon
	Falco peregrinus	Peregrine Falcon
Megapodiidae	*Leipoa ocellata*	Malleefowl
Rallidae	*Fulica atra*	Eurasian Coot

Family	Species	Common Name
Acanthizidae	*Sericornis frontalis*	White-browed Scrubwren
	Hylacola cauta	Shy Heathwren
	Calamanthus campestris	Rufous Fieldwren
	Pyrrholaemus brunneus	Redthroat
	Smicrornis brevirostris	Weebill
	Gerygone fusca	Western Gerygone
	Acanthiza robustirostris	Slaty-backed Thornbill
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill
	Acanthiza apicalis	Inland Thornbill
	Aphelocephala leucopsis	Southern Whiteface
	Acanthiza uropygialis	Chestnut-rumped Thornbill
Artamidae	*Artamus personatus*	Masked Woodswallow
	Artamus cinereus	Black-faced Woodswallow
	Artamus cyanopterus	Dusky Woodswallow
	Cracticus torquatus	Grey Butcherbird
	Cracticus nigrogularis	Pied Butcherbird
	Cracticus tibicen	Australian Magpie
	Strepera versicolor	Grey Currawong
Campephagidae	*Coracina maxima*	Ground Cuckoo-Shrike
	Coracina novaehollandiae	Black-faced Cuckoo-Shrike
	Lalage tricolor	White-winged Triller
Climacteridae	*Climacteris rufa*	Rufous Treecreeper
Corvidae	*Corvus coronoides*	Australian Raven
	Corvus bennetti	Little Crow
	Corvus orru	Torresian Crow
Estrildidae	*Taeniopygia guttata*	Zebra Finch
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow
	Hirundo neoxena	Welcome Swallow
	Petrochelidon nigricans	Tree Martin
	Petrochelidon ariel	Fairy Martin
Maluridae	*Malurus splendens*	Splendid Fairy-wren
	Malurus leucopterus	White-winged Fairy-wren
	Malurus lamberti	Variegated Fairy-wren
	Malurus pulcherrimus	Blue-breasted Fairy-wren
Meliphagidae	*Lichenostomus virescens*	Singing Honeyeater
	Lichenostomus leucotis	White-eared Honeyeater
	Lichenostomus flavicollis	Yellow-throated Honeyeater
	Lichenostomus cratitius	Purple-gaped Honeyeater
	Lichenostomus ornatus	Yellow-plumed Honeyeater
	Purnella albifrons	White-fronted Honeyeater
	Manorina flavigula	Yellow-throated Miner
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater
	Anthochaera carunculata	Red Wattlebird
	Epthianura tricolor	Crimson Chat
	Epthianura albifrons	White-fronted Chat
	Sugomel niger	Black Honeyeater
	Gliciphila melanops	Tawny-crowned Honeyeater
	Lichmera indistincta	Brown Honeyeater
	Melithreptus brevirostris	Brown-headed Honeyeater
	Myiagra inquieta	Restless Flycatcher
	Grallina cyanoleuca	Magpie-Lark
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella
Pachycephalidae	*Pachycephala inornata*	Gilbert's Whistler
	Pachycephala pectoralis	Golden Whistler

Family	Species	Common Name
	Pachycephala rufiventris	Rufous Whistler
	Colluricincla harmonica	Grey Shrike-thrush
	Oreoica gutturalis	Crested Bellbird
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote
	Pardalotus striatus	Striated Pardalote
Petroicidae	*Microeca fascinans*	Jacky Winter
	Petroica goodenovii	Red-capped Robin
	Melanodryas cucullata	Hooded Robin
	Eopsaltria australis	Eastern Yellow Robin
	Eopsaltria griseogularis	Western Yellow Robin
	Drymodes superciliaris	Northern Scrub-robin
	Drymodes brunneopygia	Southern Scrub-robin
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler
Psophodidae	*Cinclosoma castanotus*	Chestnut Quail-thrush
Rhipiduridae	*Rhipidura fuliginosa*	Grey Fantail
	Rhipidura leucophrys	Willie Wagtail
Timaliidae	*Zosterops lateralis*	Silvereye
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant
Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe
Cacatuidae	*Eolophus roseicapillus*	Galah
	Nymphicus hollandicus	Cockatiel
Psittacidae	*Glossopsitta porphyrocephala*	Purple-crowned Lorikeet
	Polytelis anthopeplus	Regent Parrot
	Platycercus icterotis	Western Rosella
	Barnardius zonarius	Australian Ringneck
	Psephotus varius	Mulga Parrot
	Melopsittacus undulatus	Budgerigar
	Neophema splendida	Scarlet-chested Parrot
Strigidae	*Ninox novaeseelandiae*	Southern Boobook

Table 3. Mammals potentially found in the vicinity of the project area

Family	Species	Common Name
Bovidae	*Capra hircus*	Goat
	Ovis aries	Sheep
Canidae	*Canis lupus familiaris*	Dog
	Vulpes vulpes	Red Fox
Felidae	*Felis catus*	House Cat
Molossidae	*Austronomus australis*	White-striped Free-tail Bat
	Mormopterus planiceps	Southern Free-tail Bat
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat
	Chalinolobus morio	Chocolate Wattled Bat
	Mormopterus sp.	
	Nyctophilus geoffroyi	Lesser Long-eared Bat
	Nyctophilus major	Greater Long-eared Bat
	Scotorepens balstoni	Inland Broad-nosed Bat
	Vespadelus regulus	Southern Forest Bat
Dasyuridae	*Ningaui ridei*	Wongai Ningaui
	Ningaui yvonneae	Mallee Ningaui
	Sminthopsis crassicaudata	Fat-tailed Dunnart
	Sminthopsis dolichura	Little Long-tailed Dunnart
	Sminthopsis gilberti	Gilbert's Dunnart
	Sminthopsis hirtipes	Hairy-footed Dunnart
	Sminthopsis ooldea	Ooldea Dunnart
Burramyidae	*Cercartetus concinnus*	Southwestern Pygmy Possum

Family	Species	Common Name
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo
	Macropus irma	Western Brush Wallaby
	Macropus robustus	Wallaroo or Euro
	Macropus rufus	Red Kangaroo
Leporidae	*Oryctolagus cuniculus*	European Rabbit
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna
Equidae	*Equus caballus*	Domestic Horse
Muridae	*Mus musculus*	House Mouse
	Notomys alexis	Spinifex Hopping Mouse
	Notomys mitchellii	Mitchell's Hopping Mouse
	Pseudomys albocinereus	Ash-grey Mouse
	Pseudomys bolami	Bolam's Mouse
	Pseudomys hermannsburgensis	Sandy Inland Mouse
	Rattus fuscipes	Bush Rat
	Rattus rattus	Black Rat

Table 4. Amphibians potentially found in the vicinity of the project area

Family	Species	Common Name
Limnodynastidae	*Limnodynastes dorsalis*	Western Banjo Frog
	Neobatrachus albipes	White-footed Trilling Frog
	Neobatrachus centralis	
	Neobatrachus kunapalari	Kunapalari Frog
	Neobatrachus pelobatoides	Humming Frog
	Neobatrachus sutor	Shoemaker Frog
Myobatrachidae	*Crinia pseudinsignifera*	Bleating Froglet
	Pseudophryne guentheri	Crawling Toadlet
	Pseudophryne occidentalis	Western Toadlet

Table 5. Reptiles potentially found in the vicinity of the project area

Family	Species	Common Name
Agamidae	*Ctenophorus adelaidensis*	Southern Heath Dragon
	Ctenophorus caudicinctus	Ring-tailed Dragon
	Ctenophorus cristatus	Bicycle Dragon
	Ctenophorus fordi	Mallee Sand Dragon
	Ctenophorus isolepis	Crested Dragon
	Ctenophorus maculatus	Spotted Military Dragon
	Ctenophorus ornatus	Ornate Crevice Dragon
	Ctenophorus reticulatus	Western Netted Dragon
	Ctenophorus salinarum	Salt Pan Dragon
	Ctenophorus scutulatus	
	Moloch horridus	Thorny Devil
	Pogona minor	Bearded Dragon
	Tympanocryptis cephalus	Pebble Dragon
Boidae	*Morelia spilota imbricata*	Carpet Python
Carphodactylidae	*Nephrurus laevissimus*	
	Nephrurus vertebralis	
	Underwoodisaurus milii	Barking Gecko
Diplodactylidae	*Crenadactylus ocellatus*	Clawless Gecko
	Diplodactylus granariensis	
	Diplodactylus pulcher	
	Lucasium maini	
	Oedura reticulata	
	Strophurus assimilis	Goldfields Spiny-tailed Gecko
	Strophurus elderi	

Family	Species	Common Name
	Strophurus intermedius	
	Strophurus strophurus	
Elapidae	*Brachyurophis fasciolata*	
	Brachyurophis semifasciata	
	Demansia psammophis	Yellow-faced Whipsnake
	Furina ornata	Moon Snake
	Neelaps bimaculatus	Black-naped Snake
	Parasuta gouldii	
	Parasuta monachus	
	Parasuta nigriceps	
	Pseudechis australis	Mulga Snake
	Pseudonaja affinis	Dugite
	Pseudonaja mengdeni	Gwardar
	Pseudonaja modesta	Ringed Brown Snake
	Simoselaps bertholdi	Jan's Banded Snake
	Simoselaps semifasciata	
	Suta fasciata	Rosen's Snake
Gekkonidae	*Christinus marmoratus*	Marbled Gecko
	Gehyra purpurascens	
	Gehyra variegata	
	Heteronotia binoei	Bynoe's Gecko
	Rhynchoedura ornata	Beaked Gecko
Pygopodidae	*Delma australis*	
	Delma butleri	
	Delma fraseri	
	Delma nasuta	
	Lialis burtonis	
	Pygopus lepidopodus	Common Scaly Foot
Scincidae	*Cryptoblepharus buchananii*	
	Ctenotus atlas	
	Ctenotus leonhardii	
	Ctenotus mimetes	
	Ctenotus schomburgkii	
	Ctenotus severus	
	Ctenotus uber	
	Cyclodomorphus branchialis	
	Cyclodomorphus melanops	Slender Blue-tongue
	Egernia carinata	
	Egernia depressa	Southern Pygmy Spiny-tailed Skink
	Egernia formosa	
	Egernia multiscutata	
	Egernia richardi	
	Eremiascincus richardsonii	Broad-banded Sand Swimmer
	Hemiergis initialis	
	Hemiergis millewae	
	Hemiergis peronii	
	Lerista distinguenda	
	Lerista dorsalis	
	Lerista kingi	
	Lerista picturata	
	Lerista taeniata	
	Lerista terdigitata	
	Lerista tridactyla	
	Liopholis inornata	
	Menetia greyii	
	Morethia adelaidensis	

Family	Species	Common Name
	Morethia butleri	
	Morethia obscura	
	Tiliqua occipitalis	Western Bluetongue
	Tiliqua rugosa	
Typhlopidae	*Anilios australis*	
	Anilios bicolor	
	Anilios bituberculatus	
	Anilios hamatus	
Varanidae	*Varanus caudolineatus*	
	Varanus gouldii	Bungarra or Sand Monitor
	Varanus rosenbergi	Heath Monitor
	Varanus tristis	Racehorse Monitor

5.4 Conservation significant fauna species recorded or predicted to occur in the project area

Species listed under the *EPBC Act 1999* or the *Wildlife Conservation Act 1950* as being threatened or of conservation significance or are on the DPaW Priority and Threatened Species list and are potentially in the vicinity of the project area are shown in Table 6.

Conservation significant fauna are protected by the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act 1999)*, and this list includes species covered by international treaties such as the Japan-Australia Migratory Bird Agreement (JAMBA) and China-Australia Migratory Bird Agreement (CAMBA) and the Western Australia (WA) *Wildlife Conservation Act 1950*. The WA *Wildlife Conservation Act 1950* provides for the publishing of the *Wildlife Conservation (Specially Protected Fauna) Notice* that lists species under multiple categories (see Appendix B). In addition, the DPaW maintains a list of fauna that require monitoring under five priority headings (see Appendix B) based on DPaW's knowledge of their distribution, abundance and threatening processes. The *EPBC Act 1999* and *Wildlife Conservation Act 1950* 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 DPaW wishes to monitor potential impacts on these species. Environmental consultants and proponents of developments are encouraged to avoid and minimise impacts on these species. Definitions of the significant fauna under the *WA Wildlife Conservation Act* are provided in Appendix B.

Five threatened species of fauna and four migratory species of birds were identified under the *EPBC Act 1999* as potentially occurring in the vicinity of the project area. There are 13 Schedule species listed under the WA *Wildlife Conservation Act 1950* and eight priority species listed on the DPaW's Priority Fauna List that potentially occur in the region. The following is an assessment of the likelihood of each of the species listed in Table 2 being found in the project area and if they are found, the potential for impacting on the species during development.

Table 6. Species that are potentially found in the vicinity of the project area and that are listed as being of conservation significance under state or commonwealth government legislation or with DPaW.

Species	Status under the Wildlife Conservation Act / DPaW	Status under the EPBC Act	Comment on potential impact that vegetation clearing will have on conservation significant species
Ogyris subterrestris Arid Bronze Azure Butterfly	Schedule 1	Critical	Outside of its known distribution so unlikely to impact on this species. Potential impact very low as it is unlikely to be in the project area.
Calyptorhynchus latirostris Carnaby's Black-Cockatoo	Schedule 1	Endangered	Not recently recorded in the vicinity of the project area. The impact is therefore likely to be very low.
Leipoa ocellata Malleefowl	Schedule 1	Vulnerable	Potentially in the vicinity of the project area, however, it is unlikely to be impacted as there are no active mounds in the project area, there are limited areas of ideal habitat and they are mobile enough to move away from noise or disturbance.
Dasyurus geoffroii Chuditch	Schedule 1	Vulnerable	Not recently recorded in the vicinity of the project area, and although the habitat may be suitable in some areas, the impact is likely to be very low due to it not being present in the area.
Myrmecobius fasciatus Numbat	Schedule 1	Vulnerable	Not recently recorded in the vicinity of the project area, so it is unlikely to be in the project area. The potential impact on this species is very low.
Merops ornatus Rainbow Bee-eater	Schedule 3	Migratory	It is unlikely that vegetation clearing will significantly impact on this species because it can easily move to adjacent undisturbed areas once clearing commences. There may be a low impact if a nest is disturbed during vegetation clearing.
Apus pacificus Fork-tailed Swift	Schedule 3	Migratory	It is unlikely that vegetation clearing will significantly impact on this species as they are an aerial species and rarely come to the ground. They can also easily move to adjacent undisturbed areas once clearing commences.
Ardea alba Great Egret	Schedule 3	Migratory	Low possibility that it is in the general area as they are highly mobile and migratory species, so the potential impact is very low.
Ardea ibis Cattle Egret	Schedule 3	Migratory	Very low possibility that it is in the general area as they are highly mobile and migratory species, so the potential impact is very low.
Lophochroa leadbeateri Major Mitchell's Cockatoo	Schedule 4		The project area is a long way outside the known geographic distribution for Major Mitchell's Cockatoo and given that it will readily move to adjacent undisturbed areas once vegetation clearing commences, any potential impacts on this species are likely to be very low.

Species	Status under the Wildlife Conservation Act / DPaW	Status under the EPBC Act	Comment on potential impact that vegetation clearing will have on conservation significant species
Falco peregrinus Peregrine Falcon	Schedule 4		Low potential to be in the area, and if it is, it is unlikely that vegetation clearing will significantly impact on this species because it can easily move to adjacent undisturbed areas once clearing commences.
Morelia spilota imbricata Carpet Python	Schedule 4		Not recently recorded in the vicinity of the project area, and although the habitat may be suitable in some areas, the impact is likely to be very low in a bioregional context.
Aspidites ramsayi Woma	Schedule 4		Highly unlikely to be in the project area, so any potential impact on this species is likely to be very low.
Acanthophis antarcticus Southern Death Adder	Priority 3		Not recently recorded in the vicinity of the project area, and although the habitat may be suitable in some areas, any impacts are likely to be very low in a bioregional context.
Platycercus icterotis xanthogenys (Mallee) Western Rosella	Priority 4		Could be found in the eucalypt woodland, however, it would readily move to adjacent undisturbed areas once clearing commences. Overall potential for impact is low, when considered in a bioregional context.
Hylacola cautus whitlocki Shy Heathwren	Priority 4		Could be found in the project area, however, it will readily move to adjacent undisturbed areas once clearing commences. Overall potential for impact is low; however, there may be localised impacts if a nest was disturbed.
Oreoica gutturalis gutturalis Crested Bellbird	Priority 4		Could be found in the project area, however, it would readily move to adjacent undisturbed areas once clearing commences. Overall potential for impact is low; however, there may be localised impacts if a nest was disturbed.
Burhinus grallarius Bush Stone-curlew	Priority 4		Low probability of being found in the project area. If it is present, then it will readily move to adjacent undisturbed areas once clearing commences. Overall potential for impact is low.
Nyctophilus(timoriensis) sp. 1 Central Long-eared Bat	Priority 4		This species has been recorded in other surveys in the region, however, vegetation clearing associated with exploration is unlikely to significantly impact on this species, as it will readily move away from a disturbance.
Charadrius rubricollis rubricollis Hooded Plover (western subspecies)	Priority 4		Low probability of being found in the area due to lack of habitat. Potential impacts on this species are assessed as low.
Ardeotis australis Australian Bustard	Priority 4		Low probability of being found in the project area. If it is present, then it will readily move to adjacent undisturbed areas once clearing commences. Overall potential for impact is low.

5.4.1 Potential impact on species of conservation significance

Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*) – Schedule 1 under the *Wildlife Conservation Act 1950* and Critical under the *EPBC Act 1999*.

This butterfly is associated with colonies of the ant *Camponotus terebrans*. Larvae hatching from eggs laid near ant nest entrances (often near the bases of various mallee eucalypts) are carried by the ants into their nest. Details of its 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. It is known from Lake Douglas, which is 100kms north of the project area (Field 1999).

It is Terrestrial Ecosystems' assessment that vegetation clearing in the project area is unlikely to have a significant impact on this species as it is outside its known geographical range.

Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*) – Schedule 1 under the *Wildlife Conservation Act 1950* and Endangered under the *EPBC Act 1999*.

Carnaby's Cockatoo is found in the south-west of Australia from Kalbarri through to Ravensthorpe. It has a preference for feeding on the seeds of Marri, Banksia, Dryandra, Hakea, Eucalyptus, Grevillea, Pinus and *Allocasuarina* spp.. It is nomadic often moving toward the coast after breeding. It breeds in tree hollows that are 2.5–12m above the ground and has an entrance of 23-30cm with a depth of 1-2.5m. Nesting mostly occurs in smooth-barked trees (e.g. Salmon Gum, Wandoo, Red Morrell). Loss of habitat, in particular, feeding areas near breeding sites is considered to be a major threat to this species.

The project area is a long way east of the known extant geographic distribution for this species (Johnstone and Storr 1998, Department of Sustainability Environment Water Population and Communities 2012), however, Davies (1966) reported Carnaby's Cockatoo as far east as Norseman fifty years ago, but this was a rare occurrence and given the recently reported significant contraction in its geographic range, it is highly unlikely to be seen this far east again. Terrestrial Ecosystems' assessment is that they are unlikely to be seen in the vicinity of the project area, so any impacts are likely to be very low.

Malleefowl (*Leipoa ocellata)* - Schedule 1 under the *Wildlife Conservation Act 1950* and Vulnerable under the *EPBC Act 1999*.

Malleefowl are large, ground-dwelling birds that rarely fly unless alarmed or are perching for the night. Historically, Malleefowl have been found in mallee regions of southern Australia from approximately the 26th parallel of latitude southwards. Recently their range has contracted due to fox predation and land clearance. Their abundance in the Goldfields is low and they are sparsely distributed, favouring those areas that are more densely vegetated. Malleefowl build distinctive nests that comprise a large mound of soil/rock covering a central core of leaf litter. These nest mounds range in diameter but can span more than five metres and may be up to one metre high. Malleefowl are generally monogamous and, once breeding commences, they pair for life. The presence of nest mounds provides an indication of the presence of Malleefowl in the area.

Malleefowl have been recorded in other fauna surveys in the vicinity of the project area (Appendix A). However, no evidence (e.g. tracks or mounds) of Malleefowl were found in the project area, and there is limited high quality habitat available for this species. It is therefore Terrestrial Ecosystems' assessment that Malleefowl may be found in the general vicinity, however any impact on them would be low as they are unlikely to nest in the project area and they can easily move away from vegetation clearing or other disturbances.

Chuditch (*Dasyurus geoffroii*) – Schedule 1 under the *Wildlife Conservation Act 1950* and Vulnerable under the *EPBC Act 1999*.

The Chuditch is the largest carnivorous marsupial in Western Australia (WA). It is usually active from dusk to dawn. Formally known from over 70% of Australia, the Chuditch now has a patchy distribution throughout the

Jarrah forest and mixed Karri/Marri/Jarrah forest of south-west WA and other isolated areas. 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).

They have been recorded in similar habitat around Forrestania (i.e. 100plus km to the west), but there are no recent records in the vicinity of the project area. Based on the available data, it is Terrestrial Ecosystems assessment that the impact is likely to be very low due to it not being present or present in very low densities.

Numbat (*Myrmecobius fasciatus*) - Schedule 1 under the *Wildlife Conservation Act 1950* and Vulnerable under the *EPBC Act 1999*.

Numbats were once present across southern semi-arid and arid Australia, including parts of NSW, SA and southern NT, as well as the south-west of Western Australia. In Western Australia, there are small residual populations at Dryandra and Perup, with recent translocations at Boyagin Nature Reserve, Tutanning Nature Reserve, Batalling block and Karroun Hill Nature Reserve. Numbats are essentially solitary, forage during the day in winter and in the early morning and late afternoon in summer.

There is a very old record (i.e. 1927) of a Numbat being found in the western goldfields (Atlas of Living Australia), however, it is highly unlikely that they are in the project area or vicinity. It is Terrestrial Ecosystems assessment that the impact is likely to be very low due to it not being present in the area.

Rainbow Bee-eater (*Merops ornatus*) - Migratory under the *EPBC Act 1999* and Schedule 3 under the *Wildlife Conservation Act 1950*.

The Rainbow Bee-eater is widespread during late spring and summer in the southern section of WA, particularly in sandy areas that have access to water. This species was recorded in numerous fauna surveys in the goldfields in the vicinity of the project area (Appendix A), and could therefore be seen in the project area the spring and summer. These migratory birds will readily move out of the area if disturbed, so any impacts are likely to be low.

Fork-tailed Swift (*Apus pacificus*) - Migratory under the *EPBC Act 1999* and Schedule 3 under the *Wildlife Conservation Act 1950*.

The Fork-tailed Swift breeds in north-east and mid-east Asia and winters in Australia and New Guinea. It arrives in the Kimberley in late September and in central and southern WA in November and leaves in late April. The Fork-tailed Swift may be an infrequent visitor to the area although it has not been recorded in previous surveys.

It is Terrestrial Ecosystems' assessment that the Fork-tailed Swift may infrequently be seen in the vicinity of the project area, but is unlikely to be impacted by the proposed developments as it is an aerial species and rarely comes to the ground.

Great Egret (*Ardea alba*) - Migratory under the *EPBC Act 1999* and Schedule 3 under the *Wildlife Conservation Act 1950*

Herons and egrets all depend, to some extent upon surface water for hunting. This is a large, elegant, white wader dependent upon floodwaters, rivers, shallow wetlands and intertidal mudflats.

It is Terrestrial Ecosystems assessment the Great Egret would not be seen in the project area due to a lack of suitable habitat, so any impacts would be very low.

Cattle Egret (*Ardea ibis*) - Migratory under the *EPBC Act 1999* and Schedule 3 under the *Wildlife Conservation Act 1950*

The smallest of Australian egrets, this species has undertaken an invasion of Australia from the north, where it was originally more common in the Indonesian archipelago than Australia. This invasion may have been assisted by the

opening up of farming land and irrigation schemes, providing the pasturelands and shallow wetlands that the species prefers to forage in.

The only habitats within the project area which may support this species are surface marshes and the fringes of the salt lakes if they are in flood. It is Terrestrial Ecosystems assessment the Cattle Egret would not be seen in the project area due to a lack of suitable habitat, so any impacts would be very low.

Major Mitchell's Cockatoo (*Lophochroa leadbeateri*) – Schedule 4 under the *Wildlife Conservation Act 1950.*

The Major Mitchell's Cockatoo geographic distribution includes some of the semi-arid and arid zones of Australia. It has a disjunct geographic distribution in WA with a population in the semi-arid area east of Geraldton to include Lake Moore and Lake Barlee and the west of the project area. Major Mitchell's Cockatoo is most often seen high in the branches of Salmon Gums (*Eucalyptus salmonophloia*) and other large eucalypts, in heavily timbered creek-lines or roadside verges in various parts of the WA wheatbelt. Major Mitchell's Cockatoo breed in the hollows of large eucalypts. It is scarce throughout most of WA and the primary cause for its decline is land clearing for agriculture and subsequent fragmentation of remaining habitat. There is a small population that is seen around Southern Cross and as far east as Kalgoorlie (see Atlas of Living Australia). There are also records in Terrestrial Ecosystems' fauna survey database of Major Mitchell's Cockatoo being seen in the woodlands to the west of the project area but none within 50km.

It is Terrestrial Ecosystems' assessment that Major Mitchell's Cockatoo could infrequently be seen in the vicinity of the project area, but this is not their core area, and as such, the potential for impacting on this species is low.

Peregrine Falcon (*Falco peregrinus*) – Schedule 4 *Wildlife Conservation Act 1950*.

The Peregrine Falcon is uncommon, although widespread throughout much of Australia excluding the extremely dry areas and has a wide and patchy distribution. It favours hilly or mountainous country and open woodlands and may be an occasional visitor to the project area. 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. Peregrine Falcons were recorded during numerous fauna surveys in the goldfields (Appendix A), so they are in the area.

It is Terrestrial Ecosystems' assessment that the Peregrine Falcon may infrequently be observed in the project area; however, vegetation clearing is unlikely to have a significant impact on this species as there are plenty of similar habitats in adjacent areas.

Carpet Python (*Morelia spilota imbricata*) - Schedule 4 under the *Wildlife Conservation Act 1950*.

The Carpet Python is a large snake found across the south-west of WA, north to Geraldton and Yalgoo, and east of Kalgoorlie, Fraser Range and Eyre and there are records (1981 and 1996) for this species north of Widgiemooltha (see Atlas of Living Australia). It inhabits forest, heath or wetland areas and shelters in hollow logs or in branches of large trees. It feeds on a variety of vertebrates including small mammals and reptiles. Carpet Python assemblages are generally found in low numbers and are dispersed across a relatively large area, except during the breeding season when aggregations have been recorded.

Although there is suitable habitat in the project area, it is highly unlikely that they are in the project area, so any potential impact on the species will be low.

Woma (southern form: *Aspidites ramsayi*) – Schedule 4 under the Wildlife Conservation Act 1950.

This python was once common in a crescent shaped distribution from Shark Bay through the wheatbelt to Kitchener. The Atlas of Living Australia has records of them being caught in the vicinity of the Great Eastern Highway from around Southern Cross and east towards Coolgardie and then there is a disjunct population near Zanthus.

Given the lack of records near the project area, Terrestrial Ecosystems has assessed potential impacts on this species as very low.

Southern Death Adder (*Acanthophis antarcticus*) – Priority 3 with DPaW

The Southern Death Adder is a very cryptic snake that is found from the Darling Range, central wheatbelt and from Esperance across the Nullarbor Plain to the South Australian border. It is rarely caught in fauna surveys and only opportunistically encountered on roads and in undisturbed bushland.

The Southern Death Adder is in relatively low densities across the goldfields and there is a very low possibility it is in the project area. However, there are no records in the Atlas of Living Australia in the vicinity of the project area, so the potential impact on the species is very low in a bioregional context.

Western Rosella (*Platycercus icterotis xanthogenys*) – Priority 4 with DPaW.

The mallee form of the Western Rosella is found mostly in Eucalypt and Casuarina woodland and shrublands, especially Wandoo, Flooded Gums and Salmon Gums. This species was sighted by Chapman et al., (1991) near Cave Hill Nature Reserve, but it was not seen in any of the other fauna surveys around the project area (Appendix A). Based on his surveys in the Goldfields, Prof. H. Recher (pers. comm.) suggested that this species is sparse throughout the Great Western Woodland and probably nested in the woodlands.

There is a low probability that the Western Rosella could be found in the eucalypt woodland in low densities, however, it would readily move to adjacent undisturbed areas once vegetation clearing commences. The overall potential for impact is low, however, there may be localised impacts if a hollow containing a nesting bird was disturbed.

Shy Heathwren (*Hylacola cautus whitlocki*) – Priority 4 with DPaW.

The Shy Heathwren is a small ground species that is found in the semi-arid interior of WA, including much of the southern wheatbelt. Its habitat includes dense shrub and heathlands in the understorey of eucalypt woodlands, often on sandy soils. Johnstone and Storr (2004) recorded it as locally moderately common or common, but generally scarce or uncommon and patchily distributed, and reported that the project area is within its geographic distribution. There are no records in the Atlas of Living Australia for this species in the vicinity of the project area, although it was recorded during surveys at St Ives (ATA Environmental, 2006). It could be expected across the majority of the project area, however, it is likely to be confined to the understorey of eucalypt woodlands.

Given that the proposed land clearing represents a very small fraction of similar habitat in the area, it is Terrestrial Ecosystems' assessment that the proposed clearing in the project area is unlikely to have a significant impact on this species when considered in a bioregional context. If it is in the area, then it will move once vegetation clearing commences.

Crested Bellbird (*Oreoica gutturalis gutturalis*) – Priority 4 with DPaW

Johnstone and Storr (2004) reported the geographic distribution for the Crested Bellbird to include the greater part of WA. Its preferred habitat is scrub and thickets (but not near edges). In the south-west of WA it is found mostly in wooded areas, including open Banksia scrub and heath land. It was seen in numerous fauna surveys in the bioregion (Appendix A) and there is a record in Atlas of Living Australia about 20km to the west of the project area. Prof. H. Recher (pers. comm.) suggested that they were common in the Great Western Woodlands.

It is Terrestrial Ecosystems' assessment that the Crested Bellbird could be seen in the project area as it has been recorded in similar habitats in nearby surveys. Terrestrial Ecosystems assessment is that any vegetation clearing will not significantly impact on the Crested Bellbird, when considered in a bioregional context and it as it is likely to move to adjacent areas once clearing commences.

Bush Stone-curlew (*Burhinus grallarius*) – Priority 4 species with DPaW

The Bush Stone-curlew is a large bird that is often found in lightly wooded areas. The Bush Stone-curlew demonstrates some site fidelity but its home range is relative large. The Bush Stone-curlew was recorded by Halpern Glick Maunsell (1998) at St Ives, although there are no records in the Atlas Australia for this species near the project area. It is a very cryptic species and could have easily been missed in other surveys in the region. It is Terrestrial Ecosystems' view that the Bush Stone-curlew may be seen infrequently in the project area, however, they will move to adjacent areas once clearing commences so it is unlikely to be significantly impacted.

Central Long-eared Bat (*Nyctophilus (timorensis*) sp.) – Priority 4 with DPaW

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

Given that the proposed vegetation clearing represents a very small fraction of similar habitat in the general area, it is Terrestrial Ecosystems' assessment that the proposed clearing in the project area is unlikely to have a significant impact on this species, as it will readily move to adjacent areas.

Hooded Plover (*Charadrius rubricollis*) – Priority 4 species with DPaW

This species frequents the margins and shallows of salt lakes, and also along coastal beaches, where it forages for invertebrates. It is found along the southern coast and salt lakes north to Port Gregory, Three Springs, Mt Gibson, Lake Brown, Lake Barlee, Lake Cowan and Eyre. It is an uncommon to common resident on the southern sea beaches from Cape Naturaliste east to Eyre. It probably breeds in the samphire habitat along the boundary of some of the salt lakes in the bioregion.

It is Terrestrial Ecosystems' assessment that the Hooded Plover is not in the project area due to a lack of suitable habitat. The potential for impacting this species is therefore low.

Australian Bustard (*Ardeotis australis*) – Priority 4 species with DPaW

Preferring open woodlands and grasslands, the Australian Bustard is a large, ground bird with a distinctive body shape. Although not flightless, Bustards spend the greater proportion of the time on the ground and tend to walk or run from danger rather than fly. Predation by introduced species, including anthropogenic hunting, and habitat loss has caused population declines. This species is expected to utilise habitats across much of the project area.

It is Terrestrial Ecosystems' assessment that any vegetation clearing will not significantly impact on the Australian Bustard, as they are nomadic and likely to move to adjacent undisturbed areas once clearing commences. Any impacts are likely to be low.

5.5 Risk assessment

Fauna surveys to support Environmental Impact Assessments (EIA) are part of the environmental risk assessment undertaken to consider what potential impacts a development might have on the biodiversity on a particular area and region. Potential impacts on fauna from the proposed development are identified and briefly described above. Tables 7, 8 and 9 provide a summary of the risk assessment associated with this project.

The assessment contained in Table 9 is supported by more detail discussion in sections above and the management recommendations below.

Table 7. Fauna impact risk assessment descriptors

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. These criteria do not fit all circumstances (e.g. adequacy of fauna survey data), however, they are useful in providing the reader with an appreciation of the level of likelihood and consequences of an event. 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 events or 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 9.

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 sometime.
C	Moderate	The environmental event should occur or one or more conservation significant species should be present at sometime.
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 of risk
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. Will require a referral to the Commonwealth under the *EPBC Act 1999*.
Extreme	Unacceptable, project should be redesigned or not proceed.

Table 8. Levels of acceptable risk

		Likelihood				
		Rare or very low (A)	Unlikely or low (B)	Moderate (C)	Likely (D)	Almost certain (E)
Consequences	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 9. Risk assessment

		Before Management				With Management		
Factor	Potential Impact	Inherent Risk			Risk Controls / Management	Residual Risk		
		Likelihood	Consequence	Significance		Likelihood	Consequence	Significance
Inadequate fauna survey data.	Unknown loss of fauna, fauna of conservation significance, fauna assemblage(s) in development site.	C	2	Low				
Inadequate knowledge of potential impacts.	Unknown or poorly assessed impact(s) on fauna assemblage and conservation significant species.	B	2	Low				
Inadequate bioregional data for contextual purposes.	Incomplete analysis of data and appreciation of impacts on biodiversity values in a regional context.	B	2	Low				
Removal of habitat – site scale.	Almost complete loss of terrestrial fauna in cleared areas, severe impact on local fauna assemblage.	E	1	Low				
Significant reduction of habitats – local scale.	Loss of fauna and fauna habitat and impacts on local fauna assemblage (excluding conservation significant species).	B	1	Low				
Significant reduction of habitats – landscape scale.	Loss of fauna and fauna habitat and impacts on fauna in a landscape context (excluding conservation significant species).	A	1	Low				
Significant reduction of habitats – regional scale.	Loss of fauna and fauna habitat and impacts on fauna in a bioregional context (excluding conservation significant species).	A	1	Low				

		Before Management				With Management		
Factor	Potential Impact	Inherent Risk			Risk Controls / Management	Residual Risk		
		Likelihood	Consequence	Significance		Likelihood	Consequence	Significance
Loss of conservation significant species	Loss of a localised population or a few individuals – *Leipoa ocellata*.	A	3	Low				
	Loss of a localised population or a few individuals – *Platycercus icterotis xanthogenys*.	A	3	Low				
	Loss of a localised population or a few individuals – *Lophochroa leadbeateri.*	A	3	Low				
	Loss of a localised population or a few individuals – *Morelia spilota imbricata.*	A	2	Low				
	Loss of a localised population or a few individuals – *Oreoica gutturalis gutturalis.*	B	2	Low				
	Loss of a localised population or a few individuals – *Nyctophilus(timoriensis)* sp.	A	2	Low				
	Loss of a localised population or a few individuals – *Charadricus rubricollis rubricollis.*	B	2	Low				
	Loss of a localised population or a few individuals – *Falco peregrinus.*	A	2	Low				
	Loss of a localised population or a few individuals – *Hylacola cauta whitlocki*.	A	2	Low				
	Loss of a localised population or a few individuals – *Acanthophis antarcticus.*	A	2	Low				
	Loss of a localised population or a few individuals – *Burhinus grallarius*.	A	2	Low				

		Before Management				With Management		
Factor	Potential Impact	Inherent Risk			Risk Controls / Management	Residual Risk		
		Likelihood	Consequence	Significance		Likelihood	Consequence	Significance
	Loss of a localised population or a few individuals – *Ardeotis australis*.	A	2	Low				
Nomadic avian species	Loss of a localised population or a few individuals – *Merops ornatus.*	A	2	Low				
Migratory avian species.	Loss of a localised population or a few individuals – *Apus pacificus.*	A	2	Low				
	Loss of a localised population or a few individuals –*Ardea alba.*	A	2	Low				
	Loss of a localised population or a few individuals – *Ardea ibis.*	A	2	Low				
Anthropogenic activity	Introduced fauna populations increasing.	C	2	Low				
	Altered fire regimes adversely affecting fauna assemblages.	B	2	Low				
	Road kills.	E	2	Low				

6 DISCUSSION

6.1 Adequacy of available vertebrate fauna data

The EPA *Terrestrial Biological Surveys as an Element of Biodiversity Protection:* Position Statement No. 3 (EPA 2002), *Guidance Statement for Assessment of Environmental Factors: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia No. 56* (EPA 2004) and the *Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA / DEC 2010) are the three relevant documents to assess the adequacy of the available information and reporting for vertebrate fauna surveys in Western Australia.

The adequacy of the data provided and the resulting assessment of potential impacts of vegetation clearing and exploration or development in the project area on terrestrial fauna should be assessed in the context of whether additional fauna survey data would provide a better understanding of potential impacts and as a consequence improve how these impacts might be managed. Terrestrial Ecosystems' view is that given the available fauna survey data and the abundance of similar habitat in adjacent areas, there is no justification for undertaking a more detailed Level 2 vertebrate fauna survey in the project area, as there are sufficient data to make an adequate assessment of potential impacts on the terrestrial vertebrate fauna in the project area.

6.2 Fauna assemblages

6.2.1 Amphibians

Amphibians typically found in eucalypt woodlands in the Goldfields are listed in Table 4. All the Limnodynastidae species are burrowing frogs and only come to the surface to feed and breed after substantial rain. *Pseudophryne occidentalis* finds shelter under rocks and in crevices during the dry periods and enters temporary ponds to breed after major rainfall events and *P. pseudinsignifera* is an aquatic species and would only be found around permanent water sources. All species have a wide-spread distribution and are abundant.

6.2.2 Reptiles

Reptile species richness in the project area will be comparable with similar eucalypt woodlands elsewhere in the bioregion. The list provided in Appendix A represents species likely to be found over a large area of diverse habitat types. Eucalypt woodlands would typically support up to 40 species of reptiles, but many of these would be in low abundance (see Table 5). There is a very low possibility that the Carpet Python was present in the project area, although they were not seen during the fauna habitat assessment or recorded in recent assessments.

6.2.3 Birds

Avian species richness in the Goldfields is influenced by rainfall and is generally higher in woodlands compared with chenopod shrublands and more sparsely vegetated areas. The list provided in Table 2 represents species likely to be found over a large area of diverse habitat types. Eucalypt woodlands would typically support up to 50-70 species of birds, but many of these would be in very low numbers (see Appendix A). Birds typically move from an area once vegetation clearing commences, so the impact is relatively low if the area is small. However, eggs and chicks in nests are often lost during the clearing process. The Malleefowl is the most significant species that could be impacted by the proposed mining development, however, the habitat is not ideal and no evidence was found to suggest that they are present.

6.2.4 Mammals

Mammal abundance in the semi-arid areas varies seasonably and from year-to-year depending on the available resources and previous rainfall. Table 3 provides an indication of the mammals that have been recorded in other surveys in the region. Small mammals that retreat to burrows and logs during the day are often lost during the clearing process. There are no known conservation significant mammals likely to be in the project area.

6.3 Biodiversity values of the site

The EPA Position Statement No. 3 indicates an ecological assessment must consider its biodiversity value at the genetic, species and ecosystem levels, and its ecological functional value at the ecosystem level (EPA 2002). There are insufficient data available to consider biodiversity at the genetic level.

Fauna habitat types represented in the project area are abundant and in very good 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 A) provides a good indication of the vertebrate fauna that are potentially in the project area.

The listed avian species of conservation significance potentially seen in the project area are the Major Mitchell's Cockatoo, Western Rosella, Peregrine Falcon, Crested Bellbird, Shy Heathwren, Bush Stone-curlew, Australian Bustard and the Malleefowl and the migratory Rainbow Bee-eater, Fork-tailed Swift, Great Egret and Cattle Egret. All of these avian species are mobile and will readily move to adjacent areas if disturbed. The only potential impact would be clearing a tree or nest that contained eggs or chicks (e.g. Western Rosella, Crested Bellbird, Shy Heathwren), and the likelihood of this happening is assessed as low.

There is a very low possibility that the area supports Carpet Pythons and Southern Death Adders. Carpet Pythons are scarce in the 'Great Western Woodlands' with some documented and isolated populations further to the south around the Lake Johnstone project area, east of Widgiemooltha and north and east of Kalgoorlie. The Southern Death Adder is a very cryptic species and seldom recorded during surveys when they are present. Given their current known distribution and the low probability of them being present in the project area, any potential impacts are likely to be very low in a bioregional context.

6.3.1 Condition of fauna habitat and extent of habitat degradation

There is one broad fauna habitats in the project area - mixed eucalypt woodland over mixed sclerophyll shrubland with or without chenopods with a sparse understory

There are numerous tracks and some evidence of recent and historical exploration activity and areas that have been rehabilitated in the project area; the majority of the available habitat is in poor to good condition.

6.3.2 Ecological linkages

The project area currently does not provide any important ecological linkages or fauna movement corridors. There are exploration tracks that dissect the project area, but all are relatively narrow and are unlikely to provide a barrier that would inhibit the movement of fauna within the general area.

6.3.3 Conservation significant species

There is a very low possibility that the area supports Carpet Pythons, Southern Death Adder, Major Mitchell's Cockatoo, Western Rosella, Peregrine Falcon, Bush Stone-curlew, Australian Bustard, Malleefowl, Fork-tailed Swift, Great Egret and Cattle Egret, so any potential impacts on these species are assessed as very low. The Crested Bellbird, Shy Heathwren and the Rainbow Bee-eater are probably in the area. All avian species potentially found in the project area are mobile and will readily move to adjacent areas if disturbed.

As the proposed impact area is small relative to the available similar habitat in the adjacent areas and the broader region, the probability of significantly impacting on any of these species is low.

6.3.4 Great Western Woodland

The project area is within the Great Western Woodland (Department of Environment and Conservation 2010) which is an area of special interest to various conservation groups and the DPaW. Currently, there are no specific management strategies in place that focus on the vertebrate fauna, however, the proposed state government management strategies for pest and fire will have an indirect impact if and when they are implemented.

Conservation groups are keen for the Great Western Woodland to be preserved and will continually put pressure on DPaW and environmental regulators to limit development in this area.

6.4 Potential impacts on fauna

Clearing of vegetation will potentially affect vertebrate fauna in a number of ways, including:

- Death/injury of fauna during clearing, grading and impacts with vehicles;
- Loss of habitat;
- Fragmentation of habitat;
- Increase in feral fauna around the mining development; and
- Disturbance of fauna in nearby areas from light, noise and dust.

These impacts are discussed below.

6.4.1 Direct impacts

6.4.1.1 Animal deaths during the clearing process and displacement of fauna

Clearing vegetation and exploration activities will result in the loss of most small fauna that retreat to burrows, such as reptiles and mammals. Nocturnal species are unlikely to be active when most of the land clearing is taking place which will inevitably result in these individuals being killed or injured in their burrows or as they attempt to escape. Larger terrestrial animals and avian species will most often move to adjacent areas. These species will be required to establish new activity areas and home ranges, and this could result in the temporary displacement of resident species. However, long-term impacts are likely to be low.

6.4.1.2 Reduction or loss of activity areas and closure of burrows

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

6.4.2 Indirect impacts

In addition to the obvious impact of vegetation clearing there can be an equally significant or greater impact in the adjacent areas because of 'edge effects'. Edge effects include disruption to ecological processes such as predation and dispersal, animal movements and can change assemblage structure. The consequence is that the impact area will always be much larger than the cleared area. Vehicle tracks also have the propensity to develop weed infestations which can impact on natural fauna habitats. Cleared corridors can also provide improved predator access to areas, enhance the invasion of pest species into areas and may act as inhibitors or disrupt fauna migration and movement patterns.

There are numerous potential threats associated with vegetation clearing and exploration or development that could have a significant impact on the vertebrate fauna in the project area. Some of these are discussed below.

6.4.2.1 Habitat fragmentation

In addition to vegetation clearing, infrastructure including tracks, has the potential to fragment habitat. Cleared linear tracks of land are 'unnatural' in much of the habitat. These linear structures that partition existing activity areas, isolate sections of established communities and may alter long and medium-term patterns of movement around established home ranges particularly for small mammals and reptiles. A reduction in the population as a result of this infrastructure 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.

As most of the tracks within the project area will be relatively narrow; the potential impact associated with habitat fragmentation is likely to be low.

6.4.2.2 Introduced fauna

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

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

Infrastructure known to support feral species, such as rubbish disposal sites and bins, should be managed to minimise increases in these populations.

6.4.2.3 Road fauna deaths

An increase in road fauna deaths is likely to occur where new roads 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. Therefore, there is an increased propensity for these species to be killed by vehicles.

6.4.2.4 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 an area, or alter their activity periods.

6.4.3 Summary of impacts

Based on the available information, it is Terrestrial Ecosystems' view that clearing of the vegetation for exploration or development will not significantly impact on conservation significant species listed under the Commonwealth *EPBC Act 1999* or WA *Wildlife Conservation Act 1950*. Fauna will be lost during the clearing process, but this impact is unlikely to be significant, as similar fauna habitat supporting similar fauna assemblages are abundant in adjacent areas.

6.5 Native vegetation clearing principles

The *Environmental Protection Act* (*1986*) provides criteria to judge the potential impact of a development on clearing native vegetation on flora and fauna. These criteria have been listed below with a response to indicate how clearing of the vegetation in the project area might be judged against these principles as they relate to fauna and fauna assemblages.

Table 10. Assessment of impact on fauna and fauna assemblages using the Native Vegetation Clearing Principles

Principle	Response
It comprises a high level of biological diversity.	Clearing vegetation will not compromise 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.	The project area does not contain habitat that is necessary for fauna indigenous to Western Australia
It includes, or is necessary for the continued existence or, rare flora.	Not applicable.
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 community.
It is significant as a remnant of native vegetation in an area that has been extensively cleared.	The area is not a remnant nor will the proposed clearing create a remnant.
It is growing in, or in association with, an environment associated with a watercourses or wetland.	The area does not contain a watercourse of wetland.
The clearing of the vegetation is likely to cause appreciable land degradation.	Not applicable.

The clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	Clearing of vegetation is unlikely to impact on the environmental values of the bioregion.
The clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	Not applicable.
The clearing of the vegetation is likely to cause, or exacerbate the incidence of flooding.	Not applicable.

7 SUMMARY AND CONCLUSIONS

Native Vegetation Solutions (NVS) commissioned Terrestrial Ecosystems on behalf of Metals X Limited to complete a Level 1 fauna risk assessment of 177ha of vegetation near the current Higginsville Mining Operations. Metals X Limited through its 100% owned subsidiary company Higginsville Gold Operation proposes to expand current pit and waste landform areas as well as develop a new pit and waste landform area for the Fairplay project in the Higginsville area. A mining proposal is currently being prepared, and will be submitted with the inclusion of this report.

Fauna survey data from other projects in the bioregion provide an adequate indication of the fauna assemblages likely to be encountered in the project area. These data are adequate to assess potential impacts on the vertebrate fauna potentially found in the project area and a Level 2 fauna survey is not required.

The project area has been degraded by previous exploration and mining activity and has numerous exploration tracks. The project area had a single fauna habitat of mixed eucalyptus woodland over mixed sclerophyll shrubland with or without chenopods with a sparse understory that was assessed as in poor to good condition.

No conservation significant vertebrate fauna were assessed as likely to be significantly impacted by the proposed development. There is a very low possibility that the area supports Carpet Pythons, Southern Death Adder, Major Mitchell's Cockatoo, Western Rosella, Peregrine Falcon, Bush Stone-curlew, Australian Bustard, Rufous Fieldwren, Malleefowl, Fork-tailed Swift, Great Egret and Cattle Egret. Crested Bellbird, Shy Heathwren and the Rainbow Bee-eater may potentially inhabit the project area but are unlikely to be significantly impacted by further vegetation clearing. All other avian species potentially found in the project area are mobile and will readily move to adjacent areas if disturbed.

8 REFERENCES

ATA Environmental. 2006. Vertebrate Fauna Assessment of St Ives Gold Mine. Kalgoorlie.

Bamford Consulting Ecologists. 2010. Gold Fields St Ives Gold Mine, Kambalda. Fauna Assessment: impacts of water discharge and general mining activity on vertebrate fauna. Perth.

Chapman, A., I. Kealley, D. McMillan, P. McMillan, and G. Rolland. 1991. Biological surveys of four Goldfields Reserves. Landnote **1/91**:1-26.

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.

Cowan, M. 2002. Coolgardie 3 (COO3 - Eastern Goldfields subregion). Pages 156-169 A Biodiversity Audit of Western Australia's 53 Biogeographic Subregions in 2002. Department of Conservation and Land Management, Perth.

Dames and Moore. 1999. Public Environmental Review - Gold Mine Developments on Lake Lefroy. Unpublished report to WMC Resources Ltd (St Ives Gold), Perth.

Davies, S. J. J. F. 1966. The movements of the White-tailed Black Cockatoo (*Calyptorhynchus baudinii*) in south-western Australia. Western Australian Naturalist **10**:33-42.

Dell, J., and R. A. How. 1984. Vertebrate fauna. Records of the Australian Museum **Supplement No. 18**:57-89.

Department of Environment and Conservation. 2010. A Biodiversity and Cultural Conservation Stratgey for the Great Western Woodlands.

Department of Sustainability Environment Water Population and Communities. 2012. EPBC Act Referral Guidelines for Three Threatened Black Cockatoo Species: Carnaby's Cockatoo (endangered) *Calyptorhynchus latirostris*, Baudin's Cockatoo (vulnerable) *Calyptorhynchus baudinii*, Forest Red-tailed Black Cockatoo (vulnerable) *Calyptorhynchus banksii naso*. Canberra.

Environmental Protection Authority. 2002. Terrestrial Biological Surveys as an Element of Biodiversity Protection: Position Statement No. 3. Environment Protection Authority, Perth.

Environmental Protection Authority. 2004. Guidance for the Assessment of Environmental Factors. Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia No. 56. Perth.

Environmental Protection Authority and Department of Environment and Conservation (Eds Hyder, B. M., Dell, J. and Cowan, M.A.),. 2010. Technical Guide - Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment. Environmental Protection Authority, Perth.

Field, R. P. 1999. A new species of *Ogyris* Angus (Lepidoptera: Lycaenidae) from southern arid Australia. Memoirs of Museum Victoria **57**:251-251.

Halpern Glick Maunsell. 1998. Lake Lefroy Environmental Assessment. Report ES4490C., Perth.

Handley, M. A. 1991. The Biota of Inland Salt Lakes of the Kambalda Region, and Coastal Salt Lakes of Esperence, Western Australia. A Comparative Study. Curtin University of Technology, Perth.

Johnstone, R. E., and G. M. Storr. 1998. Handbook of Western Australian Birds. Volume 1 - 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.

Keith Lindbeck and Associates. 2007. St. Ives Gold Mining Company Tailings Storage Facility (No. 4) Spring Fauna Survey. Perth.

McKenzie, N. L., J. K. Rolfe, N. J. Hall, and W. K. Youngson. 1993. Vertebrate Fauna, the Biological Survey the Eastern Goldfields of Western Australia, Part 9, Norseman - Balladonia Study Area. Records of the Western Australian Museum, **Supplement No. 42**:33-55.

Newby, K. R., J. Dell, R. A. How, and R. J. Hnatiuk. 1984. Vertebrate Fauna. Records of the Western Australian Museum **Supplement No 42.**:33-55.

Ninox Wildlife Consulting. 1995. Assessment of the Vertebrate Fauna within Rehabilitation and a Comparison with Native Vegetation in a Range of Nickel Leases near Widgiemooltha. Perth.

Ninox Wildlife Consulting. 1998. A Vertebrate Fauna Survey of the Randell Timber Reserve (1997 & 1998). Perth.

Ninox Wildlife Consulting. 2004a. St Ives Gold Delta Island Vertebrate Fauna Assessment. Perth.

Ninox Wildlife Consulting. 2004b. St Ives Gold Mine, Vertebrate fauna assessment. Perth, unpublished report for Goldfields - St Ives Mining Company Pty Ltd.

Storr, G., L. Smith, and R. Johnstone. 1983. Lizards of Western Australia. II: Dragons and Monitors. Western Australian Museum, Perth, Western Australia.

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

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

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

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. 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., 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 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., 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. A., and G. G. Thompson. 2005b. 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. 2006. Reptiles of the Western Australian Goldfields. Goldfields Environmental Management Group, Kalgoorlie, WA.

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.

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.

Watson, A., S. Judd, J. Watson, A. Lam, and D. Mackenzie. 2008. The Extraordinary Nature of the Great Western Woodlands. Perth.

Western Wildlife. 2006. St Ives Gold Fauna Survey; Spring 2005. Kalgoorlie.

Figures

Vertebrate Fauna Assessment – Fairplay Project

TERRESTRIAL ECOSYSTEMS

2015-0027-f01.dgn

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TERRESTRIAL ECOSYSTEMS

Drawn: S. Thompson

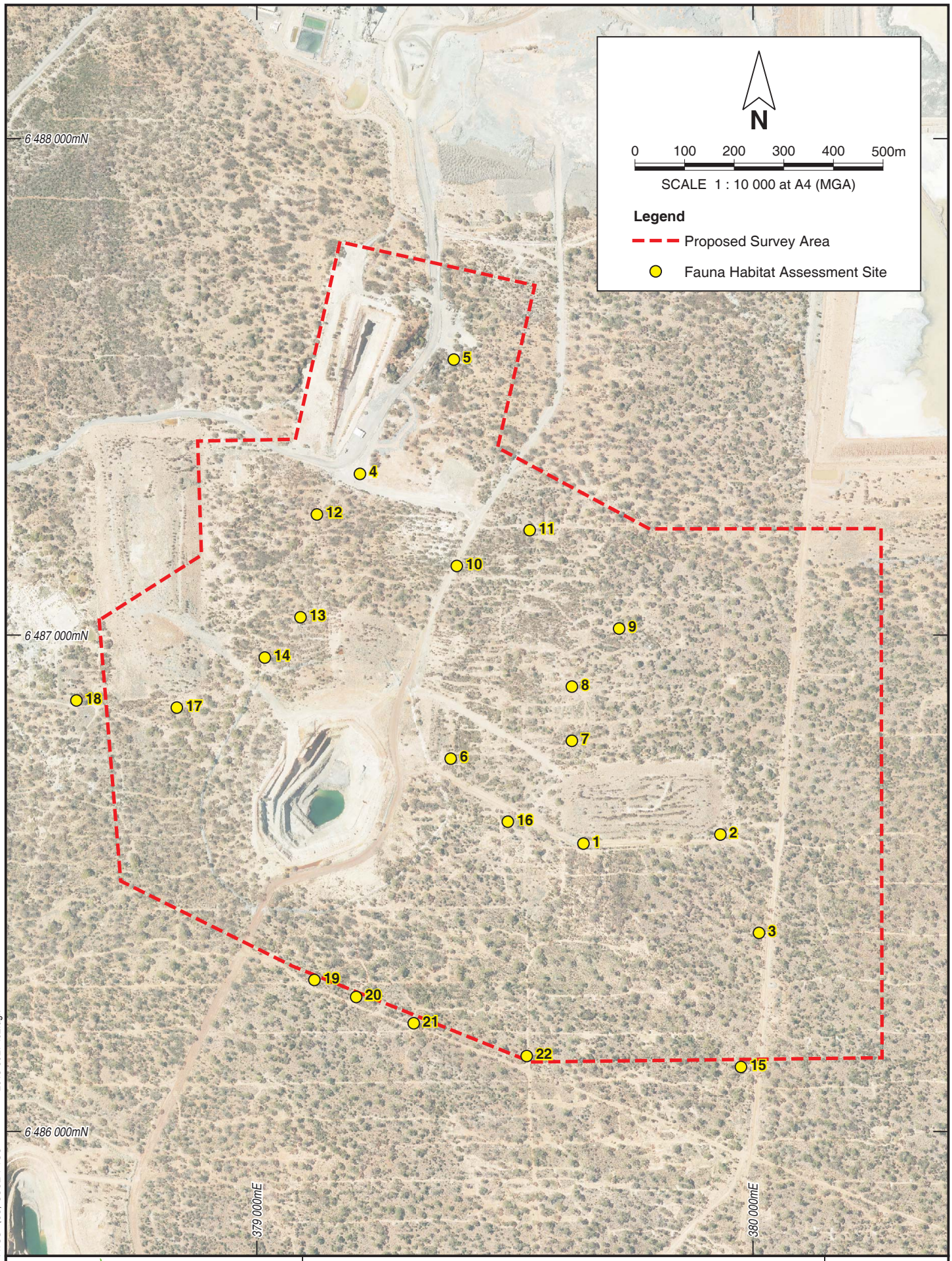
Date: 5 Jun 2015

Native Vegetation Solutions
VERTEBRATE FAUNA RISK ASSESSMENT
FAIRPLAY PROJECT

REGIONAL LOCATION

Figure 1

Job: 2015-0027



TERRESTRIAL ECOSYSTEMS

Drawn: S. Thompson

Date: 5 Jun 2015

Native Vegetation Solutions
VERTEBRATE FAUNA RISK ASSESSMENT
FAIRPLAY PROJECT

PROJECT AREA

Figure 2

Job: 2015-0027

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Appendix A
Vertebrate Fauna Recorded in Biological Surveys in the Region

Vertebrate Fauna Assessment – Fairplay Project

TERRESTRIAL ECOSYSTEMS

Note: Each column of data represents a different habitat type or survey site

Descriptions of the vegetation for each habitat surveyed are contained below

X indicates a presences in the area, V = Vulnerable, E = Endangered, M = Migratory, TH = Threatened

2nd indicates observations of secondary evidence (tracks, scats, diggings etc.)

Numbers denote numbers captured during systematic trapping efforts; X = presence noted.

Appendix A(1). Vertebrate fauna recorded in biological surveys in the region

		Survey	A																																			
Family	**Species**	**Common Name**	**Camp 1**	**Camp 1/1**	**Camp 1/10**	**Camp 1/11**	**Camp 1/12**	**Camp 1/13**	**Camp 1/2**	**Camp 1/3**	**Camp 1/4**	**Camp 1/5**	**Camp 1/6**	**Camp 1/7**	**Camp 1/8**	**Camp 1/9**	**Camp 2**	**Camp 2/15**	**Camp 2/16**	**Camp 2/18**	**Camp 2/19**	**Camp 2/20**	**Camp 2/23**	**Camp 2/24**	**Camp 2/25**	**Camp 2/26**	**Camp 2/27**	**Camp 2/28**	**Camp 4**	**Camp 4/1**	**Camp 4/12**	**Camp 4/14**	**Camp 4/15**	**Camp 4/4**	**Camp 4/5**	**Camp 4/6**	**Opportunistic**
Birds																																						
Accipitridae	*Lophoictinia isura*	Square-tailed Kite	X														X						X															
	Haliastur sphenurus	Whistling Kite	X																																			
	Aquila audax	Wedge-tailed Eagle	X		X								X																									
	Hieraaetus morphnoides	Little Eagle	X														X																					
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar	X	X					X								X				X		X						X			X						
Podargidae	*Podargus strigoides*	Tawny Frogmouth	X	X								X					X												X			X						
Casuariidae	*Dromaius novaehollandiae*	Emu					X						X			X	X		X										X									
Charadriidae	*Vanellus tricolor*	Banded Lapwing	X		X	X																							X									
Ardeidae	*Ardea pacifica*	White-necked Heron																																				1
Columbidae	*Columba livia*	Rock Dove																																				1
	Streptopelia senegalensis	Laughing Dove																																				1
	Phaps chalcoptera	Common Bronzewing	X										X				X			X			X															
Alcedinidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher	X										X				X				X		X															
	Todiramphus sanctus	Sacred Kingfisher	X														X																					
Meropidae	*Merops ornatus*	Rainbow Bee-eater	X	X								X					X												X			X						
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-Cuckoo															X				X																	
	Chalcites osculans	Black-eared Cuckoo															X				X				X	X												
	Cacomantis pallidus	Pallid Cuckoo	X														X				X																	
	Cacomantis flabelliformis	Fan-tailed Cuckoo																																				1
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar	X		X												X												X			X						
Falconidae	*Falco cenchroides*	Nankeen Kestrel	X													X	X																					
	Falco berigora	Brown Falcon	X			X				X																												
	Falco longipennis	Australian Hobby	X	X																																		
Megapodiidae	*Leipoa ocellata*	Malleefowl	X		X																								X									

		Survey	A																																			
Family	**Species**	**Common Name**	**Camp 1**	**Camp 1/1**	**Camp 1/10**	**Camp 1/11**	**Camp 1/12**	**Camp 1/13**	**Camp 1/2**	**Camp 1/3**	**Camp 1/4**	**Camp 1/5**	**Camp 1/6**	**Camp 1/7**	**Camp 1/8**	**Camp 1/9**	**Camp 2**	**Camp 2/15**	**Camp 2/16**	**Camp 2/18**	**Camp 2/19**	**Camp 2/20**	**Camp 2/23**	**Camp 2/24**	**Camp 2/25**	**Camp 2/26**	**Camp 2/27**	**Camp 2/28**	**Camp 4**	**Camp 4/1**	**Camp 4/12**	**Camp 4/14**	**Camp 4/15**	**Camp 4/4**	**Camp 4/5**	**Camp 4/6**	**Opportunistic**
Otididae	*Ardeotis australis*	Australian Bustard															X																					
Acanthizidae	*Calamanthus cautus*	Shy Heathwren	X									X			X		X									X											
	Pyrrholaemus brunneus	Redthroat	X	X							X			X	X	X	X									X											
	Smicrornis brevirostris	Weebill	X	X		X			X	X	X	X		X		X	X	X	X		X		X	X	X	X			X		X	X					
	Gerygone fusca	Western Gerygone	X					X							X		X	X											X			X					
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill															X																				
	Acanthiza apicalis	Inland Thornbill	X	X		X	X				X	X	X	X			X	X		X	X		X	X	X	X			X								
Acrocephalidae	*Cincloramphus mathewsi*	Rufous Songlark																																			1
	Cincloramphus cruralis	Brown Songlark	X																																		
Artamidae	*Artamus cinereus*	Black-faced Woodswallow	X									X																									
	Artamus cyanopterus	Dusky Woodswallow	X			X				X		X					X	X					X						X								
	Cracticus torquatus	Grey Butcherbird		X		X											X	X	X		X		X			X			X		X	X					
	Cracticus nigrogularis	Pied Butcherbird	X			X							X				X																				
Artamidae	*Cracticus tibicen*	Australian Magpie																																			2
	Strepera versicolor	Grey Currawong	X	X		X					X	X					X	X	X		X					X			X			X					
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-Shrike	X			X				X			X	X		X	X	X	X		X			X					X								
	Lalage sueurii	White-winged Triller																																			1
Climacteridae	*Climacteris rufa*	Rufous Treecreeper	X			X				X		X					X	X			X						X		X			X	X				
Corvidae	*Corvus coronoides*	Australian Raven	X														X																				
	Corvus bennetti	Little Crow	X														X			X																	
Eupetidae	*Cinclosoma castanotum*	Chestnut Quail-thrush	X							X							X	X	X		X																
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow															X																				
	Petrochelidon nigricans	Tree Martin	X		X												X												X			X					
Maluridae	*Malurus pulcherrimus*	Blue-breasted Fairy-wren	X												X		X									X											
Meliphagidae	*Lichenostomus virescens*	Singing Honeyeater																											X								
	Lichenostomus leucotis	White-eared Honeyeater	X	X		X			X			X	X			X	X	X	X		X			X		X		X	X		X	X					
	Lichenostomus flavicollis	Yellow-throated Honeyeater																X	X	X	X																
	Lichenostomus ornatus	Yellow-plumed Honeyeater	X	X		X		X	X	X	X	X	X		X		X	X	X		X		X	X	X	X	X		X			X	X				
	Lichenostomus plumulus	Grey-fronted Honeyeater																																			
	Purnella albifrons	White-fronted Honeyeater	X	X											X		X	X	X		X		X			X											
	Manorina flavigula	Yellow-throated Miner	X	X																																	
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater	X	X													X						X						X								
	Anthochaera carunculata	Red Wattlebird	X	X		X	X	X	X	X		X	X				X	X	X		X		X	X	X	X	X	X	X			X					
	Epthianura tricolor	Crimson Chat															X								X												
	Epthianura albifrons	White-fronted Chat	X		X	X																															
	Lichmera indistincta	Brown Honeyeater	X		X																																
	Melithreptus brevirostris	Brown-headed Honeyeater	X		X	X			X		X	X			X		X	X	X		X		X			X			X			X					
Monarchidae	*Myiagra inquieta*	Restless Flycatcher	X														X									X											
	Grallina cyanoleuca	Magpie-Lark																																			
Motacilidae	*Anthus novaeseelandiae*	Australasian Pipit	X		X	X											X			X									X								

		Survey	A																																			
Family	**Species**	**Common Name**	**Camp 1**	**Camp 1/1**	**Camp 1/10**	**Camp 1/11**	**Camp 1/12**	**Camp 1/13**	**Camp 1/2**	**Camp 1/3**	**Camp 1/4**	**Camp 1/5**	**Camp 1/6**	**Camp 1/7**	**Camp 1/8**	**Camp 1/9**	**Camp 2**	**Camp 2/15**	**Camp 2/16**	**Camp 2/18**	**Camp 2/19**	**Camp 2/20**	**Camp 2/23**	**Camp 2/24**	**Camp 2/25**	**Camp 2/26**	**Camp 2/27**	**Camp 2/28**	**Camp 4**	**Camp 4/1**	**Camp 4/12**	**Camp 4/14**	**Camp 4/15**	**Camp 4/4**	**Camp 4/5**	**Camp 4/6**	**Opportunistic**
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird															X	X																			
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	X	X					X			X				X	X				X					X			X								
Pachycephalidae	*Falcunculus frontatus*	Crested Shrike-tit	X									X					X	X																			
	Pachycephala inornata	Gilbert's Whistler	X		X							X					X																				
	Pachycephala pectoralis	Golden Whistler	X	X					X		X					X	X	X			X		X			X											
	Pachycephala rufiventris	Rufous Whistler															X									X											
	Colluricincla harmonica	Grey Shrike-thrush	X	X		X				X	X	X			X	X	X	X	X		X					X		X	X			X					
	Oreoica gutturalis	Crested Bellbird	X	X					X	X	X	X	X				X	X			X				X	X			X			X					
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote	X					X																													
	Pardalotus striatus	Striated Pardalote	X	X	X	X		X	X	X	X	X		X			X	X	X		X		X	X	X	X			X		X	X	X				
Petroicidae	*Microeca fascinans*	Jacky Winter	X		X												X	X			X		X	X		X			X								
	Petroica goodenovii	Red-capped Robin	X	X		X										X	X						X														
	Melanodryas cucullata	Hooded Robin															X	X																			
	Eopsaltria griseogularis	Western Yellow Robin	X	X	X												X				X		X						X			X					
	Drymodes brunneopygia	Southern Scrub-robin	X									X					X																				
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler	X	X		X				X		X	X				X	X					X	X		X			X				X				
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	X		X	X	X		X		X	X	X				X	X							X	X			X			X					
Sturnidae	*Sturnus vulgaris*	Common Starling																																			2
Timaliidae	*Zosterops lateralis*	Silvereye	X		X												X	X																			
Cacatuidae	*Eolophus roseicapillus*	Galah																																			1
Psittacidae	*Glossopsitta porphyrocephala*	Purple-crowned Lorikeet	X	X					X	X	X	X					X	X								X			X			X					
	Polytelis anthopeplus	Regent Parrot	X																																		
	Platycercus icterotis	Western Rosella	X																										X			X					
	Barnardius zonarius	Australian Ringneck	X	X	X					X		X					X	X	X		X		X			X			X			X					
	Psephotus varius	Mulga Parrot	X							X							X	X											X								
Strigidae	*Ninox novaeseelandiae*	Southern Boobook	X	X									X				X						X			X			X			X					
Mammals																																					
Camelidae	*Camelus dromedarius*	Dromedary									X					X			X																		
Canidae	*Canis lupus dingo*	Dingo							X											X																	
	Vulpes vulpes	Red Fox							X																												
Felidae	*Felis catus*	House Cat							X						X																						
Molossidae	*Austronomus australis*	White-striped Freetail Bat		X		X			X	X			X		X							X										X					
	Mormopterus planiceps	Southern Freetail-bat							X				X		X							X			X							X					
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	X	X					X				X		X																	X					
	Chalinolobus morio	Chocolate Wattled Bat											X																								
	Nyctophilus geoffroyi	Lesser Long-eared Bat									X	X	X									X															
	Nyctophilus major	Western Long-eared Bat										X		X	X									X													
	Vespadelus regulus	Southern Forest Bat		X					X	X			X		X					X					X							X					
Dasyuridae	*Ningaui yvonneae*	Mallee Ningaui																	X						X			X									
	Sminthopsis crassicaudata	Fat-tailed Dunnart													X							X						X									

		Survey	A																																			
Family	**Species**	**Common Name**	**Camp 1**	**Camp 1/1**	**Camp 1/10**	**Camp 1/11**	**Camp 1/12**	**Camp 1/13**	**Camp 1/2**	**Camp 1/3**	**Camp 1/4**	**Camp 1/5**	**Camp 1/6**	**Camp 1/7**	**Camp 1/8**	**Camp 1/9**	**Camp 2**	**Camp 2/15**	**Camp 2/16**	**Camp 2/18**	**Camp 2/19**	**Camp 2/20**	**Camp 2/23**	**Camp 2/24**	**Camp 2/25**	**Camp 2/26**	**Camp 2/27**	**Camp 2/28**	**Camp 4**	**Camp 4/1**	**Camp 4/12**	**Camp 4/14**	**Camp 4/15**	**Camp 4/4**	**Camp 4/5**	**Camp 4/6**	**Opportunistic**
	Sminthopsis dolichura	Little Long-tailed Dunnart		X			X									X								X	X	X	X										
Burramyidae	*Cercartetus concinnus*	Southwestern Pygmy Possum									X	X						X	X		X	X	X	X	X	X	X	X		X				X			
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo							X				X		X																						
Leporidae	*Oryctolagus cuniculus*	European Rabbit								X		X		X					X			X			X	X											
Muridae	*Mus musculus*	House Mouse		X					X						X	X					X							X								X	
	Notomys mitchellii	Mitchell's Hopping Mouse		X							X				X	X			X							X									X		
	Pseudomys bolami	Bolam's Mouse				X																X	X	X													
Amphibians																																					
Limnodynastidae	*Neobatrachus sp.*		X		X								X				X																				
Myobatrachidae	*Pseudophryne occidentalis*	Western Toadlet	X		X								X				X			X						X											
Reptiles																																					
Agamidae	*Ctenophorus adelaidensis*	Southern Heath Dragon	X	X													X																				
	Ctenophorus cristatus	Bicycle Dragon	X	X	X	X		X		X		X	X			X	X	X	X				X	X					X								
	Ctenophorus salinarum	Salt Pan Dragon	X						X						X		X		X	X		X				X		X	X								
	Moloch horridus	Thorny Devil	X				X								X		X	X				X	X			X			X		X						
	Pogona minor	Bearded Dragon	X	X									X		X	X	X	X											X								
Diplodactylidae	*Crenadactylus ocellatus*	Clawless Gecko	X								X																										
	Diplodactylus granariensis		X										X																								
	Lucasium maini		X	X		X						X				X	X					X				X			X		X						
	Oedura reticulata		X	X	X																																
	Strophurus intermedius																X					X															
Elapidae	*Acanthophis antarcticus*	Southern Death Adder																																			1
	Neelaps bimaculatus	Black-naped Snake	X																																		
	Parasuta gouldii		X	X	X						X						X																				
	Pseudonaja affinis	Dugite	X										X				X									X											
Gekkonidae	*Christinus marmoratus*	Marbled Gecko	X		X		X			X							X	X																			
	Gehyra variegata		X	X									X				X	X			X	X	X			X											
	Heteronotia binoei	Bynoe's Gecko	X	X					X	X			X				X	X		X		X				X											
Pygopodidae	*Delma australis*		X		X												X		X																		
	Delma butleri																X							X													
	Lialis burtonis		X		X												X		X																		
Scincidae	*Cryptoblepharus buchananii*		X					X									X	X		X			X						X			X					
	Cryptoblepharus pulcher clarus																X																				
	Ctenotus atlas		X			X		X								X	X		X							X			X		X						
	Ctenotus schomburgkii		X							X	X	X		X			X	X					X			X											
	Ctenotus uber		X								X																										
	Cyclodomorphus branchialis		X					X							X		X		X					X	X												
	Egernia multiscutata		X																																		
	Egernia richardi		X		X	X				X		X					X										X		X								
	Hemiergis initialis brookeri																X		X				X														

		Survey	A																																		
Family	**Species**	**Common Name**	**Camp 1**	**Camp 1/1**	**Camp 1/10**	**Camp 1/11**	**Camp 1/12**	**Camp 1/13**	**Camp 1/2**	**Camp 1/3**	**Camp 1/4**	**Camp 1/5**	**Camp 1/6**	**Camp 1/7**	**Camp 1/8**	**Camp 1/9**	**Camp 2**	**Camp 2/15**	**Camp 2/16**	**Camp 2/18**	**Camp 2/19**	**Camp 2/20**	**Camp 2/23**	**Camp 2/24**	**Camp 2/25**	**Camp 2/26**	**Camp 2/27**	**Camp 2/28**	**Camp 4**	**Camp 4/1**	**Camp 4/12**	**Camp 4/14**	**Camp 4/15**	**Camp 4/4**	**Camp 4/5**	**Camp 4/6**	**Opportunistic**
	Hemiergis initialis initialis		X								X						X																				
	Lerista dorsalis		X										X				X	X																			
	Lerista picturata		X	X													X	X	X				X														
	Lerista sp.		X	X												X	X	X		X			X	X													
	Liopholis inornata		X		X												X									X		X	X								
	Menetia greyii		X			X										X	X	X	X	X			X	X		X											
	Morethia butleri		X	X		X				X							X	X	X	X			X	X			X		X			X					
	Morethia obscura		X	X													X	X					X						X			X					
	Tiliqua occipitalis	Western Bluetongue	X								X						X							X													
	Tiliqua rugosa		X	X								X					X											X									
Typhlopidae	*Ramphotyphlops australis*																X																				
Varanidae	*Varanus gouldii*	Bungarra or Sand Monitor	X								X	X					X		X																		
	Varanus rosenbergi	Heath Monitor	X		X																																

A McKenzie, N.L., Rolfe, J.K., Hall, N.J. and Youngson, W.K. (1993) Vertebrate Fauna. In Hall, N.J. and McKenzie N.L. The Biological Survey of the Eastern Goldfields of Western Australia Part 9. Norseman - Balladonia. *Records of the Western Australian Museum*, Supplement No 42, 33-55.

X Presence Only

Appendix A(2). Vertebrate fauna recorded in biological surveys in the region

		Survey	A																						B									
Family	**Species**	**Common Name**	**Lake Finn Rd**	**Opportunitic**	**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**	**Site 16**	**Site 17**	**Site 18**	**Site 19**	**Site 20**	**Argo Discharge**	**Beta Hunt Disturbance**	**Junction Discharge**	**Junction Reference**	**Neptune Disturbance**	**Neptune Reference**	**Opportunistic**	**Thunderer Disturbance**	**Thunderer Reference**	**West Dunes Reference**
Birds																																		
Accipitridae	*Accipiter fasciatus*	Brown Goshawk																																X
	Aquila audax	Wedge-tailed Eagle																													X	2		
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar																															X	
Columbidae	*Phaps chalcoptera*	Common Bronzewing																										10			X			
Columbidae	*Ocyphaps lophotes*	Crested Pigeon																								3			2	X				
Meropidae	*Merops ornatus*	Rainbow Bee-eater																							X	X				X			X	
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-Cuckoo																										1					X	
Falconidae	*Falco berigora*	Brown Falcon																							2									
Acanthizidae	*Calamanthus cautus*	Shy Heathwren																										1			X			X
	Pyrrholaemus brunneus	Redthroat																							X			X			X			X
	Smicrornis brevirostris	Weebill																							14			14	4	3			10	6
	Acanthiza apicalis	Inland Thornbill																							1			10			X			5
	Acanthiza uropygialis	Chestnut-rumped Thornbill																							X			2			X		8	X
Artamidae	*Artamus personatus*	Masked Woodswallow																															X	
	Artamus cyanopterus	Dusky Woodswallow																										2			X			
	Cracticus torquatus	Grey Butcherbird																												4			X	2
	Cracticus tibicen	Australian Magpie																															X	
	Strepera versicolor	Grey Currawong																										X						X
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-Shrike																							2	7		7		1			X	
Climacteridae	*Climacteris rufa*	Rufous Treecreeper																													X		X	X
Corvidae	*Corvus coronoides*	Australian Raven																							2	X			X	X				
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow																							4	X		1	3				3	X
	Petrochelidon nigricans	Tree Martin																											4					
Maluridae	*Malurus leucopterus*	White-winged Fairy-wren																							40			4						X
Meliphagidae	*Lichenostomus virescens*	Singing Honeyeater																							12	10		1	1			6	5	
	Lichenostomus ornatus	Yellow-plumed Honeyeater																										X			X		2	
	Purnella albifrons	White-fronted Honeyeater																							3	3		61	2				6	X
	Manorina flavigula	Yellow-throated Miner																							7	2		4	18	7		X	8	3
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater																							9	X		20					X	1
	Anthochaera carunculata	Red Wattlebird																							2	X		7		X			X	1
	Lichmera indistincta	Brown Honeyeater																										1						4
	Melithreptus brevirostris	Brown-headed Honeyeater																										X			X			
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird																																1

		Survey	A																							B								
Family	**Species**	**Common Name**	**Lake Finn Rd**	**Opportunitic**	**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**	**Site 16**	**Site 17**	**Site 18**	**Site 19**	**Site 20**	**Argo Discharge**	**Beta Hunt Disturbance**	**Junction Discharge**	**Junction Reference**	**Neptune Disturbance**	**Neptune Reference**	**Opportunistic**	**Thunderer Disturbance**	**Thunderer Reference**	**West Dunes Reference**
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella																										2						
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush																								1		1			X			X
	Oreoica gutturalis	Crested Bellbird																								X		X	1	1			X	
Pardalotidae	*Pardalotus striatus*	Striated Pardalote																							1			1	2	2			4	1
Petroicidae	*Petroica goodenovii*	Red-capped Robin																													X		1	
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail																								1			X	X			1	
Timaliidae	*Zosterops lateralis*	Silvereye																													X			X
Psittacidae	*Glossopsitta porphyrocephala*	Purple-crowned Lorikeet																							1						X			
	Polytelis anthopeplus	Regent Parrot																							X									
	Barnardius zonarius	Australian Ringneck																								1		2		19			5	
	Psephotus varius	Mulga Parrot																															X	
	Neophema splendida	Scarlet-chested Parrot																							1									
Mammals																																		
Canidae	*Canis lupus familiaris*	Dog																								1								
Felidae	*Felis catus*	House Cat			1																								2					
Dasyuridae	*Ningaui sp.*				3	2							2	2																				
	Ningaui yvonneae	Mallee Ningaui																							2		1	2		1			1	1
	Sminthopsis crassicaudata	Fat-tailed Dunnart															3			1														
	Sminthopsis dolichura	Little Long-tailed Dunnart										1								2														
	Sminthopsis gilberti	Gilbert's Dunnart									1					1					1			1										
Burramyidae	*Cercartetus concinnus*	Southwestern Pygmy Possum					4		1		1	1	3		1					1	3						3	1						1
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo																								1					1			
Leporidae	*Oryctolagus cuniculus*	European Rabbit																								1								
Muridae	*Mus musculus*	House Mouse								2				1				1		1					2	1	1	3	4			10	7	2
	Notomys alexis	Spinifex Hopping Mouse																	1															
	Notomys mitchellii	Mitchell's Hopping Mouse				1								2					1		1							1						
	Pseudomys bolami	Bolam's Mouse																			1				2		1	2				1		5
	Pseudomys hermannsburgensis	Sandy Inland Mouse								3								1		1														
Amphibians																																		
Limnodynastidae	*Neobatrachus kunapalari*	Kunapalari Frog																							1	1	1	1		1				
	Neobatrachus sutor	Shoemaker Frog				1	1				1								1															
Myobatrachidae	*Pseudophryne occidentalis*	Western Toadlet						5	2																			2						
Reptiles																																		
Agamidae	*Ctenophorus cristatus*	Bicycle Dragon	8	1			2	1	1	1		4	2		7			1			1	2	7				1	1						1
	Ctenophorus fordi	Mallee Sand Dragon	1										1	3									1		1		2							
	Ctenophorus salinarum	Salt Pan Dragon																							4	1						9		

		Survey	A																							B									
Family	**Species**	**Common Name**	**Lake Finn Rd**	**Opportunitic**	**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**	**Site 16**	**Site 17**	**Site 18**	**Site 19**	**Site 20**	**Argo Discharge**	**Beta Hunt Disturbance**	**Junction Discharge**	**Junction Reference**	**Neptune Disturbance**	**Neptune Reference**	**Opportunistic**	**Thunderer Disturbance**	**Thunderer Reference**	**West Dunes Reference**
	Ctenophorus scutulatus																			3			1								2			
	Moloch horridus	Thorny Devil											1									2									1			
	Pogona minor	Bearded Dragon	1		2				1					1			1	3		2						1		1		1			1	1
	Tympanocryptis cephalus	Pebble Dragon																		1														
Carphodactylidae	*Nephrurus laevissimus*					1								1											1		5	3	2			2		1
	Nephrurus vertebralis			1																														
	Underwoodisaurus milii	Barking Gecko								3						1							2	4								4		
Diplodactylidae	*Diplodactylus granariensis*						1		2															1										
	Diplodactylus pulcher							1																										
	Lucasium damaeum																																	
	Lucasium maini						1											2																
	Strophurus assimilis	Goldfields Spiny-tailed Gecko																							3			1	1			1		
	Strophurus elderi																								1								1	
Elapidae	*Brachyurophis semifasciata*																																1	
	Parasuta monachus																						1											
	Pseudechis australis	Mulga Snake																			1			1										
	Pseudonaja mengdeni	Gwardar																											1					
Gekkonidae	*Gehyra purpurascens*																																1	
	Gehyra variegata				2										1			2		1		1				2			1	2			1	
	Heteronotia binoei	Bynoe's Gecko					2			2	1			1	2						1		1			1	1		2					
Pygopodidae	*Delma australis*																										2							
	Lialis burtonis																																1	
	Pygopus lepidopodus	Common Scaly Foot											1								1													
Scincidae	*Cryptoblepharus sp.*									1												1												
	Ctenotus atlas					4							4	13						1		4			5		6	4	1	1			10	7
	Ctenotus leonhardii																									4								
	Ctenotus schomburgkii						2					1							1			2	1		4									
	Ctenotus uber				1	1			1	4	1		1		1						1		6											
	Egernia depressa	Southern Pygmy Spiny-tailed Skink									1																							
	Egernia formosa									1														1										
	Hemiergis initialis										1					1																		
	Lerista distinguenda																										1						1	3
	Liopholis inornata																	1							2		1	1						
	Menetia greyii					2		1														2		1		1				2		3	2	2
	Morethia adelaidensis																4																	
	Morethia butleri						1					1			1	2	1	3	1		1	1												

		Survey	A																						B									
Family	**Species**	**Common Name**	**Lake Finn Rd**	**Opportunitic**	**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**	**Site 16**	**Site 17**	**Site 18**	**Site 19**	**Site 20**	**Argo Discharge**	**Beta Hunt Disturbance**	**Junction Discharge**	**Junction Reference**	**Neptune Disturbance**	**Neptune Reference**	**Opportunistic**	**Thunderer Disturbance**	**Thunderer Reference**	**West Dunes Reference**
	Morethia obscura															1											4							
	Tiliqua rugosa			1						1				1	1			2				1		1										
Typhlopidae	*Ramphotyphlops australis*																										1							
	Ramphotyphlops bicolor																																	2
Varanidae	*Varanus gouldii*	Bungarra or Sand Monitor				2													1							2								
	Varanus tristis	Racehorse Monitor					1																											

A ATA Environmental 2006 *Vertebrate Fauna Assessment St Ives Gold Mine*. Unpublished report for Jim's Seeds, Weeds and Trees, Ltd, Kalgoorlie.

B Bamford Consulting Ecologists (2010) *Gold Fields St Ives Gold Mine, Kambalda. Fauna Assessment: impacts of water discharge and general mining activity on vertebrate fauna*. Unpublished report to Gold Fields St Ives Gold Mine, Perth.

X Presence only

Appendix A(3). Vertebrate fauna recorded in biological surveys in the region

		Survey	A			B	C									D																				
Family	**Species**	**Common Name**	**LF**	**LS**	**OM/T**	**St Ives**	**Opportunistic**	**Site 1a**	**Site 1b**	**Site 1c**	**Site 1d**	**Site 2a**	**Site 2b**	**Site 2c**	**Site 2d**	**Site 1**	**Site 2**	**Site 20**	**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**	**Site 16**	**Site 17**	**Site 18**	**Site 19**
Birds																																				
Accipitridae	*Haliastur sphenurus*	Whistling Kite			X	X																			X											
	Accipiter fasciatus	Brown Goshawk				X	1																	X		X										X
	Accipiter cirrocephalus	Collared Sparrowhawk				X																														
	Aquila audax	Wedge-tailed Eagle				X						2																								
	Hieraaetus morphnoides	Little Eagle				X																														
Anatidae	*Tadorna tadornoides*	Australian Shelduck				X																														
	Anas superciliosa	Pacific Black Duck					1				1																									
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar				X																														
Podargidae	*Podargus strigoides*	Tawny Frogmouth				X																														
Casuariidae	*Dromaius novaehollandiae*	Emu	X	X		X	1																													
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover				X																														
Recurvirostridae	*Recurvirostra novaehollandiae*	Red-necked Avocet				X																														
Recurvirostridae	*Cladorhynchus leucocephalus*	Banded Stilt				X																														
Columbidae	*Phaps chalcoptera*	Common Bronzewing				X			1	1	2				2	X		X								X				X	X					
	Ocyphaps lophotes	Crested Pigeon				X												X																		
Alcedinidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher				X																	X			X										
	Todiramphus sanctus	Sacred Kingfisher				X																														
	Merops ornatus	Rainbow Bee-eater				X	1						2				X								X	X		X				X		X	X
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-Cuckoo				X																														
	Chalcites osculans	Black-eared Cuckoo				X																														
	Cacomantis pallidus	Pallid Cuckoo	X			X																														
Falconidae	*Falco cenchroides*	Nankeen Kestrel				X																														
	Falco berigora	Brown Falcon				X															X															
	Falco peregrinus	Peregrine Falcon			X	X																														
Acanthizidae	*Calamanthus cautus*	Shy Heathwren				X																														
	Calamanthus campestris	Rufous Fieldwren																		X																
	Pyrrholaemus brunneus	Redthroat				X														X	X		X				X			X		X		X	X
	Smicrornis brevirostris	Weebill	X	X		X	1	13	15	16	6	9	32	8	8		X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X
	Gerygone fusca	Western Gerygone				X				1																										
	Acanthiza robustirostris	Slaty-backed Thornbill																																		
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill				X												X										X								X
	Acanthiza apicalis	Inland Thornbill	X	X		X				1				4		X				X	X						X			X		X				X
	Aphelocephala leucopsis	Southern Whiteface																																		
	Acanthiza uropygialis	Chestnut-rumped Thornbill	X	X		X	1	9	3	2			3	14				X									X			X		X				X
Artamidae	*Artamus personatus*	Masked Woodswallow	X	X																																
	Artamus cinereus	Black-faced Woodswallow		X		X									3	X						X	X	X												

		Survey	A			B	C									D																				
Family	**Species**	**Common Name**	**LF**	**LS**	**OM/T**	**St Ives**	**Opportunistic**	**Site 1a**	**Site 1b**	**Site 1c**	**Site 1d**	**Site 2a**	**Site 2b**	**Site 2c**	**Site 2d**	**Site 1**	**Site 2**	**Site 20**	**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**	**Site 16**	**Site 17**	**Site 18**	**Site 19**
	Artamus cyanopterus	Dusky Woodswallow				X																	X	X	X			X							
	Cracticus torquatus	Grey Butcherbird	X		X	X									1		X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X
	Cracticus nigrogularis	Pied Butcherbird				X	1				4																						X		
	Cracticus tibicen	Australian Magpie				X			1	2	2							X															X	X	
	Strepera versicolor	Grey Currawong				X	1	3	1			1	1	1				X	X			X	X		X	X						X			
Campephagidae	*Coracina maxima*	Ground Cuckoo-Shrike			X	X																													
	Coracina novaehollandiae	Black-faced Cuckoo-Shrike	X		X	X				1	1	1	2	1				X	X			X	X	X		X	X				X		X	X	X
	Lalage sueurii	White-winged Triller																																X	
Climacteridae	*Climacteris affinis*	White-browed Treecreeper																																	
	Climacteris rufa	Rufous Treecreeper	X		X	X									1						X		X	X	X			X						X	
Corvidae	*Corvus coronoides*	Australian Raven	X			X	1			2		1	3	2				X			X						X				X	X	X	X	
	Corvus bennetti	Little Crow	X			X																													
	Corvus orru	Torresian Crow				X																													
Eupetidae	*Cinclosoma castanotum*	Chestnut Quail-thrush				X														X		X	X								X	X			
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow	X			X																				X									
	Hirundo neoxena	Welcome Swallow																																X	
	Petrochelidon nigricans	Tree Martin				X						2																							
Maluridae	*Malurus leucopterus*	White-winged Fairy-wren				X																							X						
	Malurus pulcherrimus	Blue-breasted Fairy-wren				X														X															
Meliphagidae	*Lichenostomus virescens*	Singing Honeyeater	X	X		X	1										X					X								X		X			
	Lichenostomus leucotis	White-eared Honeyeater			X	X															X	X				X				X		X			
	Lichenostomus flavicollis	Yellow-throated Honeyeater																	X	X	X		X												
	Lichenostomus ornatus	Yellow-plumed Honeyeater			X	X	1			1	4	12		11	25		X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X
	Purnella albifrons	White-fronted Honeyeater	X	X	X	X	1	1	3	2							X					X	X							X		X			X
	Manorina flavigula	Yellow-throated Miner	X	X		X	1			2	9	2						X										X			X		X	X	X
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater	X	X		X	1				4							X			X					X	X	X		X	X	X			X
	Anthochaera carunculata	Red Wattlebird	X		X	X	1		4	2	8	1		1	1		X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X
	Epthianura tricolor	Crimson Chat			X																														
	Epthianura albifrons	White-fronted Chat				X																													
	Lichmera indistincta	Brown Honeyeater				X										X	X					X	X	X		X	X	X		X	X	X	X	X	X
	Melithreptus brevirostris	Brown-headed Honeyeater			X	X	1		3		11											X													
Monarchidae	*Grallina cyanoleuca*	Magpie-Lark				X																												X	
Motacilidae	*Anthus novaeseelandiae*	Australasian Pipit				X																													
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird				X																											X		
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella				X																									X				
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler				X																													
	Colluricincla harmonica	Grey Shrike-thrush	X		X	X	1				1	2	1	2	3		X	X		X	X		X	X	X	X		X		X	X	X		X	X
	Oreoica gutturalis	Crested Bellbird	X		X	X												X						X	X	X	X			X	X	X		X	X
Pardalotidae	*Pardalotus striatus*	Striated Pardalote	X	X	X	X	1	4	1	8	4	2	7	1	1			X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X

		Survey	A			B	C									D																				
Family	**Species**	**Common Name**	**LF**	**LS**	**OM/T**	**St Ives**	**Opportunistic**	**Site 1a**	**Site 1b**	**Site 1c**	**Site 1d**	**Site 2a**	**Site 2b**	**Site 2c**	**Site 2d**	**Site 1**	**Site 2**	**Site 20**	**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**	**Site 16**	**Site 17**	**Site 18**	**Site 19**
Petroicidae	*Microeca fascinans*	Jacky Winter			X	X																			X	X				X				X	
	Petroica goodenovii	Red-capped Robin	X			X		1							1			X												X		X			X
	Eopsaltria griseogularis	Western Yellow Robin				X																													
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler				X				1					1																X	X			
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	X		X	X																			X									X	
Sturnidae	*Sturnus vulgaris*	Common Starling																																	
Timaliidae	*Zosterops lateralis*	Silvereye				X																												X	
Psittacidae	*Glossopsitta porphyrocephala*	Purple-crowned Lorikeet			X	X											X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Polytelis anthopeplus	Regent Parrot				X	1				1																								
	Barnardius zonarius	Australian Ringneck		X	X	X	1	2		3	3	4	5	4	4		X	X	X	X	X		X	X	X	X	X	X			X				
Mammals																																			
Canidae	*Vulpes vulpes*	Red Fox			X																														
Felidae	*Felis catus*	House Cat							1																										
Dasyuridae	*Ningaui ridei*	Wongai Ningaui															4									1									
	Ningaui sp.																																		
	Ningaui yvonneae	Mallee Ningaui	X		X	X		3		3			1		2									1											
	Sminthopsis crassicaudata	Fat-tailed Dunnart				X															2								3						
	Sminthopsis dolichura	Little Long-tailed Dunnart	X			X								1				2										1				1			
Burramyidae	*Cercartetus concinnus*	Southwestern Pygmy Possum	X			X				1			1				1		2	1		2	3	1	3		4	3			2	1		2	
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo				X																													
	Macropus robustus	Wallaroo or Euro				X																													
	Macropus rufus	Red Kangaroo				X																													
Leporidae	*Oryctolagus cuniculus*	European Rabbit	X		X																														
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna				X	1																												
Muridae	*Mus musculus*	House Mouse	X	X	X			4	1																				4						
	Notomys mitchellii	Mitchell's Hopping Mouse														1	12									1				1					
	Pseudomys bolami	Bolam's Mouse				X																1					1								
	Pseudomys hermannsburgensis	Sandy Inland Mouse				X																													
Amphibians																																			
Limnodynastidae	*Neobatrachus kunapalari*	Kunapalari Frog	X		X	X																													
	Neobatrachus pelobatoides	Humming Frog	X			X																													
	Neobatrachus sutor	Shoemaker Frog			X	X																													
Myobatrachidae	*Pseudophryne occidentalis*	Western Toadlet		X		X												1			1														
Reptiles																																			
Agamidae	*Ctenophorus cristatus*	Bicycle Dragon				X	1			1			1		4			1						X	1			1		X			1	X	1
	Ctenophorus fordi	Mallee Sand Dragon	X			X										1	1							2	1	3								X	
	Ctenophorus isolepis	Crested Dragon							1																										
	Ctenophorus ornatus	Ornate Crevice Dragon					1		1	1																									
	Ctenophorus reticulatus	Western Netted Dragon				X																													

		Survey	A			B	C									D																				
Family	**Species**	**Common Name**	**LF**	**LS**	**OM/T**	**St Ives**	**Opportunistic**	**Site 1a**	**Site 1b**	**Site 1c**	**Site 1d**	**Site 2a**	**Site 2b**	**Site 2c**	**Site 2d**	**Site 1**	**Site 2**	**Site 20**	**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**	**Site 16**	**Site 17**	**Site 18**	**Site 19**
	Ctenophorus salinarum	Salt Pan Dragon	X	X		X	1																						2							
	Ctenophorus scutulatus								1																							X			1
	Moloch horridus	Thorny Devil				X																														
	Pogona minor	Bearded Dragon	X			X	1									X				1								1	1	1						
	Tympanocryptis cephalus	Pebble Dragon				X																														
Carphodactylidae	*Nephrurus laevissimus*		X			X										1	5							3		2										
	Underwoodisaurus milii	Barking Gecko				X			2									8		2	62							1				2	1		1
Diplodactylidae	*Crenadactylus ocellatus*	Clawless Gecko				X														3											1					
	Diplodactylus granariensis					X											1	1	1	3	2		2							2	3				1
	Diplodactylus pulcher					X			1		4										3	7	1				4					1	2		4
	Lucasium damaeum																																			
	Lucasium maini				X	X		2	9	3	3	1		1	1				9		2	1		1											4
	Oedura reticulata					X				1												1			1	1										
	Strophurus assimilis	Goldfields Spiny-tailed Gecko												1		1								1					1		3					
	Strophurus elderi																3							1		1										
Elapidae	*Brachyurophis fasciolata*					X																														
	Brachyurophis semifasciata																2														1	1				
	Demansia psammophis	Yellow-faced Whipsnake				X												1																		
	Parasuta gouldii					X																						1								
	Parasuta monachus					X																											1			
	Pseudechis australis	Mulga Snake					1											X																		
	Pseudonaja mengdeni	Gwardar				X																														
	Pseudonaja modesta	Ringed Brown Snake																										1								
	Simoselaps bertholdi	Jan's Banded Snake				X											1			1								1								
Gekkonidae	*Christinus marmoratus*	Marbled Gecko						1																		X										
	Gehyra purpurascens					X									1																					
	Gehyra variegata		X	X		X								1		3	1	1	1			1						1		1	1			2		
	Heteronotia binoei	Bynoe's Gecko	X	X		X	1									2			2		1								2	1			1		6
Pygopodidae	*Delma australis*																1	1	1																	
	Delma butleri		X			X											2														2					
	Delma fraseri					X											3			1																
	Lialis burtonis					X											2								1						1			3		
	Pygopus lepidopodus	Common Scaly Foot				X																												1		
Scincidae	*Cryptoblepharus buchananii*																		4				2				1	2		X	2					
	Cryptoblepharus carnabyi													1																						
	Cryptoblepharus plagiocephalus		X			X																														
	Ctenotus atlas		X	X		X				1		2			2		6							3		11										
	Ctenotus leonhardii					X																														
	Ctenotus schomburgkii				X	X													1											3	1			X	5

		Survey	A			B	C									D																				
Family	**Species**	**Common Name**	**LF**	**LS**	**OM/T**	**St Ives**	**Opportunistic**	**Site 1a**	**Site 1b**	**Site 1c**	**Site 1d**	**Site 2a**	**Site 2b**	**Site 2c**	**Site 2d**	**Site 1**	**Site 2**	**Site 20**	**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**	**Site 16**	**Site 17**	**Site 18**	**Site 19**
	Ctenotus severus											1			2																					
	Ctenotus uber					X																2		1								1	1	1	1
	Cyclodomorphus melanops	Slender Blue-tongue								1						1																				
	Egernia formosa					X																4					1									
	Egernia multiscutata					X																														
	Eremiascincus richardsonii	Broad-banded Sand Swimmer																				4														
	Hemiergis initialis					X												X		1							1									
	Lerista distinguenda															1	4							1												
	Lerista muelleri				X	X																														
	Lerista picturata					X										1		2	1				5	1	3	1	1	2		1			3	3	1
	Lerista sp.																		4	4	2		4				2	2	5	1	3	5	3	2	4
	Liopholis inornata											1				1	1							1												
	Menetia greyii		X		X	X				2														1			1			1	1		4	3	2
	Morethia adelaidensis				X																								1							
	Morethia butleri					X													2		2		1	1			2						1		2
	Morethia obscura																										2	2			1					
	Tiliqua occipitalis	Western Bluetongue				X																														
	Tiliqua rugosa		X			X	1	1			1				1			X													2					
Typhlopidae	*Ramphotyphlops australis*					X											1		1	1	2		1	1												
	Ramphotyphlops bituberculatus					X																														
Varanidae	*Varanus gouldii*	Bungarra or Sand Monitor				X	1					1	1				2																			

A Dames and Moore (1999) *Public Environmental Review Gold Mine Development on Lake Lefroy*.Unpublished report for St Ives Gold Mine; Kalggorlie.

B Ninox Wildlife Consulting (2004) *St Ives Gold Mine Vertebrate Fauna Assessment 2004*. Unpublished report for St Ives Gold Mining Co Pty LTd, Kalgoorlie.

C Keith Lindbeck and Associates (2007) *St. Ives Gold Mining Company Tailings Storage Facility (No. 4) Spring Fauna Survey*. Unpublished report for St. Ives Gold Mining Company.

D Western Wildlife (2006) *St Ives Gold Fauna Survey; Spring 2005*. Unpublished report for Jim's Seeds, Weeds and Trees, Kalgoorlie.

Appendix A(4). Vertebrate fauna recorded in biological surveys in the region

		Survey	Dell and How (1984)																							
Family	**Species**	**Common Name**	**WZ13**	**WZ16**	**WZ16a**	**WZ18**	**WZ18a**	**WZ2**	**WZ22**	**WZ23**	**WZ24a**	**WZ25**	**WZ25a**	**WZ26**	**WZ27**	**WZ3**	**WZ32a**	**WZ33**	**WZ34**	**WZ34a**	**WZ37a**	**WZ40**	**WZ6**	**WZ7**	**WZ7a**
Birds																										
Accipitridae	*Lophoictinia isura*	Square-tailed Kite							1	2												1			
	Accipiter cirrocephalus	Collared Sparrowhawk		1			3				3													2	
	Aquila audax	Wedge-tailed Eagle			4						2		2	1			1			1					
	Hieraaetus morphnoides	Little Eagle					2				2			1						1	4	1			
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar					1				2		4					1				1			
Podargidae	*Podargus strigoides*	Tawny Frogmouth			1						1											1			
Casuariidae	*Dromaius novaehollandiae*	Emu			1																		2	9	
	Charadrius australis	Inland Dotterel			2																				
	Vanellus tricolor	Banded Lapwing																			18				
Columbidae	*Phaps chalcoptera*	Common Bronzewing					1																	36	
Meropidae	*Merops ornatus*	Rainbow Bee-eater							2	2	1			1											
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-Cuckoo					3			2	3	1					1	1	8	2		3	1	1	
	Chalcites osculans	Black-eared Cuckoo					1			2						2						2	3	1	
	Cacomantis pallidus	Pallid Cuckoo					1		3		1		2	2		2	4	1							
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar					1				1														
Falconidae	*Falco cenchroides*	Nankeen Kestrel			4							1					1				1				
	Falco berigora	Brown Falcon			1		2				3		1	1			1	1	1	6	1	1			
	Falco peregrinus	Peregrine Falcon																						1	
Megapodiidae	*Leipoa ocellata*	Malleefowl																							
Acanthizidae	*Calamanthus fuliginosus*	Striated Fieldwren			1																				
	Pyrrholaemus brunneus	Redthroat					3		5	9	1	3				1				1		10	21	18	
	Smicrornis brevirostris	Weebill					38		72	62	99	131	116	13	11	3	6	81	36	52		73	6		
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill			1						2						3		1	13					
	Acanthiza apicalis	Inland Thornbill					4		10	21	2	15								1		33	25	19	
	Aphelocephala leucopsis	Southern Whiteface																		6					
	Acanthiza uropygialis	Chestnut-rumped Thornbill					6		5		24	13					6	26	3	35				7	
Artamidae	*Artamus personatus*	Masked Woodswallow			4		12				200														
	Artamus cinereus	Black-faced Woodswallow			5														13		15				
	Artamus cyanopterus	Dusky Woodswallow					6		2	13	7	1	12		2							1			
	Cracticus torquatus	Grey Butcherbird			2		7		3		22	5	16				3	4	8	12		2	2		
	Cracticus nigrogularis	Pied Butcherbird			2		23										1		3				1	2	
	Cracticus tibicen	Australian Magpie			7						1						2	8		3					
	Strepera versicolor	Grey Currawong					5		2	3	8	15	7					1	1						
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-Shrike					3		1	1	13	1	1					1	7	8	2	1	1	2	
	Lalage sueurii	White-winged Triller									1														
Climacteridae	*Climacteris affinis*	White-browed Treecreeper									11														
	Climacteris rufa	Rufous Treecreeper					7		1	3		2		3											

		Survey	Dell and How (1984)																						
Family	**Species**	**Common Name**	**WZ13**	**WZ16**	**WZ16a**	**WZ18**	**WZ18a**	**WZ2**	**WZ22**	**WZ23**	**WZ24a**	**WZ25**	**WZ25a**	**WZ26**	**WZ27**	**WZ3**	**WZ32a**	**WZ33**	**WZ34**	**WZ34a**	**WZ37a**	**WZ40**	**WZ6**	**WZ7**	**WZ7a**
Corvidae	*Corvus coronoides*	Australian Raven									1														
	Corvus bennetti	Little Crow			23						20	25	10				1	1	27	4	17				
Eupetidae	*Cinclosoma castanotum*	Chestnut Quail-thrush							5	1													2		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin					14										6								
Maluridae	*Malurus leucopterus*	White-winged Fairy-wren			20						1						1								
Maluridae	*Malurus pulcherrimus*	Blue-breasted Fairy-wren								3													22		
Meliphagidae	*Lichenostomus virescens*	Singing Honeyeater								1									6		1				
	Lichenostomus leucotis	White-eared Honeyeater					3		8	4	6	8	3	3	2	1		2				3	11	1	
	Lichenostomus ornatus	Yellow-plumed Honeyeater					256		81	86	12	4	1			7						47	186		
	Purnella albifrons	White-fronted Honeyeater							1	3	4	1						1		2			8		
	Manorina flavigula	Yellow-throated Miner			10		4			6	117	6	73				6	23	17	23		2			
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater									2		1				5	3	12	15	4	1			
	Anthochaera carunculata	Red Wattlebird					82		28	24	4	5	16	3	4	2	2	3		2		4		26	
	Epthianura albifrons	White-fronted Chat																	70		30			2	
	Lichmera indistincta	Brown Honeyeater					21		4							23							46	23	
	Melithreptus brevirostris	Brown-headed Honeyeater					2			4		9		6								2	8	1	
Motacilidae	*Anthus novaeseelandiae*	Australasian Pipit		9	32												2		2		47				
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird					6			1	2		1									1			
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella							8		8	9					1	8							
Pachycephalidae	*Pachycephala inornata*	Gilbert's Whistler							1							1									
	Pachycephala pectoralis	Golden Whistler							3	1		4										2	19		
	Pachycephala rufiventris	Rufous Whistler									4														
	Colluricincla harmonica	Grey Shrike-thrush					3		5	1	6	6	4					2	1	1		3	6		
	Oreoica gutturalis	Crested Bellbird		1			4		1	5	11	5	3	1			3	5	11	5		4	2	2	
Pardalotidae	*Pardalotus striatus*	Striated Pardalote					25		14	30	32	23	29	4	7		1	2	4	5		29	4		
Petroicidae	*Microeca fascinans*	Jacky Winter					2				8	8		1	2		5	7	19			1	1		
	Petroica goodenovii	Red-capped Robin			4		1		1		5	1								1		2		4	
	Melanodryas cucullata	Hooded Robin			2															8					
	Eopsaltria australis	Eastern Yellow Robin							4																
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler								5	8			7					7						
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail			3		1				2			1	1		1			1				1	
Timaliidae	*Zosterops lateralis*	Silvereye							3															3	
Cacatuidae	*Eolophus roseicapillus*	Galah			55						3						13		2	1	46				
Psittacidae	*Glossopsitta porphyrocephala*	Purple-crowned Lorikeet					78		54	41	2	9		2		7						13	7	13	
	Polytelis anthopeplus	Regent Parrot					26			2													2		
	Platycercus icterotis	Western Rosella																				2			
	Barnardius zonarius	Australian Ringneck			1		27			3	35	5	7				10	8	3	10	8	2	1	15	
	Psephotus varius	Mulga Parrot									17						4		4	4					
Strigidae	*Ninox novaeseelandiae*	Southern Boobook					9										1								
Mammals																									

		Survey	Dell and How (1984)																							
Family	**Species**	**Common Name**	**WZ13**	**WZ16**	**WZ16a**	**WZ18**	**WZ18a**	**WZ2**	**WZ22**	**WZ23**	**WZ24a**	**WZ25**	**WZ25a**	**WZ26**	**WZ27**	**WZ3**	**WZ32a**	**WZ33**	**WZ34**	**WZ34a**	**WZ37a**	**WZ40**	**WZ6**	**WZ7**	**WZ7a**
Camelidae	*Camelus dromedarius*	Dromedary			X												X								
Canidae	*Vulpes vulpes*	Red Fox																							
Felidae	*Felis catus*	House Cat																							
Molossidae	*Austronomus australis*	White-striped Freetail Bat			1	1					1		2	2	1						4				
	Mormopterus planiceps	Southern Freetail-bat																			3				
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat				3								4	1						16				
	Chalinolobus morio	Chocolate Wattled Bat				1															1				
	Nyctophilus geoffroyi	Lesser Long-eared Bat				1					1										2				
	Nyctophilus major	Western Long-eared Bat																							
	Nyctophilus sp.													1											
	Scotorepens balstoni	Inland Broad-nosed Bat									3														
	Vespadelus regulus	Southern Forest Bat		1		1								5							1		1		
Dasyuridae	*Ningaui ridei*	Wongai Ningaui	1																						
	Ningaui yvonneae	Mallee Ningaui																	2						
	Sminthopsis crassicaudata	Fat-tailed Dunnart	1	1	1									1					3				1		
	Sminthopsis dolichura	Little Long-tailed Dunnart																							
	Sminthopsis ooldea	Ooldea Dunnart																							
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo	X	X		X			X	X				X		X	X	X		X	X				X
	Macropus robustus	Wallaroo or Euro				X							X						X					X	
	Macropus rufogriseus	Red-necked Wallaby																		X					
	Macropus rufus	Red Kangaroo																							
Leporidae	*Oryctolagus cuniculus*	European Rabbit	1	1	X	X								X				X		1				1	
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna							X	X															
Equidae	*Equus caballus*	Domestic Horse																							
Muridae	*Mus musculus*	House Mouse			2	1															1				
	Notomys mitchellii	Mitchell's Hopping Mouse																							
	Pseudomys bolami	Bolam's Mouse																							
	Pseudomys hermannsburgensis	Sandy Inland Mouse																	1	1					
	Rattus rattus	Black Rat																							
Amphibians																									
Hylidae	*Litoria cyclorhyncha*	Spotted-thighed Frog																							
Limnodynastidae	*Limnodynastes dorsalis*	Western Banjo Frog																							
	Neobatrachus centralis		1		1	1											1						1		
	Neobatrachus kunapalari	Kunapalari Frog																							
	Neobatrachus pelobatoides	Humming Frog																							
	Neobatrachus sutor	Shoemaker Frog																					1		
Myobatrachidae	*Crinia pseudinsignifera*	Bleating Froglet																							
	Pseudophryne occidentalis	Western Toadlet				3										4							1	2	
Reptiles																									
Agamidae	*Ctenophorus adelaidensis*	Southern Heath Dragon								1															

		Survey	Dell and How (1984)																								
Family	**Species**	**Common Name**	**WZ13**	**WZ16**	**WZ16a**	**WZ18**	**WZ18a**	**WZ2**	**WZ22**	**WZ23**	**WZ24a**	**WZ25**	**WZ25a**	**WZ26**	**WZ27**	**WZ3**	**WZ32a**	**WZ33**	**WZ34**	**WZ34a**	**WZ37a**	**WZ40**	**WZ6**	**WZ7**	**WZ7a**
	Ctenophorus caudicinctus	Ring-tailed Dragon																									
	Ctenophorus cristatus	Bicycle Dragon				1			3	2		6	5	1		1		1		1			1	1	
	Ctenophorus fordi	Mallee Sand Dragon																							
	Ctenophorus isolepis gularis	Central Military Dragon																	10		5				
	Ctenophorus maculatus	Spotted Military Dragon																							
	Ctenophorus mckenziei	Dwarf Bicycle Dragon																							
	Ctenophorus nuchalis	Central Netted Dragon																			5				1
	Ctenophorus ornatus	Ornate Crevice Dragon																							
	Ctenophorus pictus	Painted Dragon																							
	Ctenophorus reticulatus	Western Netted Dragon									10						1								
	Ctenophorus salinarum	Salt Pan Dragon		4	12												10								
	Ctenophorus scutulatus										3														
	Diporiphora reginae				1												1		6		3				
	Moloch horridus	Thorny Devil				1						1											1		
	Pogona minor	Bearded Dragon									3	2		3					1	2			1		
	Tympanocryptis houstoni	Nullabor Earless Dragon																							
Boidae	*Aspidites ramsayi*	Woma (southwest pop)																							
	Morelia spilota imbricata	Carpet Python																							
Carphodactylidae	*Nephrurus laevissimus*																								
	Underwoodisaurus milii	Barking Gecko			2	5				2			2	3			1							1	
Diplodactylidae	*Crenadactylus ocellatus ocellatus*																								
	Diplodactylus granariensis					5					1	3	2					1							
	Diplodactylus granariensis granariensis																								
	Diplodactylus pulcher					1			1		7		2			2	1	1	4		2			1	
	Lucasium damaeum																								
	Lucasium maini		1		1	26			1		1		8			3	2								
	Oedura reticulata											21	10												
	Strophurus assimilis	Goldfields Spiny-tailed Gecko																							
	Strophurus elderi																1		3		1				
	Strophurus intermedius					1							1				1								
	Strophurus strophurus																								
Elapidae	*Brachyurophis fasciolata fasciolata*																								
	Brachyurophis semifasciata																								
	Demansia psammophis psammophis																								
	Demansia reticulata																			1					
	Echiopsis curta	Bardick																							
	Elapognathus coronatus	Crowned Snake																							
	Furina ornata	Moon Snake																							
	Neelaps bimaculatus	Black-naped Snake																							
	Parasuta gouldii								1	3						1							1		

		Survey	Dell and How (1984)																							
Family	**Species**	**Common Name**	**WZ13**	**WZ16**	**WZ16a**	**WZ18**	**WZ18a**	**WZ2**	**WZ22**	**WZ23**	**WZ24a**	**WZ25**	**WZ25a**	**WZ26**	**WZ27**	**WZ3**	**WZ32a**	**WZ33**	**WZ34**	**WZ34a**	**WZ37a**	**WZ40**	**WZ6**	**WZ7**	**WZ7a**
	Parasuta monachus																				1				
	Parasuta nigriceps																								
	Parasuta spectabilis																								
	Pseudechis australis	Mulga Snake									1														
	Pseudonaja affinis affinis	Dugite																							
	Pseudonaja mengdeni	Gwardar																							
	Pseudonaja modesta	Ringed Brown Snake			1																				
	Simoselaps bertholdi	Jan's Banded Snake										1	2												1
	Simoselaps semifasciata															1			2						
	Suta fasciata	Rosen's Snake																							
Gekkonidae	*Christinus alexanderi*																								
	Christinus marmoratus	Marbled Gecko																							
	Gehyra purpurascens																								
	Gehyra variegata		1		1	25		3	3			10	12	3		7	4	1	1	1	1		1		
	Heteronotia binoei	Bynoe's Gecko				4			4	19			2	6		2	1				1		2	1	1
Pygopodidae	*Aprasia striolata*																								
	Delma australis		3																2		1				
	Delma butleri																								
	Delma fraseri									1															
	Delma nasuta													3				4	17	1					
	Lialis burtonis													1				2	1		1				
	Pygopus lepidopodus	Common Scaly Foot																					1		
	Pygopus nigriceps																								
Scincidae	*Cryptoblepharus buchananii*								1	1	4	1		2									2		
	Cryptoblepharus carnabyi																								
	Cryptoblepharus plagiocephalus																								
	Cryptoblepharus pulcher clarus																								
	Ctenotus atlas					5						6						4	5						
	Ctenotus leonhardii				4																1				
	Ctenotus orientalis																								
	Ctenotus pantherinus	Leopard Skink																2	1						
	Ctenotus pantherinus ocellifer	Leopard Skink																							
	Ctenotus schomburgkii		2							4	4	4	1	1				1					1	1	
	Ctenotus severus																								
	Ctenotus uber uber																								
	Cyclodomorphus branchialis													1			1	4	4	2	16		2		
	Cyclodomorphus melanops elongatus	Slender Blue-tongue																							
	Egernia carinata					1			1														3	1	
	Egernia depressa	Southern Pygmy Spiny-tailed Skink																							
	Egernia formosa																								

		Survey	Dell and How (1984)																							
Family	**Species**	**Common Name**	**WZ13**	**WZ16**	**WZ16a**	**WZ18**	**WZ18a**	**WZ2**	**WZ22**	**WZ23**	**WZ24a**	**WZ25**	**WZ25a**	**WZ26**	**WZ27**	**WZ3**	**WZ32a**	**WZ33**	**WZ34**	**WZ34a**	**WZ37a**	**WZ40**	**WZ6**	**WZ7**	**WZ7a**
	Egernia multiscutata					1			1														1		
	Egernia richardi																								
	Eremiascincus richardsonii	Broad-banded Sand Swimmer			4																				
	Hemiergis initialis								3		12	5	6	1				1					2		
	Hemiergis millewae		8											2			6	2	14	11	14				
	Hemiergis peronii peronii																								
	Lerista dorsalis																								
	Lerista muelleri																								
	Lerista picturata								3		1	1	3						1						
	Lerista sp.					7			5		6	2	6	3		1		2	2		2		3	1	
	Lerista taeniata																								
	Lerista terdigitata				1									1					2						
	Lerista tridactyla																								
	Liopholis inornata										4										2				
	Liopholis striata	Night Skink																							
	Menetia greyii				1	1								3		3	1	2	7	2	5		1	1	
	Morethia adelaidensis																								
	Morethia butleri					4		1		2			2	1		1		1						1	
	Morethia obscura									1				1											
	Tiliqua occipitalis	Western Bluetongue																							
	Tiliqua rugosa			3						1	2	1	1						1	2					
Typhlopidae	*Ramphotyphlops australis*																								
	Ramphotyphlops bicolor																								
	Ramphotyphlops bituberculatus				1											1									
	Ramphotyphlops hamatus																								
Varanidae	*Varanus gouldii*	Bungarra or Sand Monitor												1											
	Varanus rosenbergi	Heath Monitor																							
	Varanus tristis tristis																								

Dell, J and How, R. (1984) Vertebrate fauna. In The Biological Survey of the Eastern Goldfields of Western Australia, *Records of the Western Australian Museum*, Supplement No 18, 57-89.

Appendix A(5). Vertebrate fauna recorded in biological surveys in the region

		Survey	B								
Family	**Species**	**Common Name**	**Dordie Rock NR #1**	**Dordie Rock NR #2**	**Dordie Rock NR #3**	**Dordie Rock NR #4**	**Kurrawang NR #3**	**Kurrawang NR #4**	**Kurrawang NR #5**	**Kurrawang NR #6**	**Kurrawang NR #7**
Birds											
Accipitridae	*Lophoictinia isura*	Square-tailed Kite								X	
	Accipiter fasciatus	Brown Goshawk									
	Aquila audax	Wedge-tailed Eagle									
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar	X							X	
Podargidae	*Podargus strigoides*	Tawny Frogmouth								X	
Casuariidae	*Dromaius novaehollandiae*	Emu	X								X
Columbidae	*Phaps chalcoptera*	Common Bronzewing									
	Ocyphaps lophotes	Crested Pigeon									X
Meropidae	*Merops ornatus*	Rainbow Bee-eater			X		X	X	X		
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-Cuckoo									
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar									
Falconidae	*Falco cenchroides*	Nankeen Kestrel									X
	Falco berigora	Brown Falcon									
	Falco longipennis	Australian Hobby									
Megapodiidae	*Leipoa ocellata*	Malleefowl	X								
Otididae	*Ardeotis australis*	Australian Bustard									
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat		X							
	Smicrornis brevirostris	Weebill	X	X			X	X	X		
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill						X	X		
	Acanthiza apicalis	Inland Thornbill		X						X	
	Aphelocephala leucopsis	Southern Whiteface									
	Acanthiza uropygialis	Chestnut-rumped Thornbill	X	X				X	X		
Artamidae	*Artamus personatus*	Masked Woodswallow									
	Artamus cinereus	Black-faced Woodswallow							X		
	Artamus cyanopterus	Dusky Woodswallow			X						
	Cracticus torquatus	Grey Butcherbird	X				X	X			X
	Cracticus nigrogularis	Pied Butcherbird			X		X	X			X
	Cracticus tibicen	Australian Magpie									X
	Strepera versicolor	Grey Currawong	X	X						X	X
Campephagidae	*Coracina maxima*	Ground Cuckoo-Shrike									X
	Coracina novaehollandiae	Black-faced Cuckoo-Shrike		X	X						X
Climacteridae	*Climacteris rufa*	Rufous Treecreeper			X						
Corvidae	*Corvus coronoides*	Australian Raven	X								
	Corvus bennetti	Little Crow	X								X

		Survey	B								
Family	**Species**	**Common Name**	**Dordie Rock NR #1**	**Dordie Rock NR #2**	**Dordie Rock NR #3**	**Dordie Rock NR #4**	**Kurrawang NR #3**	**Kurrawang NR #4**	**Kurrawang NR #5**	**Kurrawang NR #6**	**Kurrawang NR #7**
Eupetidae	*Cinclosoma castanotum*	Chestnut Quail-thrush			X				X	X	
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow									
	Hirundo neoxena	Welcome Swallow									
	Petrochelidon nigricans	Tree Martin									
Maluridae	*Malurus splendens*	Splendid Fairy-wren									X
	Malurus leucopterus	White-winged Fairy-wren									
Meliphagidae	*Lichenostomus virescens*	Singing Honeyeater									
	Lichenostomus leucotis	White-eared Honeyeater	X						X		
	Lichenostomus ornatus	Yellow-plumed Honeyeater	X	X	X			X	X		X
	Purnella albifrons	White-fronted Honeyeater	X								
	Manorina flavigula	Yellow-throated Miner								X	X
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater	X		X		X				
	Anthochaera carunculata	Red Wattlebird	X	X	X		X		X		X
	Sugomel niger	Black Honeyeater									
	Lichmera indistincta	Brown Honeyeater							X		
	Melithreptus brevirostris	Brown-headed Honeyeater	X								
Monarchidae	*Grallina cyanoleuca*	Magpie-Lark									X
Motacilidae	*Anthus novaeseelandiae*	Australasian Pipit									X
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird									
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella									
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler									
	Colluricincla harmonica	Grey Shrike-thrush	X		X				X		X
	Oreoica gutturalis	Crested Bellbird	X	X	X		X	X	X		X
Pardalotidae	*Pardalotus striatus*	Striated Pardalote	X				X	X			
Petroicidae	*Microeca fascinans*	Jacky Winter	X						X		
	Petroica goodenovii	Red-capped Robin		X							X
	Melanodryas cucullata	Hooded Robin									
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler									
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	X								
Cacatuidae	*Eolophus roseicapillus*	Galah									X
Psittacidae	*Glossopsitta porphyrocephala*	Purple-crowned Lorikeet	X								
	Polytelis anthopeplus	Regent Parrot					X				X
	Barnardius zonarius	Australian Ringneck	X	X	X						
	Psephotus varius	Mulga Parrot									X
	Melopsittacus undulatus	Budgerigar									
Strigidae	*Ninox novaeseelandiae*	Southern Boobook									
Mammals											

		Survey	B								
Family	**Species**	**Common Name**	**Dordie Rock NR #1**	**Dordie Rock NR #2**	**Dordie Rock NR #3**	**Dordie Rock NR #4**	**Kurrawang NR #3**	**Kurrawang NR #4**	**Kurrawang NR #5**	**Kurrawang NR #6**	**Kurrawang NR #7**
Canidae	*Canis lupus*	Dingo									
Felidae	*Felis catus*	House Cat									
Molossidae	*Austronomus australis*	White-striped Freetail Bat									
	Mormopterus species 4	Southern Freetail Bat									
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat									
	Nyctophilus sp.										
	Vespadelus baverstocki	Inland Forest Bat									
Dasyuridae	*Sminthopsis crassicaudata*	Fat-tailed Dunnart					2				
	Sminthopsis gilberti	Gilbert's Dunnart									
Burramyidae	*Cercartetus concinnus*	Southwestern Pygmy Possum									
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo									X
	Macropus robustus	Wallaroo or Euro									X
Leporidae	*Oryctolagus cuniculus*	European Rabbit									
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna			1		1	1			
Muridae	*Mus musculus*	House Mouse		1				1			
	Notomys mitchellii	Mitchell's Hopping Mouse		1	1				1		
	Pseudomys hermannsburgensis	Sandy Inland Mouse									
Reptiles											
Agamidae	*Ctenophorus cristatus*	Bicycle Dragon	X		X					X	
	Ctenophorus fordi	Mallee Sand Dragon						X			
	Ctenophorus reticulatus	Western Netted Dragon									
	Moloch horridus	Thorny Devil									X
	Pogona minor	Bearded Dragon									
	Tympanocryptis cephalus	Pebble Dragon									
Carphodactylidae	*Underwoodisaurus milii*	Barking Gecko				X					
Diplodactylidae	*Diplodactylus granariensis*										
	Diplodactylus pulcher		X								X
	Lucasium damaeum										
	Lucasium maini		X								
	Oedura reticulata										
Elapidae	*Parasuta monachus*										
e	*Pseudechis australis*	Mulga Snake									
Gekkonidae	*Gehyra variegata*					X					
	Heteronotia binoei	Bynoe's Gecko									X
Pygopodidae	*Delma australis*										
	Pygopus lepidopodus	Common Scaly Foot									
Scincidae	*Cryptoblepharus buchananii*										

		Survey	B								
Family	**Species**	**Common Name**	**Dordie Rock NR #1**	**Dordie Rock NR #2**	**Dordie Rock NR #3**	**Dordie Rock NR #4**	**Kurrawang NR #3**	**Kurrawang NR #4**	**Kurrawang NR #5**	**Kurrawang NR #6**	**Kurrawang NR #7**
	Ctenotus atlas							X			
	Ctenotus schomburgkii							X			
	Ctenotus uber										
	Egernia formosa										
	Eremiascincus richardsonii	Broad-banded Sand Swimmer									
	Lerista muelleri										
	Lerista picturata										
	Liopholis inornata				X						
	Menetia greyii										X
	Morethia butleri										
	Morethia obscura				X						
	Tiliqua occipitalis	Western Bluetongue									X
	Tiliqua rugosa										X
Typhlopidae	*Ramphotyphlops australis*										
	Ramphotyphlops hamatus										
Varanidae	*Varanus gouldii*	Bungarra or Sand Monitor			X						
	Varanus tristis	Racehorse Monitor									

Chapman A; Kealley I; McMillan D; McMillan and Rolland; G (1991). Biological Surveys of Four Goldfields Reserves. *Landnote* 1/91; 1-238

Appendix A(6). Vertebrate fauna recorded in biological surveys in the region

Family	Species	Common name	W.A. Museum Surveys McKenzie and Hall (1992)									Thompson unpublished data set											Chapman et al. (1991)						
			Qpv	Qqs	Qas	As	Agb	Qqz	Qps	Ts	Tg	Crossroads	Davyhurst	Floodplains	Gimlet	Golden	Palace	Rose	Salmon Gums	Security	Spinifex	Wendy Gully	KNR #1	KNR #2	KNR #3	KNR #4	KNR #5	KNR #6	KNR #7
Casuariidae	*Dromaius novaehollandiae*	Emu		11	14						23																		X
Megapodiidae	*Leipoa ocellata*	Malleefowl							X	X	X																		
Anatidae	*Anas gracilis*	Grey Teal		10																									
	Hamirostra isura	Square-tailed Kite																										X	
	Haliastur sphenurus	Whistling Kite					2																						
	Aquila audax	Wedge-tailed Eagle				2																							
	Circus assimilis	Spotted Harrier						1																					
Falconidae	*Falco berigora*	Brown Falcon		1			1	2	2	1																			
	Falco cenchroides	Australian Kestrel					1																						X
Columbidae	*Phaps chalcoptera*	Common Bronzewing		4		3	1	2			1																		
	Ocyphaps lophotes	Crested Pigeon		2																									X
Psittacidae	*Cacatua roseicapilla*	Galah		10			24	1		1													X						X
	Cacatua leadbeateri	Major Mitchell's Cockatoo																											
	Nymphicus hollandicus	Cockatiel		15			1																						
	Glossopsitta porphyrocephala	Purple-crowned Lorikeet		3		6	7	7																					
	Polytelis anthopeplus	Regent Parrot																						X	X				X
	Barnardius zonarius semitorquatus	Australian Ringneck		63	11	16	6	7			3																		
	Platycercus icterotis xanthogenys	Western Rosella																											
	Platycercus varius	Mulga Parrot		1	7		16			4	4																		X
	Melopsittacus undulatus	Budgerigar							4	2	4																		
Cuculidae	*Cuculus pallidus*	Pallid Cuckoo		4	1	1	1		2																				
	Chrysococcyx osculans	Black-eared Cuckoo						2																					
	Chrysococcyx basalis	Horsfield's Bronze Cuckoo		2	1	1	3	4	4	1	5																		
Strigidae	*Ninox novaeseelandiae*	Boobook Owl				1																							

Podargidae	*Podargus strigoides*	Tawny Frogmouth			1		3																						X	
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar						1																					X	
Halcyonidae	*Todiramphus pyrrhopygia*	Red-backed Kingfisher				2																								
	Todiramphus sanctus	Sacred Kingfisher																												
Meropidae	*Merops ornatus*	Rainbow Bee-eater		19		10		6	6	12	6														X	X	X		
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella		15					6																					
Climacteridae	*Climacteris rufa*	Rufous Treecreeper		4																										
	Climacteris affinis superciliosa	White-browed Treecreeper						1																						
Maluridae	*Malurus lamberti*	Variegated Fairy-wren					45			1	20																			
	Malurus leucopterus	White-winged Fairy-wren		10																										
	Malurus splendens	Splendid Fairy-wren																												X
	Amytornis textilis	Thick-billed Grasswren																												
Pardalotidae	*Pardalotus striatus*	Striated Pardalote		56		9	1	5		7														X	X	X	X			
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill				14	22	14	9	4	14																		X	
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill				4	47																				X	X		
	Acanthiza robustirostris	Slaty-backed Thornbill					2																							
	Acanthiza uropygialis	Chestnut-rumped Thornbill		2	33	25	67	42	2	3	12																X	X		
	Aphelocephala leucopsis	Southern Whiteface					18				2																			
	Pyrrholaemus brunneus	Redthroat			2	1	14	6	2		7																			
	Smicrornis brevirostris	Weebill		155	12	77	15	137	42	55	40													X	X	X	X	X		
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater				30	2				2																	X		
	Lichenostomus virescens	Singing Honeyeater			9	15	10			1																				
	Lichenostomus plumulus	Grey-fronted Honeyeater								2																				
	Lichenostomus ornatus	Yellow-plumed Honeyeater		30		8					1													X	X		X	X		X
	Lichenostomus leucotis	White-eared Honeyeater		3				7	2	1	1																	X		
	Melithreptus brevirostris	Brown-headed Honeyeater				5		17	9																					
	Phylidonyris nigra	White-cheeked Honeyeater						7																						
	Phylidonyris albifrons	White-fronted Honeyeater		11	17	19	4	15	6	15																				
	Manorina flavigula	Yellow-throated Miner		86	52	36		2	10	1	1														X				X	X
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater		10	20	14	21	13	13	12	22														X	X				

	Anthochaera carunculata	Red Wattlebird		31																			X	X	X		X		X
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler		5	1	28	23			3	18																		
Petroicidae	*Eopsaltria griseogularis*	Western Yellow Robin																											
	Microeca fascinans	Jacky Winter		11	1	6		8															X				X		
	Petroica cucullata	Hooded Robin		1																									
	Petroica goodenovii	Red-capped Robin		5	5	6	187	14		5	7																		X
Cinclosomatidae	*Cinclosoma castanotus*	Chestnut Quail-thrush																									X	X	
Pachycephalidae	*Oreoica gutturalis*	Crested Bellbird		5	5		6	5	1	2	2														X	X	X		X
	Pachycephala rufiventris	Rufous Whistler					7	10	1	5	8																		
	Colluricincla harmonica	Grey Shrike-thrush		1		1	9	7			2																X		X
Dicruridae	*Rhipidura fuliginosa*	Grey Fantail					1																						
	Rhipidura leucophrys	Willie Wagtail		1		2																							
	Grallina cyanoleuca	Magpie-lark		6			9																						X
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		13	6	9	5	2		1													X						X
	Coracina maxima	Ground Cuckoo-shrike		4																									X
	Lalage tricolor	White-winged Triller			2		1																						
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		1		7																					X		
	Artamus cyanopterus	Dusky Woodswallow		3			2																						
	Artamus personatus	Masked Woodswallow																											
Cracticidae	*Cracticus torquatus*	Grey Butcherbird		3	5		2	7		1	1													X	X	X			X
	Cracticus nigrogularis	Pied Butcherbird		9		2	2	1	1															X	X	X			X
	Cracticus tibicen	Australian Magpie		30		4		14																					X
	Strepera versicolor	Grey Currawong		7	2	7	1	2		1																		X	X
Corvidae	*Corvus bennetti*	Little Crow																											X
Hirundinidae	*Hirundo neoxena*	Welcome Swallow			4																								
	Hirundo nigricans	Tree Martin		4																									
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird					2	4																					
Passeridae	*Taeniopygia guttata*	Zebra Finch					9																						
Motacillidae	*Anthus australis*	Australian Pipit		1					2																				X
Myobatrachidae	*Neobatrachus sutor*	Shoemaker Frog	8		1		1				1																		

	Neobatrachus wilsmorei	Wilsmore's Frog			1																									
	Pseudophryne occidentalis	Western Toadlet	2																											
Gekkonidae	*Diplodactylus assimilis*																							X						
	Diplodactylus granariensis		1	2		4						29	74	1	71	13	62	68	18	8	77	76		X						
	Diplodactylus maini			3		5						9	9	1	60	6	39	69	345	1	9	1	X	X						
	Diplodactylus pulcher			2	1			2				80	84	12	21	78	87	100	8	123	53	46								X
	Nephurus milii					2		5				2	16	10	18	22	22	10	31		11	28								
	Nephrurus laevissimus				1																									
	Oedura reticulata			1									1					4												
	Rhynchoedura ornata				1							41	5			23	20	106	3		4	9								
	Strophurus assimilis												1		7	19	1		1		44	112								
	Strophurus elderi				3																									
	Gehyra purpurascens											6	1		1	1	9	6	1		1									
	Gehyra variegata			3	1	2	3	6		1		6	38	1	37	28	45	37	14	39	23	12		X						
	Heteronotia binoei		2	6	1	6	3		1			1	16		9	12	28	13	10	24	24	8								X
	Underwoodisaurus milli																							X						
Pygopodidae	*Delma australis*					1							4		3	2	9	2			8	5								
	Delma butleri											2									4	2								
	Delma fraseri											1									1									
	Delma nasuta								4		1																			
	Lialis burtonis				2			1													5	3								
	Pygopus lepidopodus												2		1				3		2	1								
Scincidae	*Cryptoblepharus plagiocephalus*				4			1					10		12	1	5	7	3	3										
	Ctenotus atlas				6			2	12	6							1			1	16	104				X			
	Ctenotus leonhardii						1																							
	Ctenotus schomburgkii				1			6		1										2	2					X			
	Ctenotus uber			7			2					27	29	13	48	5	3	6	44	46	25									
	Cyclodomorphus branchialis																							X						
	Cyclodomorphus melanops elongatus				1						1		1		2	6	2				24									
	Egernia depressa						X	4					57		68	2	2	3		27	15									

	Egernia formosa			1			1	3				1	8				1	14	4	8	1								
	Egernia inornata		1	1	1			1									8	71	4	2		2							
	Egernia striata																		2	9		1							
	Eremiascincus richardsonii											2	5		4	4			6	6	3	1							
	Hemiergis initialis initialis												4		5				1		12								
	Lerista muelleri			3	2	2		1					22		4	3	6	6	15		5	2							
	Lerista picturata			2		1						1	18		17	17	5	5	20		14	20							
	Menetia greyii					1						4	19		3	6	23	18	3	17	6	1							X
	Morethia adelaidensis			1																									
	Morethia butleri					2		1			1		14		1		6	17	7	4	4								
	Tiliqua occipitalis										3		1			2				3	5	4							X
	Tiliqua rugosa			2	3	7		5	2		2	1	3	1	1			1		2	2	1							X
Agamidae	*Caimanops amphiboluroides*							1		1										7									
	Ctenophorus cristatus			3				4				1	3		5	1	10	4			1							X	
	Ctenophorus femoralis																												
	Ctenophorus fordi				4		1	4	5	4	1															X			
	Ctenophorus isolepis citrinus																												
	Ctenophorus maculatus																												
	Ctenophorus nuchalis																												
	Ctenophorus ornatus																												
	Ctenophorus reticulatus			5	3		7	8			4	6	4		11	18		18	3	29		3							
	Ctenophorus salinarum																												
	Ctenophorus scutulatus				8			9					2		1	3	1			3		12							
	Moloch horridus				1			2	1	3	2		5									17							X
	Pogona minor					1	1	2	4	1	2	21	11	2	3	14	3	2	2	14	13	23							
	Tympanocryptis cephala														7							1							
Varanidae	*Varanus caudolineatus*				1		3	4				9	10		15	1		1	11	17	1	9							
	Varanus gouldii			2	1			1		1	1	2	10	1	9	9	3	7	8	1	5								
	Varanus tristis												5		1				3		3								
Typhlopidae	*Ramphotyphlops australis*											7	8		14		7	2	7		14	6							

	Ramphotyphlops bicolor														1						1	1							
	Ramphotyphlops bituberculatus												2		2	2	2	1		1	1								
	Ramphotyphlops hamatus											13	10		24	18	7	6	10	2	9	9							
Elapidae	*Brachyurophis semifasciata*	Southern shovel-nosed snake											6		6	5	2		7	1	9								
	Demansia psammophis psammophis	Yellow-faced whipsnake											1		4		1		1	1	1	3							
	Parasuta monachus	Monk snake	1					1				2	9		4	3	11	3	7	4	2	6							
	Pseudechis australis	Mulga snake											2			1		1	1	1									
	Pseudonaja modesta	Ringed brown snake		1				2		1			1			2		2			1	1							
	Pseudonaja nuchalis	Gwardar				X															1								
	Simoselaps bertholdi	Jan's banded snake			1																								
	Suta fasciata	Rosen's snake													3				2	1									
	Suta gouldii		1																										
Tachyglossidae	*Tachyglossus aculeatus*	Echidna						1																	2nd	2nd			
Dasyuridae	*Antechinomys laniger*	Kultarr																	1										
	Ningaui ridei	Wongai Ningaui						1	11				X			X		X	X		X	X							
	Ningaui yvonneae	Southern Ningaui											X			X		X	X		X	X		1					
	Pseudantechinus woolleyae	Woolley's Pseudantechinus												1															
	Sminthopsis crassicaudata	Fat-tailed Dunnart	2	5	1	1	1	2	1		1	26		108	2	15	12	28	5	4	2	24			2				
	Sminthopsis dolichura	Little Long-tailed Dunnart	1	3	7	4	4	8	2	1	6	11	47	2	15	25	36	28	34	46	63	32							
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo		2	8	6	1	7																					X
	Macropus robustus	Common Wallaroo, Euro				2	4																						X
	Macropus rufus	Red Kangaroo	1	15		8		3																					
Burramyidae	*Cercartetus concinnus*	Western Pygmy-possum		8	2	1						17	37		62	32	20	22	15	8	23	16	2						
Vespertilionidae	*Chalinolobus morio*	Chocolate Wattled Bat	1	3				3																					
	Nyctophilus geoffroyi	Lesser Long-eared Bat	1	2				1																					
	Nyctophilus gouldi	Gould's Long-eared Bat	10	42				4																					
	Scotorepens balstoni	Inland Broad-nosed Bat	2	11																									
	Vespadelus regulus	Southern Forest Bat	1	5																									
Molossidae	*Mormopterus planiceps*	Southern Freetail-bat	11	8																									
	Tadarida australis	White-striped Freetail-bat	5	17		1		6		2	3																		

Muridae	*Mus musculus*	House Mouse		13	1	4	8	11	8	4		18	19	31	25	2	24	22	6	10	26	13				1			
	Notomys alexis	Alexis Hopping-mouse																											
	Notomys mitchellii	Mitchell's Hopping-mouse						2	3	7			1														1		
	Pseudomys bolami	Bolam's Mouse	2		9							8	49	4	13	3	13	24	30	1	9	5							
	Pseudomys hermannsburgensis	Sandy Inland Mouse					1	2	6	2	2	2	9	2	5	3	4	14	9		8	5		1					
Canidae	*Vulpes vulpes*	Red Fox				1		1																					

Appendix A(7). Vertebrate fauna recorded in biological surveys in the region

Family	Species	Common Name	A																		B						C
Casuariidae	*Dromaius novaehollandiae*	Emu		X			X							X		X						+	X	X	+		X
Megapodiidae	*Leipoa ocellata*	Malleefowl														X										+	
Anatidae	*Anas gracilis*	Grey Teal																			+	+					
	Cygnus atratus	Black Swan																			+	+					
	Tadorna tadornoides	Australian Shelduck																			+	+					X
	Chenonetta jubata	Maned Dusck																			+						
	Anas superciliosa	Pacific Black Duck																			+						
	Anas rhynchotis	Australiasian Shoveler																			+						
	Malacorhynchus menbranaceus	Pink-eared Duck																			+						
Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe																			+						
Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant																			+						
	Phalacrocorax melanleucos	Little Pied Cormorant						X					X														
Ardeidae	*Ardea pacifica*	White-necked Heron																			+						
	Ardea novaehollandiae	White-faced Heron																			+						
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill																			+						
Accipitridae	*Elanus caeruleus*	Black-shouldered Kite																					+	+	+		
	Hamirostra isura	Square-tailed Kite											X										+	+	+	+	
	Haliastur sphenurus	Whistling Kite																					+	+	X	+	X
	Accipiter fasciatus	Brown Goshawk											X										+	+	+	+	X
	Accipiter cirrhocephalus	Collared Sparrowhawk					X								X								+	+	+	+	X
	Aquila audax	Wedge-tailed Eagle					X							X									+	+	+		X
	Aquila morphnoides	Little Eagle		X			X								X								+	+	+		X

Falconidae	*Falco berigora*	Brown Falcon						X						X									+	+	+	+	X
	Falco cenchroides	Australian Kestrel																					+	+	+		X
	Falco longipennis	Australian Hobby																					+	+	+	+	
	Falco hypoleucos	Grey Falcon																							+		
	Falco peregrinus	Peregrine Falcon																					+	+	X	+	X
	Falco subniger	Black Falcon																					+	+	+	+	
Rallidae	*Gallinula ventralis*	Black-tailed Naitve Hen																			+						
	Fulica atra	Eurasian Coot																			+						
Scolopacidae	*Limosa limosa*	Bar-tailed Godwit																			+						
	Tringa nebularia	Common Greenshank																			+						
Otididae	*Ardeotis australis*	Australian Bustard																					+	+	+		
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew																								+	
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt																			+	+					
	Cladorhynchus leucocephalus	Banded Stilt																			+	+					X
	Recurvirostra novaehollandiae	Red-necked Avocet																			+	+					X
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover																			+	+					X
	Charadrius rubricollis	Hooded Plover																			+	+					
	Vanellus tricolor	Banded Lapwing					X																				
Laridae	*Sterna nilotica*	Gull-billed Tern																			+	+					
	Sterna hybrida	Whiskered Tern																			+	+					
Columbidae	*Phaps chalcoptera*	Common Bronzewing		X			X						X										+		+	+	X
	Ocyphaps lophotes	Crested Pigeon																					+		+		X
Psittacidae	*Cacatua roseicapilla*	Galah																					+		+		
	Cacatua leadbeateri	Major Mitchell's Cockatoo																							+		
	Nymphicus hollandicus	Cockatiel																							+		
	Glossopsitta porphyrocephala	Purple-crowned Lorikeet		X		X		X	X							X							+		X	+	X
	Polytelis alexandrae	Princess Parrot																									
	Polytelis anthopeplus	Regent Parrot		X	X	X		X					X												+	+	X
	Barnardius zonarius semitorquatus	Australian Ringneck			X	X	X	X	X	X			X			X	X	X					+	X	X	+	X
	Platycercus icterotis xanthogenys	Western Rosella												X													

	Platycercus varius	Mulga Parrot							X																	+		
	Neophema splendida	Scarlet-chested Parrot																								+	+	
	Melopsittacus undulatus	Budgerigar																								+		
Cuculidae	*Cuculus pallidus*	Pallid Cuckoo																					X		+	+	X
	Chrysococcyx osculans	Black-eared Cuckoo																							+		X
	Chrysococcyx basalis	Horsfield's Bronze Cuckoo																					+		+		X
Strigidae	*Ninox novaeseelandiae*	Boobook Owl											X										+		+	+	
Tytonidae	*Tyto alba*	Barn Owl																					+		+	+	
Podargidae	*Podargus strigoides*	Tawny Frogmouth						X															+		+	+	X
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar											X										+		+		
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar											X		X								+		+		X
	Todiramphus pyrrhopygia	Red-backed Kingfisher																							+		X
	Todiramphus sanctus	Sacred Kingfisher											X														X
Meropidae	*Merops ornatus*	Rainbow Bee-eater					X	X		X		X	X		X			X					+		+		X
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella																							+	+	X
Climacteridae	*Climacteris rufa*	Rufous Treecreeper																X					X		X	+	X
Maluridae	*Malurus lamberti*	Variegated Fairy-wren	X		X			X				X											+	+	+	+	
	Malurus leucopterus	White-winged Fairy-wren																				+		+			X
	Malurus pulcherrimus	Blue-breasted Fairy-wren																									X
	Malurus splendens	Splendid Fairy-wren																					+	+		+	
Pardalotidae	*Pardalotus striatus*	Striated Pardalote		X	X			X	X	X	X					X							X	X	X	+	X
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill	X	X		X		X						X			X						X	X	+	+	X
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill					X	X				X		X									+				X
	Acanthiza uropygialis	Chestnut-rumped Thornbill														X	X						X	X	+		X
	Calamanthus fuliginosus	Striated Fieldwren																				+		+			
	Gerygone fusca	Western Gerygone																							+	+	X
	Hylacola cauta whitlocki	Shy Heathwren																									X
	Pyrrholaemus brunneus	Redthroat	X		X	X											X						+			+	X
	Smicrornis brevirostris	Weebill		X	X	X		X			X	X	X			X	X						X	X	+	+	X
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater					X	X	X			X											+		+	+	X

	Certhionyx niger	Black Honeyeater																								+		
	Certhionyx variegates	Pied Honeyeater																								+		
	Lichenostomus cratitius	Purple-gaped Honeyeater			X			X				X																
	Lichenostomus virescens	Singing Honeyeater										X											X	X	+	+	X
	Lichenostomus ornatus	Yellow-plumed Honeyeater						X								X	X	X					+		X	+	X
	Lichenostomus leucotis	White-eared Honeyeater		X		X		X				X		X		X									X		X
	Melithreptus brevirostris	Brown-headed Honeyeater				X										X							+		X	+	X
	Phylidonyris albifrons	White-fronted Honeyeater										X				X							X	X	X	+	X
	Manorina flavigula	Yellow-throated Miner																					X	X	+	+	X
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater						X		X						X		X					X	X	+		X
	Anthochaera carunculata	Red Wattlebird						X	X							X	X	X					X		X		X
	Epthianura albifrons	White-fronted Chat										X										+		+			X
	Epthianura tricolor	Crimson Chat																				+		+	X		
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler				X							X												+		X
Petroicidae	*Drymodes brunneopygius*	Southern Scrub-robin			X	X							X													+	
	Eopsaltria griseogularis	Western Yellow Robin						X																			X
	Microeca fascinans	Jacky Winter											X			X									X		X
	Petroica cucullata	Hooded Robin																							+		
	Petroica goodenovii	Red-capped Robin					X	X			X						X						X		+	+	X
Cinclosomatidae	*Cinclosoma castanotus*	Chestnut Quail-thrush											X					X							+	+	X
Pachycephalidae	*Oreoica gutturalis*	Crested Bellbird	X					X	X		X		X			X	X	X					X		X		X
	Pachycephala rufiventris	Rufous Whistler																					+		+	+	X
	Pachycephala inornata	Gilbert's Whistler																								+	
	Colluricincla harmonica	Grey Shrike-thrush	X		X		X	X					X			X		X					X		X	+	X
Dicruridae	*Myiagra inquieta*	Restless Flycatcher											X														
	Rhipidura fuliginosa	Grey Fantail																					+		+	+	
	Rhipidura leucophrys	Willie Wagtail					X						X	X		X							X		X		X
	Grallina cyanoleuca	Magpie-lark																					+	+	+		X
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike			X				X				X				X	X					X		X	+	X
	Coracina maxima	Ground Cuckoo-shrike																							X		X

	Lalage tricolor	White-winged Triller																							+			
Artamidae	*Artamus cinereus*	Black-faced Woodswallow											X										+	X	+			X
	Artamus cyanopterus	Dusky Woodswallow						X										X										X
	Artamus personatus	Masked Woodswallow					X																X	X	+			
Cracticidae	*Cracticus torquatus*	Grey Butcherbird						X								X							X		X	+		X
	Cracticus nigrogularis	Pied Butcherbird																X					+		+	+		X
	Cracticus tibicen	Australian Magpie																					+		+	+		X
	Strepera versicolor	Grey Currawong	X	X		X	X	X	X			X				X	X						+		+	+		X
Corvidae	*Corvus bennetti*	Little Crow			X			X						X		X							X	+	+	+		X
	Corvus coronoides	Australian Raven											X			X							X	+	+	+		X
	Corvus orru	Torresian Crow																										X
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow																				+	X	+				X
	Hirundo neoxena	Welcome Swallow																				+	+	+	+			
	Hirundo nigricans	Tree Martin					X																+		+			X
	Hirundo ariel	Fairy Martin																					+		+			
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird																					+		+	+		X
Passeridae	*Taeniopygia guttata*	Zebra Finch																							+			
Motacillidae	*Anthus australis*	Australian Pipit					X							X	X								+					X
Zosteropidae	*Zosterops lateralis*	Silvereye																								+		X
Sylviidae	*Cincloramphus mathewsi*	Rufous Songlark																							+			
	Cincloramphus crurualis	Brown Songlark																							+			
Myobatrachidae	*Neobatrachus kunapalari*	Kunapalari Frog																					X		X	+		X
	Neobatrachus pelobatoides	Humming Frog																					X			+		X
	Neobatrachus sutor	Shoemaker Frog																							X	+		X
	Pseudophryne occidentalis	Western Toadlet						X																X		+		X
Gekkonidae	*Crenadactylus ocellatus*																											X
	Diplodactylus assimilis							X														+	+			+		
	Diplodactylus elderi																						+		+			
	Diplodactylus granariensis								X													+	+	+	+	+		X

	Diplodactylus maini			X	X				X	X						X									X	+	X
	Diplodactylus pulcher															X								+	+	+	X
	Nephrurus laevissimus																						X	+			X
	Nephrurus levis																						+	+			
	Oedura reticulata																								+	+	X
	Gehyra purpurascens																										X
	Gehyra variegata		X						X									X				X	X	+	+	X
	Heteronotia binoei										X											X	X	+	+	X
	Underwoodisaurus milli				X													X			+					X
Pygopodidae	*Delma australis*																							+		
	Delma butleri																					X		+		X
	Delma fraseri																					+	+	+	+	X
	Lialis burtonis																					+	+	+		X
	Pygopus lepidopodus																						+			X
	Pygopus nigriceps																							+	+	
Scincidae	*Cryptoblepharus carnabyi*																					+		+		
	Cryptoblepharus plagiocephalus						X															X		+		X
	Ctenotus atlas																					X	X			X
	Ctenotus impar																						+	+		
	Ctenotus leonhardii																				+			+	+	X
	Ctenotus pantherinus ocellifer																					+		+		
	Ctenotus schomburgkii																							X		X
	Ctenotus uber																								+	X
	Cyclodomorphus branchialis																							+		
	Egernia formosa																									X
	Egernia inornata																X							+		
	Egernia multiscutata																									X
	Eremiascincus richardsonii																					+		+		
	Hemiergis initialis initialis																									X
	Lerista desertorum																					+		+		

	Lerista muelleri														X								+	+	X	+	X
	Lerista picturata																						+	+	+		X
	Menetia greyii								X														X	+	X	+	X
	Morethia adelaidensis																					+			X	+	
	Morethia butleri																								+	+	X
	Morethia obscura																	X							+	+	
	Tiliqua occipitalis						X																		+		X
	Tiliqua rugosa																						X	+	+	+	X
Agamidae	*Ctenophorus clayi*																								+		
	Ctenophorus cristatus						X					X			X		X										X
	Ctenophorus femoralis																										
	Ctenophorus fordi																						X		+		X
	Ctenophorus isolepis citrinus																								+		
	Ctenophorus maculatus																						+				
	Ctenophorus nuchalis																									+	
	Ctenophorus ornatus						X																				
	Ctenophorus reticulatus																										X
	Ctenophorus salinarum																					+	X	X			X
	Ctenophorus scutulatus			X						X																	
	Moloch horridus												X											+	+		X
	Pogona minor						X																X	+	+	+	X
	Tympanocryptis cephala																										X
Varanidae	*Varanus caudolineatus*																								+		
	Varanus eremius																								+		
	Varanus gouldii																X				+	+	+	+	+	+	X
	Varanus panoptes																				+	+	+	+	+		
	Varanus tristis											X													+		
Typhlopidae	*Ramphotyphlops australis*																								+	+	X
	Ramphotyphlops bituberculatus																								+	+	X
Boidae	*Aspidites ramsayi*	Woma																							+	+	

	Morelia spilota imbricata	Carpet python											X												+	+	
Elapidae	*Acanthophis pyrrhus*	Desert death-adder																					+	+	+	+	
	Brachyurophis fasciolata fasciolata																										X
	Demansia psammophis psammophis	Yellow-faced whipsnake																					+	+	+	+	X
	Echiopsis curtis																								+		
	Furina ornata	Moon snake																							+	+	
	Parasuta gouldii	Gould's snake																									X
	Parasuta monachus	Monk snake																							+		X
	Pseudechis australis	Mulga snake													X								+	+	+	+	
	Pseudonaja modesta	Ringed brown snake																					+	+	+	+	
	Pseudonaja nuchalis	Gwardar																					+	+	+	+	X
	Simoselaps bertholdi	Jan's banded snake																									X
	Vermicella bertholdi				X																				+	+	
	Vermicella fasciolata																								+	+	
	Vermicella semifasciatus																								+	+	
Tachyglossidae	*Tachyglossus aculeatus*	Echidna													X			2nd							+	+	X
Dasyuridae	*Dasyurus geoffroii*	Chuditch																							+	+	
	Ningaui ridei	Wongai Ningaui																							+		
	Ningaui yvonneae	Southern Ningaui																					X		X		X
	Sminthopsis crassicaudata	Fat-tailed Dunnart																				+	+	+	+	+	X
	Sminthopsis dolichura	Little Long-tailed Dunnart	1		2						2												X		+	+	X
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo											X													+	X
	Macropus robustus	Common Wallaroo, Euro											X									+	+	+	+	+	X
	Macropus rufus	Red Kangaroo																				+	+	+	+	+	X
Burramyidae	*Cercartetus concinnus*	Western Pygmy-possum								5													X			+	X
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat																				+	+	+	+	+	
	Chalinolobus morio	Chocolate Wattled Bat																				+	+	+	+	+	
	Nyctophilus geoffroyi	Lesser Long-eared Bat																				+	+	+	+	+	
	Nyctophilus timoriensis	Greater Long-eared Bat																							+	+	
	Scotorepens balstoni	Inland Broad-nosed Bat																								+	

	Vespadelus regulus	Southern Forest Bat																					+	+	+	+	
Molossidae	*Mormopterus planiceps*	Southern Freetail-bat																			+	+	+	+	+		
	Tadarida australis	White-striped Freetail-bat																			+	+	+	+	+		
Muridae	*Mus musculus*	House Mouse							1			3				1					+	X	X	X	+		
	Notomys mitchellii	Mitchell's Hopping-mouse	1	8	2											1	1							+			
	Pseudomys bolami	Bolam's Mouse																			+				+	X	
	Pseudomys hermannsburgensis	Sandy Inland Mouse																				+		+		X	
Leporidae	*Oryctolagus cuniculus*	Rabbit																			+	X	+	X	+		
Bovidae	*Capra hircus*	Goat																				+	+	+	+		
Canidae	*Vulpes vulpes*	Red Fox																			+	+	+	X	+		
Felidae	*Felis catus*	Cat																			+	+	+	+	+		

A - Chapman, A., I. Kealley, D. McMillan, P. McMillan, and G. Rolland. 1991. Biological surveys of four Goldfields Reserves. Landnote **1/91**:1-26.
B - Halpern Glick Maunsell. 1998. Lake Lefroy Environmental Assessment. Report ES4490C., Perth.
C - Ninox Wildlife Consulting. 2004. St Ives Gold Delta Island Vertebrate Fauna Assessment. Perth.

Appendix B
Definitions of Significant Fauna under the WA *Wildlife Conservation Act 1950*

Vertebrate Fauna Assessment – Fairplay Project

TERRESTRIAL ECOSYSTEMS

APPENDIX B
DEFINITIONS OF SIGNIFICANT FAUNA UNDER THE WESTERN AUSTRALIAN *WILDLIFE CONSERVATION ACT 1950*

In Western Australia, all native fauna species are protected under the Western Australian *Wildlife Conservation Act 1950-1979*. Fauna species that are considered rare, threatened with extinction or have a high conservation value are specially protected under the Act. In addition, some species of fauna are covered under the 1991 ANZECC convention, while certain birds are listed under the Japan and Australian Migratory Bird Agreement (JAMBA) and the China and Australian Migratory Bird Agreement (CAMBA).

Classification of rare and endangered fauna under the *Wildlife Conservation (Specially Protected Fauna) Notice* recognises four schedules of taxa. These are:

Schedule 1 – fauna which are rare or likely to become extinct and are declared to be fauna in need of special protection;
Schedule 2 – fauna which are presumed to be extinct and are declared to be fauna in need of special protection;
Schedule 3 – birds which are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction which are declared to be fauna in need of special protection; and
Schedule 4 – fauna that are in need of special protection, for reasons other than mentioned in Schedules 1, 2 or 3.

In addition to the above classifications, DPaW also classifies fauna under five different Priority codes:

Priority one – ***Taxa with few, poorly known populations on threatened lands*.** Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
Priority two – *Taxa with few, poorly known populations on conservation lands, or taxa with several, poorly known populations not on conservation lands.* Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat from habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
Priority three – *Taxa with several, poorly known populations, some on conservation lands*. Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
Priority four – *Taxa in need of monitoring*. Taxa which are considered to have been adequately surveyed or for which sufficient knowledge is available and which are not considered currently threatened or in need of special protection, but could if present circumstances change. These taxa are usually represented on conservation lands. Taxa which are declining significantly but are not yet threatened.
Priority five – *Taxa in need of monitoring.* Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Appendix C
Results of the *EPBC Act* Protected Matters Search

Vertebrate Fauna Assessment – Fairplay Project

TERRESTRIAL ECOSYSTEMS

Australian Government

Department of the Environment

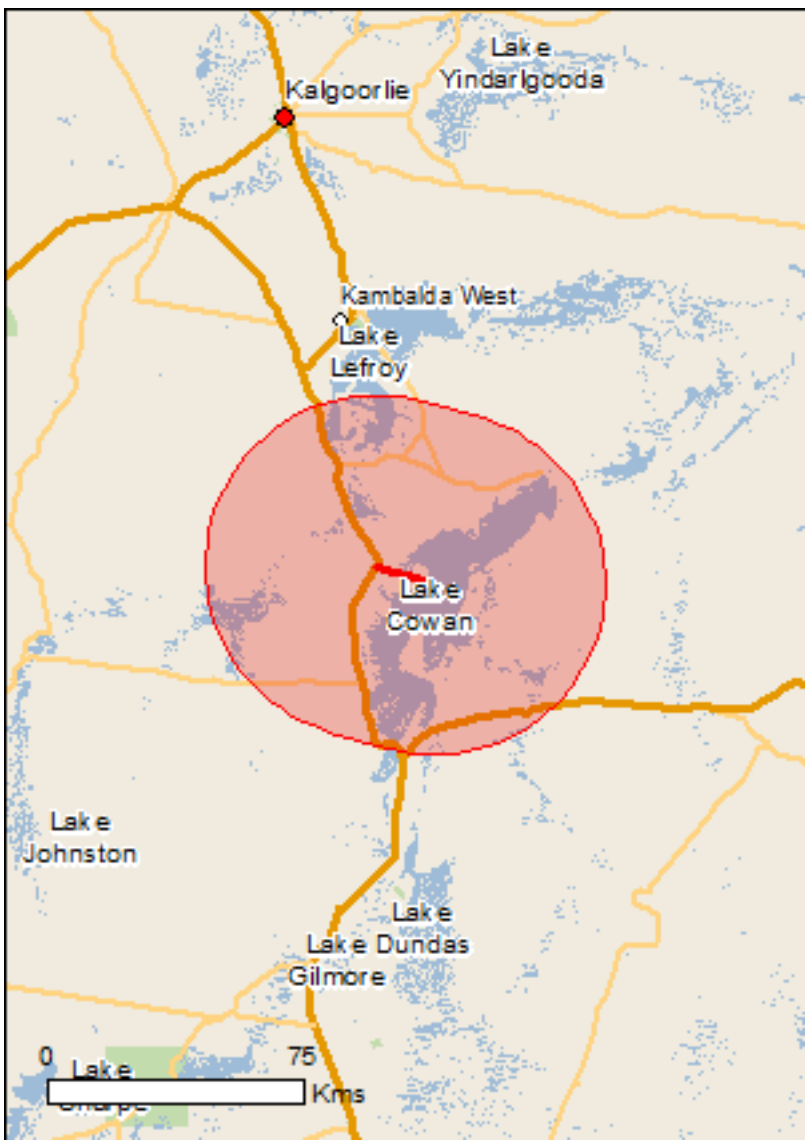
EPBC Act Protected Matters Report

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

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

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

Report created: 03/06/15 16:47:19



Coordinates

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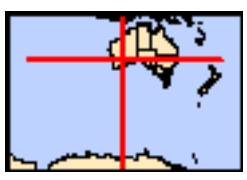

Summary

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:	6
Listed Migratory Species:	4

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/index.html

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:	5
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	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:	5
Regional Forest Agreements:	None
Invasive Species:	16
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
Mammals		
Notoryctes typhlops Itjaritjari, Southern Marsupial Mole, Yitjarritjarri [296]	Endangered	Species or species habitat may occur within area
Plants		
Daviesia microcarpa Norseman Pea [56766]	Endangered	Species or species habitat likely to occur within area
Eucalyptus platydisca Jimberlana Mallee [64575]	Vulnerable	Species or species habitat likely to occur within area
Gastrolobium graniticum Granite Poison [14872]	Endangered	Species or species habitat likely to occur within area
Tecticornia flabelliformis Bead Glasswort [82664]	Vulnerable	Species or species habitat known to 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		
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may 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		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Binaronca	WA
Dordie Rocks	WA
Dundas	WA
Unnamed WA06043	WA
Unnamed WA08029	WA

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

Name	Status	Type of Presence
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		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
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Carrichtera annua Ward's Weed [9511]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		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.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

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

-31.79503 121.85873,-31.757672 121.709384,-31.757672 121.709384

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:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA 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, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Geoscience Australia
-CSIRO
-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 D
Fauna habitat assessment results

Vertebrate Fauna Assessment – Fairplay Project

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 1 Observer: ST

Zone: 51 Easting: 379658mE Northing: 6486580mN

Fire History: > 5 years Landform: Wastedump Habitat Quality: Poor to Good

Habitat Structure: Mixed open Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 2 Observer: ST

Zone: 51 Easting: 379934mE Northing: 6486598mN

Fire History: > 5 years Landform: Wastedump Habitat Quality: Poor to Good

Habitat Structure: Mixed open Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 3 Observer: ST

Zone: 51 Easting: 380012mE Northing: 6486400mN

Fire History: > 5 years Landform: Flat Habitat Quality: Good

Habitat Structure: Mixed Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

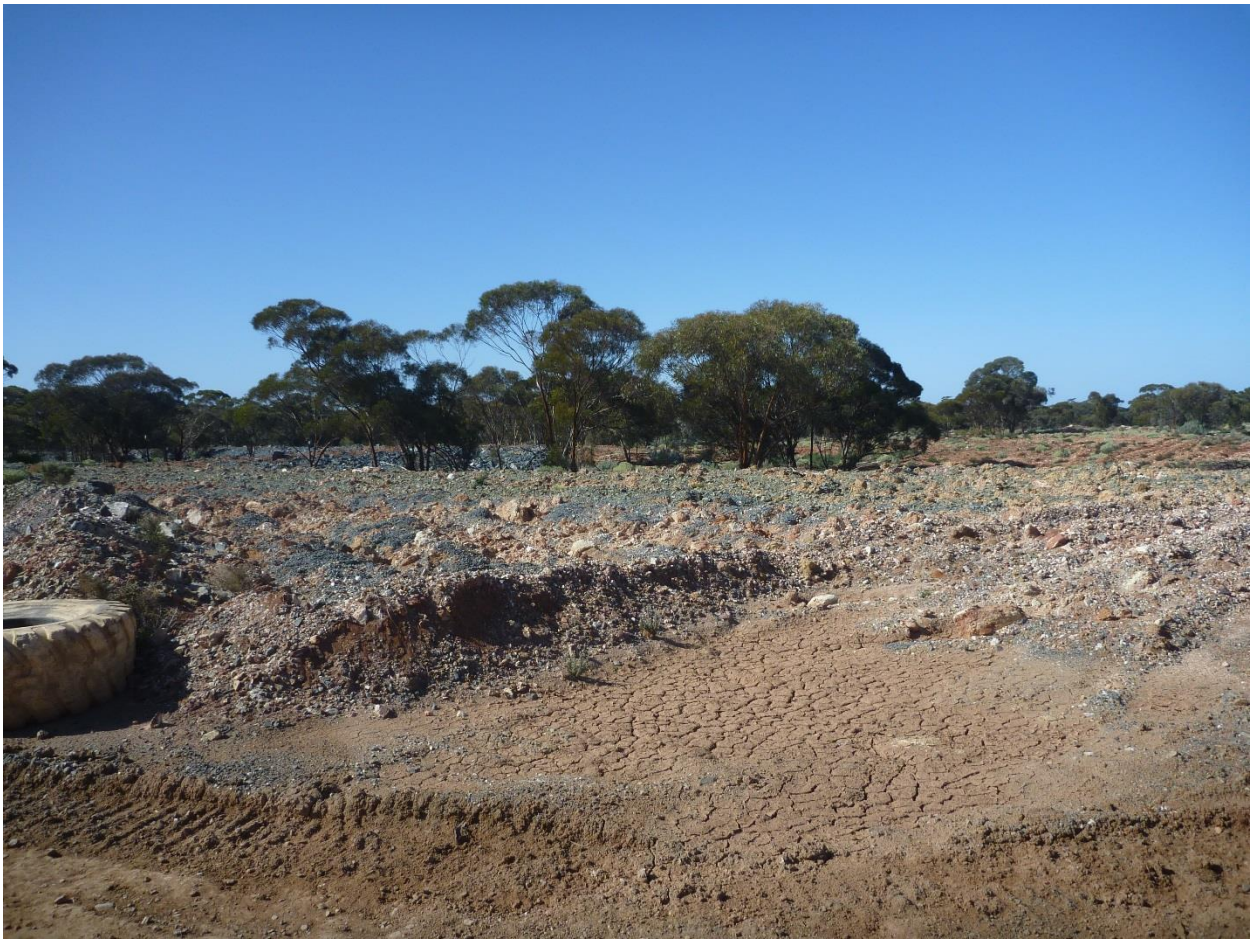
Date: 13/05/2015 Habitat Assessment #: 4 Observer: ST

Zone: 51 Easting: 379208mE Northing: 6487325mN

Fire History: > 5 years Landform: Rehabilitation Habitat Quality: Poor to Good

Habitat Structure: Scattered mixed Eucalypts and shrubs associated with rehabilitation

Soil Colour: Orange Surface Stone: Rock (50-150mm)



TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 5 Observer: ST

Zone: 51 Easting: 379397mE Northing: 6487555mN

Fire History: > 5 years Landform: Rehabilitation Habitat Quality: Poor to Good

Habitat Structure: Scattered mixed Eucalypts and shrubs associated with rehabilitation

Soil Colour: Orange Surface Stone: Rock (50-150mm)

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 6 Observer: ST

Zone: 51 Easting: 379391mE Northing: 6486751mN

Fire History: > 5 years Landform: Flat Habitat Quality: Good

Habitat Structure: Mixed open Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 7 Observer: ST

Zone: 51 Easting: 379635mE Northing: 6486787mN

Fire History: > 5 years Landform: Flat Habitat Quality: Poor to Good

Habitat Structure: Mixed open Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 8 Observer: ST

Zone: 51 Easting: 379635mE Northing: 6486896mN

Fire History: > 5 years Landform: Flat Habitat Quality: Poor to Good

Habitat Structure: Mixed open Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 9 Observer: ST

Zone: 51 Easting: 379730mE Northing: 6487013mN

Fire History: > 5 years Landform: Flat Habitat Quality: Poor to Good

Habitat Structure: Mixed open Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 10 Observer: ST

Zone: 51 Easting: 379403mE Northing: 6487139mN

Fire History: > 5 years Landform: Flat Habitat Quality: Poor to Good

Habitat Structure: Mixed open Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 11 Observer: ST

Zone: 51 Easting: 379550mE Northing: 6487211mN

Fire History: > 5 years Landform: Flat Habitat Quality: Poor to Good

Habitat Structure: Mixed open Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 12 Observer: ST

Zone: 51 Easting: 379121mE Northing: 6487243mN

Fire History: > 5 years Landform: Rehabilitation Habitat Quality: Poor to Good

Habitat Structure: Scattered mixed Eucalypts and shrubs associated with rehabilitation

Soil Colour: Orange Surface Stone: Rock (50-150mm)

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 13 Observer: ST

Zone: 51 Easting: 379088mE Northing: 6487036mN

Fire History: > 5 years Landform: Flat Habitat Quality: Good

Habitat Structure: Mixed open Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 14 Observer: ST

Zone: 51 Easting: 379016mE Northing: 6486955mN

Fire History: > 5 years Landform: Flat Habitat Quality: Good

Habitat Structure: Mixed open Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 15 Observer: ST

Zone: 51 Easting: 379976mE Northing: 6486130mN

Fire History: > 5 years Landform: Flat Habitat Quality: Good

Habitat Structure: Mixed Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 16 Observer: ST

Zone: 51 Easting: 379506mE Northing: 6486624mN

Fire History: > 5 years Landform: Flat Habitat Quality: Poor

Habitat Structure: Mixed Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 17 Observer: ST

Zone: 51 Easting: 378839mE Northing: 6486854mN

Fire History: > 5 years Landform: Flat Habitat Quality: Good

Habitat Structure: Mixed open Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 18 Observer: ST

Zone: 51 Easting: 378636mE Northing: 6486868mN

Fire History: > 5 years Landform: Flat Habitat Quality: Good

Habitat Structure: Mixed Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 19 Observer: ST

Zone: 51 Easting: 379116mE Northing: 6486305mN

Fire History: > 5 years Landform: Flat Habitat Quality: Good

Habitat Structure: Mixed Eucalyptus woodland over mixed sclerophyll and chenopod shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 20 Observer: ST

Zone: 51 Easting: 379200mE Northing: 6486271mN

Fire History: > 5 years Landform: Flat Habitat Quality: Good, but showing signs of rehabilitation

Habitat Structure: Mixed Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 21 Observer: ST

Zone: 51 Easting: 379316mE Northing: 6486218mN

Fire History: > 5 years Landform: Flat Habitat Quality: Good

Habitat Structure: Mixed open Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

Date: 13/05/2015 Habitat Assessment #: 22 Observer: ST

Zone: 51 Easting: 379544mE Northing: 6486152mN

Fire History: > 5 years Landform: Flat Habitat Quality: Good, but showing signs of rehabilitation

Habitat Structure: Mixed Eucalyptus woodland over mixed sclerophyll shrubland with a sparse understorey

Soil Colour: Orange Surface Stone: None

TERRESTRIAL ECOSYSTEMS

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