LEVEL 1 FAUNA SURVEY

OF

GOLDEN ORB PROJECT AREA

TENEMENTS M77/962 AND E77/1320

FOR

SOUTHERN CROSS GOLDFIELDS LTD

APRIL 2012

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EXECUTIVE SUMMARY

Southern Cross Goldfields Ltd. proposes to develop a gold mining operation within their Golden Orb project area. The project will include developing a mining pit and associated bunds, waste and topsoil dumps and a haul road. Ore processing will take place off site.

Rapallo Environmental was commissioned by Southern Cross Goldfields to conduct a level 1 terrestrial fauna survey of the Golden Orb project area ('project area'). The aims of the survey were to characterise the terrestrial fauna community of the project area in order to identify the potential for species of environmental significance to occur, to provide information to assist with environmental assessments of the project and to identify the potential need for further survey work.

The survey comprised a desktop assessment of available databases and literature, followed by a reconnaissance survey of the project area in September 2011.

The reconnaissance survey was conducted between 17th and 21st September by a team of two experienced ecologists. This survey period comprised two intensive transect surveys on 19 and 20 September that covered the entire tenement, as well as collecting opportunistic data during visits to the project area for a concomitant short-range endemic survey (Rapallo 2012). Additional fauna data came from verbal records of drilling crews that had worked on the project area.

Data collected during the reconnaissance survey included sightings of all terrestrial fauna species, indirect evidence such as burrows, scats and footprints, and information on fauna habitats. The habitat assessment followed vegetation communities mapped during an earlier flora and vegetation survey.

The desktop survey identified 185 species of vertebrate fauna that have the potential to occur in the project area. These include 31 mammals (24 native and 7 introduced), 51 reptiles, two frogs and 101 birds. During the reconnaissance survey, 51 species of vertebrate fauna were recorded; these included four mammals (three of which introduced species), seven reptiles, and 41 birds.

The desktop survey identified 19 species of conservation significance with potential to occur in the project area. Based on the biology of these species, the distance of existing records to the project area and the fauna habitat in the project area, only eight of these are highly likely to occur in the project area and may be impacted by the project.

The reconnaissance survey recorded three species of conservation significance; Malleefowl (*Leipoa ocellata*), Major Mitchells Cockatoo (*Lophochroa leadbeateri*) and the southern subspecies of the Crested Belbird (*Oreoica gutturalis gutturalis*). Malleefowl are listed as Schedule 1 – species that are rare or likely to become extinct under the Western Australian *Wildlife Conservation Act 1950* and Vulnerable under the federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Major Mitchells Cockatoo and the western Crested Bellbird are listed as Priority 4 – taxa in need of monitoring by the Department of Environment and Conservation (DEC). A fourth species, the wheatbelt subspecies of the White-browed Babbler (*Pomatostomus superciliosus ashbyi*) potentially occurs in the project area; an individual of the species was recorded, but the subspecies cannot be identified through field observations alone.

The habitat assessment indicates that the vegetation communities present on the project area provide high quality feeding habitat and potential nesting habitat for the Malleefowl, and suitable nesting and foraging habitat for the Major Mitchell Cockatoo and southern Crested Bellbird.

The proposed project has a high likelihood of impacting a species of state and national environmental significance. Such projects often require referral under the EPBC Act and the Environmental Protection Act 1987 prior to mining approval being granted. Rapallo strongly recommends that SXG consult with the DEC and the Environmental Protection Authority about potential obligations under the two pieces of legislation.

1. INTRODUCTION

1.1. PROJECT BACKGROUND

Southern Cross Goldfields Ltd (SXG) proposes to develop a gold mining operation in the Golden Orb project area, within mining lease M77/962 and exploration licence E77/1320. For the purpose of this report these will be referred to as the 'project area'. The project area is located approximately 100 km north of Southern Cross in the Goldfields region of Western Australia. It is accessed via the Bullfinch-Evanston road and Bullfinch is the closest town (Figure 1).

The proposed mining project in Golden Orb (the 'project') will comprise a mining pit (6 hectares) and an associated abandonment bund (1 ha), a waste dump (13 ha) and a topsoil dump (3 ha), and a 3.5 kilometre (km) haul road connecting the pits with the Bullfinch-Evanston road (20 metres wide, approximately 7 ha). The total proposed project footprint is therefore approximately 30 ha.

The deposits in Golden Orb have a combined mineral resource estimate of 694,319 tonnes of high-grade (2.55 g/t) ore. The Golden Orb project is a satellite mine to the Marda Gold Project. Ore will be hauled by road train to a central processing facility in the Marda tenement, 12 km north-east of Golden Orb (SXG 2012).

1.2. SCOPES AND OBJECTIVES

As part of its continuing environmental investigations of the project area, Rapallo Environmental completed a Level 1 terrestrial fauna survey, comprising a desktop survey of available databases and literature, and a reconnaissance field survey.

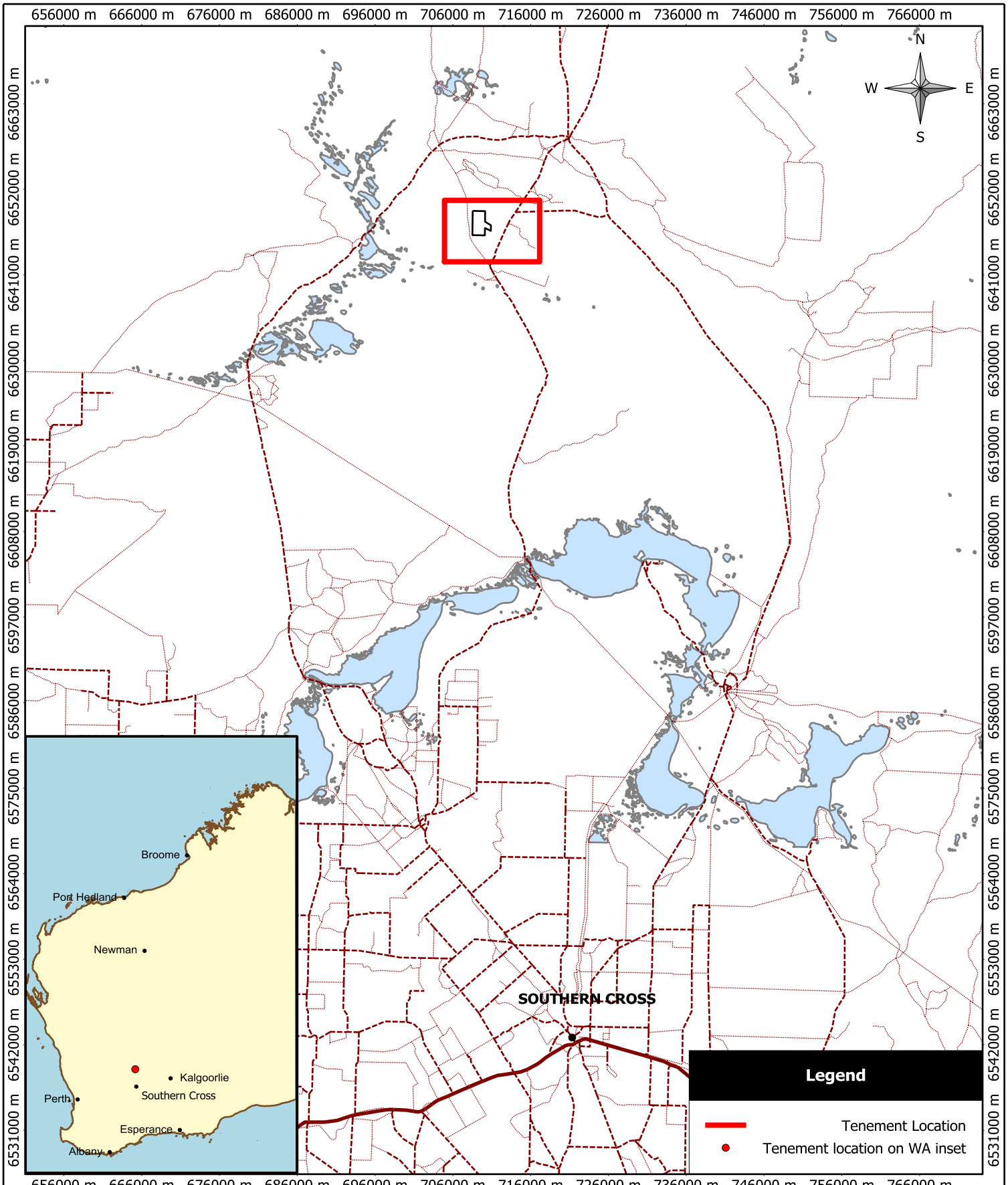
The reconnaissance survey targeted a 556 ha area, which was the same area covered in an earlier flora and vegetation survey of the project area (Botanica 2011). This area comprises most of the mining lease (M77/962) and the first 0.9 km of the haul road (including a 300 m buffer zone) within exploration licence (E77/1320).

The objectives of the Level 1 fauna survey were to:

- review available databases and published literature in order to identify conservation significant species recorded from the region, which may occur in the project area;
- conduct a reconnaissance vertebrate fauna survey in the project area in order to:
  - characterise the vertebrate fauna community within the project area,
  - identify and map fauna habitat in the project area,
- assess the likelihood of occurrence of species of conservation significance in the project area, based on fauna species recorded and available fauna habitat.

This information will be used to assist with environmental assessment of the project and to identify the potential need for further survey work.

The Level 1 fauna survey was designed according to Environmental Protection Authority (EPA) *Guidance Statement No. 56: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004). This guidance indicates that a proposed project in the Goldfields region with an impact of 10 to 50 ha requires a Level 1 fauna assessment.



Rapallo	Original size: A4 Scale: 1:650,000 Datum: MGA94(50) 0 20 km	SXG Resources	Location Plan with Golden Orb tenements highlighted. Figure 1.

1.3. LEGISLATION AND SURVEY GUIDANCE

Native flora and fauna in Western Australia are protected at a federal level under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and at a state level under the *Environmental Protection Act 1987* and the *Wildlife Conservation Act 1950*. The WA Department of Environment and Conservation (DEC) can also list fauna species under a Priority listing. State and federal conservation categories and codes are outlined in detail in Appendix I.

The Western Australian EPA has produced a series of guidance statements to aid in assessing the environmental impacts of developments in Western Australia.

1.3.1. COMMONWEALTH LEGISLATION AND CONSERVATION CATEGORIES

The EPBC Act, together with the *Environment Protection and Biodiversity Conservation Regulations 2000*, provides for the protection, identification and listing of nationally and internationally important flora, fauna, ecological communities and heritage, defined as Matters of National Environmental significance. The main authority under the EPBC Act is the Department of Sustainability, Environment, Water, Population and Community (SEWPaC). Actions likely to have a significant impact on such matters need to be referred to SEWPaC for assessment and approval.

The following categories of threatened fauna are recognised: Extinct (EX), Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), and Conservation Dependent (CD).

The EPBC Act also provides for protection of migratory species that are covered under the following International Conventions:

- Japan-Australia Migratory Bird Agreement (JAMBA)
- China-Australia Migratory Bird Agreement (CAMBA)
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)

Ecological communities are unique and naturally occurring groups of plants and animals. Their presence can be determined by factors such as soil type, position in the landscape, climate and water availability. The following categories of Threatened Ecological Communities are recognised: Critically Endangered , Endangered , and Vulnerable .

The lists of threatened species and ecological communities and the national list of migratory species are published on the SEWPaC website.

1.3.2. WESTERN AUSTRALIAN LEGISLATION AND CONSERVATION CATEGORIES

Environmental Protection Act 1987

The *Environmental Protection Act 1987* provides for the protection of the Western Australian environment from harm and pollution resulting from the development of land or natural resources. The main authority under the Act is the EPA which has statutory obligations under Part III and IV of the Act to undertake environmental impact assessment, protect the environment from harm and to provide advice to the Minister of Environment on matters of environmental importance.

The Act provides for the protection of Environmentally Sensitive Areas (ESA) under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. ESAs are selected for their environmental values at state or national level, and are defined under the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*.

Environmentally Sensitive Areas include:

- Declared World Heritage properties.
- Areas on the Register of the National Estate.
- Defined wetlands and riparian vegetation within 50 metres of the wetland.
- Area of vegetation within 50 metres of Declared Rare Flora.
- Areas covered by Threatened Ecological Communities.
- Bush Forever sites.

The main protection given to ESAs is that clearing permit exemptions that may exist under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* do not apply in ESAs.

Wildlife Conservation Act 1950

The *Wildlife Conservation Act 1950* provides for the protection of all native flora and fauna. The main authority under the Act is the DEC. Under the Act native fauna cannot be cannot be collected, kept or culled without the appropriate permits.

Special protection is given to fauna species that are formally recognised as under threat of extinction, rare, or generally in need of protection. The list of specially protected fauna is published in the WA Government Gazette as *Specially Protected Fauna Notices*, with the most recent dated August 2010.

Specially protected fauna are classified under a set of Schedules which outline the level of protection; these are:

- Schedule 1 – Threatened Fauna (T): Fauna that is rare or is likely to become extinct.
- Schedule 2 – Presumed Extinct Fauna (X)
- Schedule 3 – Birds protected under an International Agreement (IA): Migratory birds subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and the Republic of Korea relating to the protection of migratory birds.
- Schedule 4 – Other Specially Protected Fauna (S): Fauna that is in need of special protection, for reasons otherwise than for those mentioned under Schedules 1, 2 and 3.

Threatened Fauna (T) are further ranked by the DEC according to their level of threat, using International Union for Conservation of Nature (IUCN) Red List Criteria. These sub-categories are: Critically Endangered (CR), Endangered (EN) and Vulnerable (VU).

The DEC has produced a supplementary Priority Fauna list, comprising species that have not yet been adequately surveyed to be listed as Threatened, but for which the DEC feels that there is cause for concern. Priority fauna species are recognised as having conservation significance and are given consideration when developments are proposed within their distributions and known habitats. There are five levels of Priority flora: Priorities 1, 2 or 3 (not yet adequately surveyed), Priority 4 (rare, near threatened or in need of monitoring), and Priority 5 (conservation dependent). The list of Priority Fauna is published on the DEC website with the most current list dated August 2010.

1.3.3. EPA GUIDANCE STATEMENTS

The Western Australian EPA has produced a series of position statements and guidance statements to aid in assessing the environmental impacts of developments in Western Australia.

The following statements outline the minimal expectations of the EPA in regards to consideration of terrestrial fauna in an environmental impact assessment.

- *EPA Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection* (EPA 2002)
- *EPA Guidance Statement No. 56: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004)

Combined, these guidance and position statements provide a number of general recommendations for consideration for planning environmental surveys, including the level of survey required, design and intensity factors, survey limitations and reporting criteria.

For the Goldfields region, *Guidance Statement No. 56* indicates that a proposed project with an impact of 10 to 50 ha requires a Level 1 fauna assessment, and a project with an impact greater than 50 ha requires a Level 2 fauna assessment in order to adequately assess potential impacts.

2. EXISTING ENVIRONMENT

3.1. BIOGEOGRAPHY

The project area lies within the Southern Cross Subregion (COO2) of the Coolgardie Interim Biogeographic Regionalisation of Australia (IBRA) region (SEWPaC 2012a). In the Soil-landscapes of Western Australia's Rangelands and Arid Interior (Tille 2006) the project area is located in the Kalgoorlie Province of the Western soil-landscape Region.

3.2. GEOLOGY

The Coolgardie Bioregion is characterised by granite rocky outcrops, low greenstone hills, laterite uplands and broad plains; the bioregion does not have major rivers or creeks and includes numerous salt lakes. It lies on the Southern Cross Terrains of the Yilgarn Craton, which consists of greenstone belts and granites of Archaean age (2,400-3,000 million years old) (Thackway & Cresswell 1995).

The Southern Cross Subregion has subdued relief, comprising gently undulating uplands dissected by broad valleys with bands of low greenstone hills. The valleys have Quaternary duplex and graduational soils and include chains of saline playa-lakes. The granite basement outcrops. Upper levels in the landscape are the eroded remnants of a lateritic duricrust yielding yellow sandplains, gravelly sandplains and laterite breakaways (Cowan *et al.* 2001).

3.3. SOILS

The soils of the Kalgoorlie soil-landscape provide (Tille 2006) are described as follows:

> *"The undulating plains on granite have extensive areas of Calcareous loamy earths with Red loamy earths, Red deep loamy duplexes and Red shallow loamy duplexes. Redbrown hardpan shallow loams, Yellow loamy earths, Salt lake soils, Red shallow sands and Cracking clays are present, and Red shallow sandy duplexes on breakaways.*
>
> *The broad valley plains have Red loamy earths and Calcareous loamy earths, with Redbrown hardpan shallow loams and Red/brown non-cracking clays. There are also some Alkaline grey shallow and deep sandy duplexes and Yellow loamy earths. Saline valley floors have Salt lake soils with Saline wet soils and Red deep sandy duplexes. Red deep sands are found on lunettes associated with the lakes.*
>
> *The gently sloping uplands on granite have Yellow sandy earths and Yellow loamy earths, with some Yellow deep sands and Ironstone gravelly soils. The hilly terrain on greenstone has Red loamy earths, Calcareous loamy earths and Calcareous shallow loams, along with Stony soils and Red shallow loams.*
>
> *Sandplains have Red deep sands, with some Yellow deep sands in the west. On the sandy surfaced plains there are Red deep sands and Red loamy earths with Red sandy earths."*

The Australian Soil Resource Information (ASRIS) Atlas compiled by CSIRO (2006–) provides a consistent soil description for the whole of Australia. The project area lies within soil unit My45, which is described as:

> *"Undulating terrain with small gently sloping plains and some ranges on basic schists, gneisses, and allied rocks. The chief soils are neutral red earths with a variable content of ironstone gravel. Red-brown hardpan may occur in portions of the area, especially the northern portions. Associated are small sections of ranges with numerous rock outcrops containing greenstone."*

3.4. LANDFORMS

The landforms of the Kalgoorlie soil-landscape provide (Tille 2006) are described as follows:

> *"Kalgoorlie Province consists of an extensive plateau of low relief. Flat to undulating plains with small valleys (occasionally broken by low narrow rocky hills, ridges, tors and bosses) are most commonly found on granitic terrain. On these plains may be found some silcrete duricrust, claypans, salt lakes with dunes and lunettes, gilgai areas, small remnants of sand plain, and small dune tracts. Low breakaways with short saline footslopes are also occasionally present.*
>
> *Below these plains are some broad, flat to undulating, shallow valley plains formed on Quaternary alluvium and colluvium. These plains show little defined drainage and some seasonal lakes and claypans with isolated granitic and basic rock outcrops. Slightly lower down in the landscape are broad, flat valleys with chains of salt lakes. Also present on these valley floors are saline flats, claypans, kopi dunes, sand dunes, and sometimes tors and bosses of outcropping granites.*
>
> *Higher up in the landscape are gently sloping to gently undulating plateau areas on granites and gneisses. These have long gentle slopes and, in places, abrupt erosional scarps. Some granitic bosses and tors are present. Rocky ranges, hills and ridges have formed on the greenstone, along with some undulating to low hilly country. Associated with this hilly terrain are gently undulating stony plains and low rises on limonite.*
>
> *Level to gently undulating sandplains and gravelly sandplains are mostly found over lateritic residuals and granitic basement. There are also some extensive loamy plains with sandy surfaces."*

The *Biological Survey of the Eastern Goldfields of Western Australia: Jackson – Kalgoorlie Study Area* (Dell *et al.* 1985) maps the project area within the landform unit Undulating Plain (Greenstone). This land unit consist of low rises and ridges, interspersed with colluvial flats 50-500 m wide. Most rises and ridges are less than 5 m above the flats. Ridge slopes rarely exceed 10 degrees. Soils are shallow on the rises and skeletal among bedrock exposures on the ridges. Broad colluvial flats are each drained by a single channel up to 1 m deep and 5 m wide. Soils on the colluvial flats rarely exceed 1 m in thickness.

3.5. REGIONAL VEGETATION

3.5.1. BEARD VEGETATION MAPPING

The project area lies within the Coolgardie Botanical District of the South-western Interzone between the South West and the Eremean Botanical Provices (Beard 1990). This botanical district is characterised by eucalypt woodlands, becoming open and with saltbush-bluebush understorey on the more calcareous soils. Patches of shrub steppe adjoin the Great Victorian Desert (Beard 1990).

3.5.2. IBRA VEGETATION DESCRIPTION

The vegetation of the IBRA Southern Cross Subregion (Cowan *et al*. 2001) is characterised by diverse eucalypt woodlands around the salt lakes and on the low greenstone hills and valley alluvials and broad calcareous plains. The woodlands are dominated by Salmon Gum (*Eucalyptus salmonophloia*), Gimlet (*E. salubris)*, Redwood (*E. transcontinentalis*) and Red Morrell (*E. longicornis*) and are rich in endemic species of eucalypt. The salt lakes support dwarf samphire (*Halosarcia* sp. and *Tetricornia* sp.) shrublands. The granite outcrops in the landscape support swards of *Borya constricta*, with stands of *Acacia acuminata* and York Gum (*E. loxophleba*). The upland areas of yellow sandplains, gravelly

sandplains and laterite breakaways are characterised by Mallee woodlands with and scrub-heaths with sheoak (*Allocasuarina corniculata*) cypress pine (*Callitris preissii*), *Melaleuca uncinata* and Pukkati (*Acacia beauverdiana*). The same scrub community also occurs on sand lunettes associated with playas along the broad valley floors, and sand sheets around the granite outcrops. The scrubs are rich in endemic acacias and Myrtaceae.

3.5.3. NATIONAL VEGETATION INFORMATION SYSTEM (NVIS) MAPPING

The National Vegetation Information System (NVIS) classifies and maps Australia's 23 Major Vegetation Groups (MVG). The project area falls within the Eucalypt Woodlands (MVG5). Eucalypt Woodlands are one of the most common MVGs of Australia, occupying 12% of the total land continental land area. Eucalypt woodlands are widespread throughout the mountain ranges and plains west of the Great Dividing Range in eastern Australia and east of the sub-coastal ranges in the south-west of Western Australia. Understoreys may vary from grasses to shrubs and in some cases have attained a parkland appearance due to frequent fire and grazing. Eucalypt Woodlands have experienced the greatest decline of all MVGs since European settlement due to extensive clearing and modification, particularly in the agricultural zones of eastern Australia and in the south-west of Western Australia. In many regions only small isolated fragments remain, often only along creeks, road verges and rocky outcrops (SEWPAC 2012b).

3.5.4. BIOLOGICAL SURVEY OF THE EASTERN GOLDFIELDS

Botanical surveys of the Jackson-Kalgoorlie Study Area were completed between 1979 and 1982 as part of the Biological Survey of the Eastern Goldfields of Western Australia (Dell *et al.* 1985). The Jackson-Kalgoorlie study area overlaps with the northern half of the Southern Cross Subregion (COO2) and falls primarily within the Coolgardie Botanical District (Beard 1990). The Mulga-Eucalypt line runs along the northern boundary. The closest study site to the project area is the Mount Jackson area.

Vegetation types largely followed landform units. The Undulating Plain (Greenstone) land unit at the Mount Jackson area, which continues on to include the project area, supports Cleland's Blackbutt (*Eucalyptus clelandii*) and Black Oak (*Casuarina pauper*) low woodland on stony ridges, with Gimlet (*E. salubris*) low woodland on the colluvial flats.

3.5.5. BOTANICAL SURVEY AT THE PROJECT AREA

Botanica (2011) completed a flora and vegetation survey of the project area in November 2010 and April 2011. The survey area was the same 556 ha area covered in this reconnaissance fauna survey. The survey found that the majority of the tenement (95%) was covered in woodland of various types, while the remainder was covered in *Acacia* or *Allocasuarina* thickets. Four vegetation communities and two sub-communities were identified in the tenement. These are listed below.

- Salmon Gum / Gimlet woodland
    - Subgroup: *Acacia* sp. narrow phyllode thicket
- Rough-fruited Mallee (*E. corrugata*) / Giant Mallee (*E. oleosa*) woodland
- Northern Sheoak (*Allocasuarina dielsiana*) / Giant Mallee woodland
    - Subgroup: *Triodia scariosa* grassland
- *Allocasuarina* spp. over mixed shrubs on breakaway

No Declared Rare Flora were found, however four Priority flora species were recorded: *Jacksonia jackson* (P1), *Styphelia* sp. Bullfinch (M. Hislop 3574) (P3), *Eucalyptus formanii* (P4) and *Leptospermum macgillivrayi* (P1).

3.6. CLIMATE

The Southern Cross Subregion (COO2) experiences an arid non-seasonal to semi-arid Mediterranean climate with an annual rainfall of 200-300 mm (Beard 1990).

The closest Bureau of Meteorology (BOM) weather station to the project area is located at Southern Cross Airfield, approximately 115 kilometres to the south.

Summers are generally warm, with the highest temperatures recorded in January, while winters are cold with lowest temperatures experienced in June and July. Rainfall occurs year-round, with yearly totals ranging from 150 – 550 mm (Figure 2).

The reconnaissance fauna survey took place in September 2011. Rainfall in the five months preceding the survey was typical for the time of year with a total of 132.8 mm recorded for the months of May to September 2011. Temperatures during the survey were in the high 20s during the day, but at or below zero at night (BOM 2012).

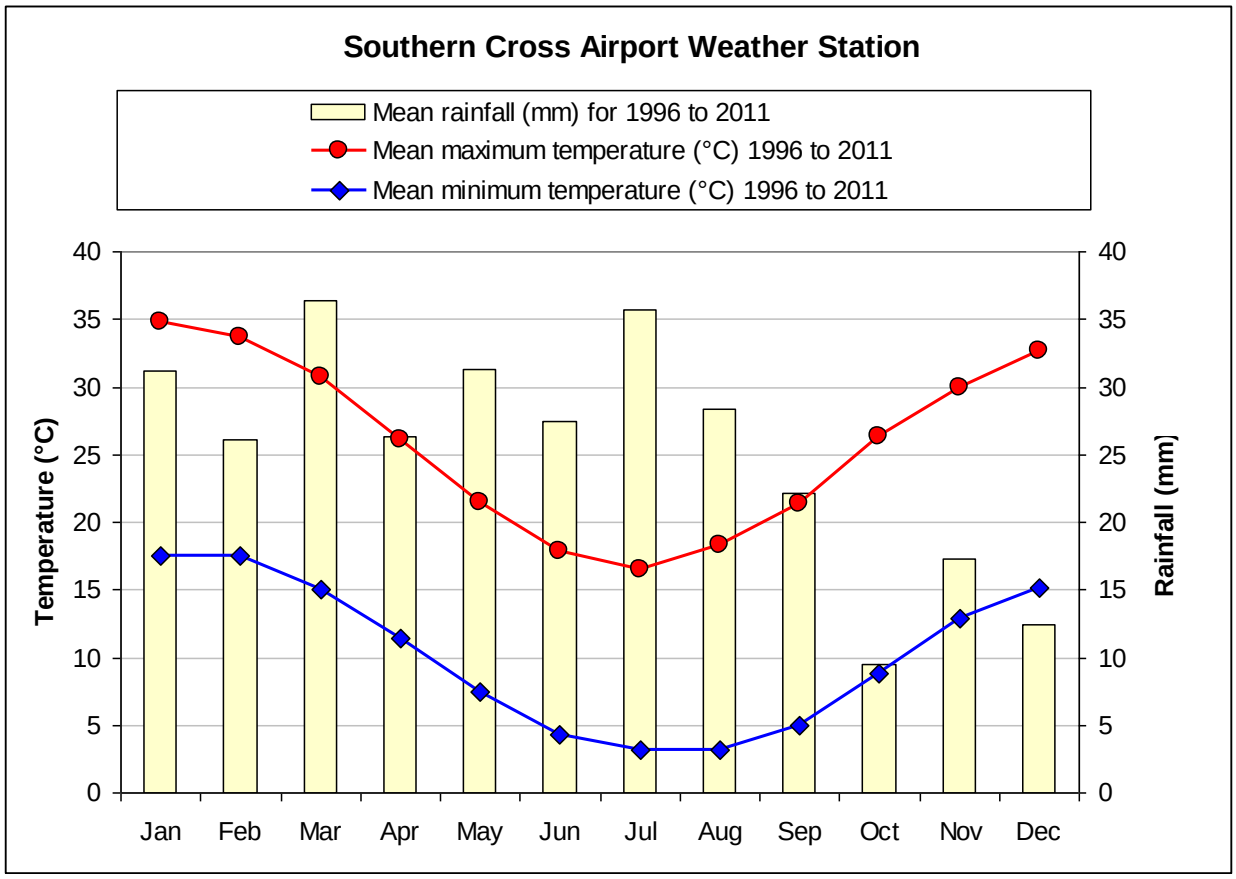


Figure 2 Southern Cross Weather Station – Average temperatures and rainfall

3.7. RESERVES AND ENVIRONMENTALLY SENSITIVE AREAS

The project area is not situated within an ESA as defined under the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*. The nearest nationally important wetland is Lake Barlee, located 85 km north-east of the project area (SEWPaC 2012c).

3.7.1. CONSERVATION RESERVES

The project area does not occur within a conservation reserve. The nearest Nature Reserves to the project area are listed below (SEWPaC 2012c).

- Mount Manning Range Nature Reserve (DEC) – 35 km east of the project area.
- Conservation Park WA48470 (adjacent to Mt Manning NR) – 25 km east of the project area.
- Walyahmoning Nature Reserve – 50 km to the west.
- Reserve WA36918 – 55 km to the south.
- Karroun Hill Nature Reserve (DEC) – located 70 km to the west.

3.7.2. PRIORITY ECOLOGICAL COMMUNITIES

The project area lies within a 23 km buffer zone of the Priority 3 Priority Ecological Community (PEC) Mount Jackson Range Vegetation Complex (DEC 2011, 2012). This PEC consists of all vegetation units associated with Banded Iron Formations (BIF) and outwash geology of the Mt Jackson range (G. Grigg, *pers. comm.* 25 January 2012). The Golden Orb project area does not include any BIF ridges, and is therefore unlikely to contain the PEC.

3.7.3. GREAT WESTERN WOODLANDS

The project area lies within the Great Western Woodlands, an area of great biological richness covering nearly 16 million ha (DEC 2010). The Great Western Woodlands partially overlap with the north-eastern edge of the South West Botanical Province (Beard 1990 The Great Western Woodlands includes the entire Coolgardie IBRA Bioregion as well as parts of the Mallee, Avon Wheatbelt, Nullarbor and Murchison Bioregions.

The Great Western Woodlands supports 15 PECs, many of which are associated with BIF and greenstone ranges (DEC 2010). It has a diverse mammal population, comprising 49 mammals, 138 reptiles, 14 frogs and 215 bird species (Watson *et al*. 2008). Seven of these species are listed as Threatened and a further 10 are listed by the DEC as Priority species (DEC 2012). Although still relatively intact (Watson *et al*. 2008), the Great Western Woodlands are under increasing pressure from introduced fauna (Woolnough *et al*. 2005), weeds (CALM 1999), and bushfires. Land clearing for residential, mining, industrial and infrastructure purposes is an ongoing issue, leading to loss of biodiversity and increased dry land salinity (DEC 2010).

The DEC's management strategy for the Great Western Woodlands is outlined in *A Biodiversity and Cultural Conservation Strategy for the Great Western Woodlands* (DEC 2010). Rather than defining specific management actions, the document outlines the DEC's general strategy for the Great Western Woodlands. The key element is to improve coordination and integration of the many fragmented planning and management elements in the area. The aims of the strategy are to achieve sustainable outcomes that ensure conservation of biodiversity and cultural values, while maintaining economic and social benefits.

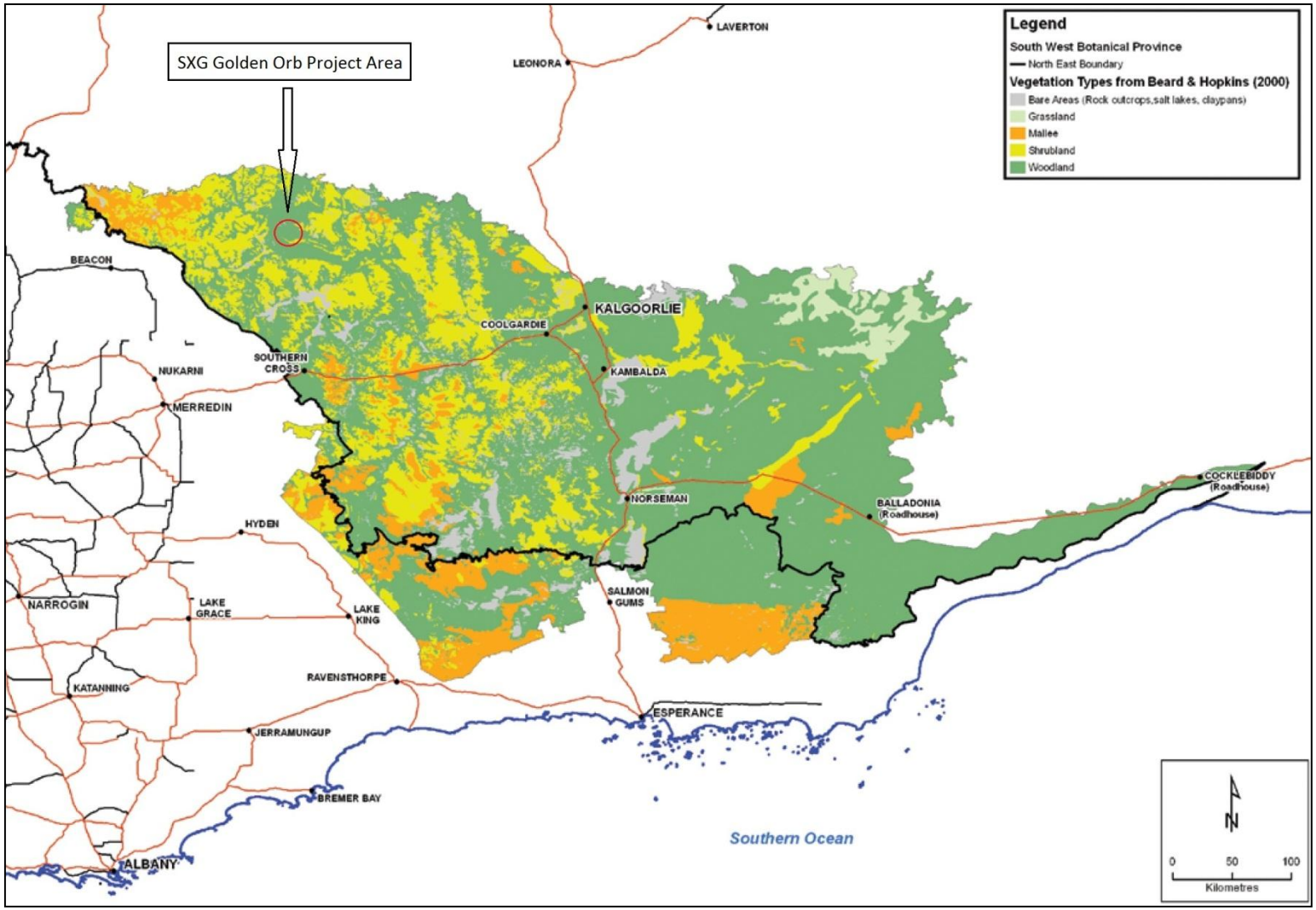
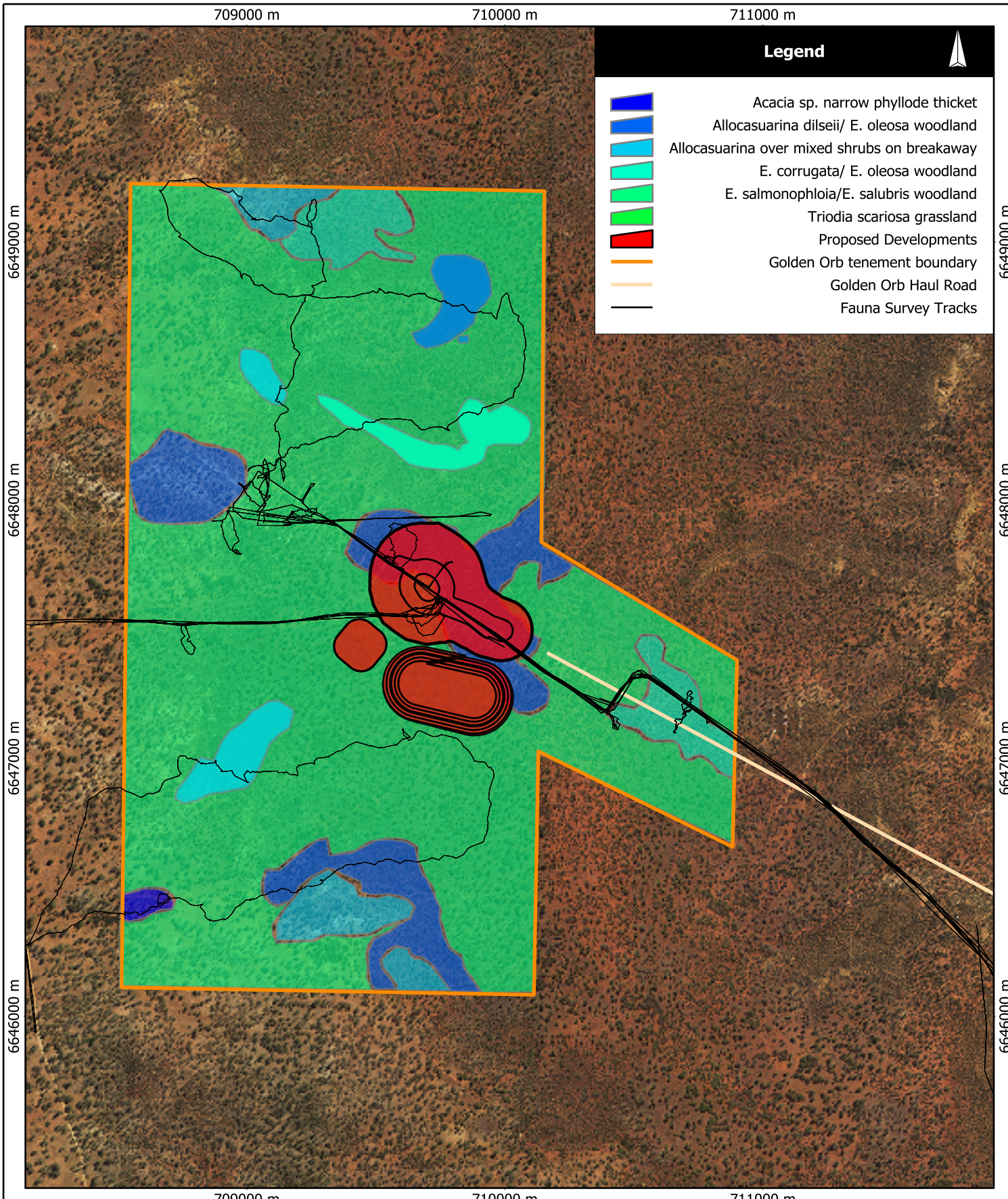


Figure 3 **Location of the project area in the Great Western Woodlands**



Rapallo

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0 500 m

Golden Orb tenement with fauna survey tracks, vegetation communities and proposed developments

Southern Cross Goldfields (SXG)

Figure 4.

4. METHODS

4.1. DESKTOP SEARCH

A desktop search was completed in preparation for the reconnaissance survey in order to identify species of conservation significance with the potential to occur in the project area. The desktop search included a database search and a review of published literature and relevant survey reports in the vicinity of the project. The databases reviewed and search areas included are listed in Table 1.

Table 1: Database Searches

Database Name	Latitude	Longitude	Search Area
DEC Threatened Fauna Database	30°17'14"S	119°11'06"E	50 km buffer around coordinates
DEC NatureMap	30°17'38"S	119°11'55"E	40 km buffer around coordinates
SEWPaC Protected Matters Search Tool	30°17'38"S	119°11'55"E	10 km buffer around coordinates
Birds Australia BirdData	30°18'07"S	119°12'24"E	1 degree square (± 10,000 km^2) containing coordinates

The reports of biological surveys and terrestrial fauna survey in the vicinity of the project area that were reviewed for the desktop search are listed in Table 2.

Table 2 Reports Reviewed for Desktop Study

Report Title	Distance from project area
Bamford Consulting Ecologists & Metcalf, B. (2005). *Fauna survey of Windarling / Mt Jackson Project: Fauna Studies*. Unpublished report for Portman Iron Ore Ltd.	Deposits located 6 km north and 7 km east of project area
Ecologia (2001). *Koolyanobbing Expansion Project. Fauna Assessment Survey*. Unpublished report for Portman Iron Ore Ltd.	50 km south-east of project area
Dell *et al*. (1985). *The Biological Survey of the Eastern Goldfields of Western Australia. Part 3. Jackson – Kalgoorlie Study Area*. Records of the Western Australian Museum Supplement Number 23.	Mt Jackson study area: 5 km east of project area. Bungalbin Hill study area: 50 km east of project.
Ninox Wildlife Consulting (2009). *A fauna survey of the Carina Prospects: Yilgarn Iron Ore Project*. Unpublished report for Polaris Metals NL.	80 km south-east of project area
Terrestrial Ecosystems (2011). *Level 1 Fauna Risk Assessment for Southern Cross Goldfields Marda Project area*. Unpublished report for Southern Cross Goldfields – Located 12 km north-east of the Project area.	12 km north-east of project area

The following literature was used to determine taxonomy and fauna distribution patterns:

- Mammals — Van Dyke & Strahan (2008), Menkhorst & Knight (2011)
- Bats — Churchill (2008)
- Reptiles — Cogger (2000), Storr *et al*. (1990, 2002), Wilson & Swan (2010).
- Amphibians — Tyler & Doughty (2009)
- Birds — Christidis & Boles (2008); Barrett *et al*. (2003), Johnstone & Storr (1998, 2004), Benshemesh (2000), Marchant & Higgins (1993), Garnett & Crowley (2000), Higgins (1999), Higgins & Peter (2002)

Nomenclature for reptiles, frogs and mammals follows that of the Western Australian Museum (WAM) *Reptile and Frog Checklist* and *Mammal Checklist* (WAM 2009) except where indicated otherwise. Nomenclature for birds follows Christidis and Boles (2008).

4.2. FIELD SURVEY

A reconnaissance vertebrate fauna survey of the project area was conducted from the 17th to 21st of September 2011 by a team of two experienced zoologists. The survey period incorporated two days of intensive transect surveys on 19th and 20th September during which the entire tenement was traversed on foot. The other survey day's data was collected opportunistically during a concomitant short-range endemic survey of the project area (Rapallo 2012a).

GIS data and aerial photography were used to demark the project area and to identify potential areas of interest. The following data were recorded during the field survey;

- terrestrial fauna species seen or heard;
- indirect evidence of fauna such as tracks, scats, burrows, etc.;
- habitat descriptions;
- GPS records of transects walked and locations of significant sightings; and,
- digital photographs of habitat types.

Additional data was collected from verbal accounts of drilling crews working in the area.

The following personnel were involved with the Level 1 fauna survey:

- Ms Marieke Weerheim – Environmental Scientist of Rapallo
- Mr Magnus Peterson – Zoologist of Rapallo

4.3. SURVEY LIMITATIONS

The potential limitations of the survey, as per EPA Guidance Statement 51, are discussed in Table 3.

Table 3 Potential limitations and discussion about their relevance to the Marda tenement survey

Potential Limitation	Discussion
Competency/ Experience	Mr Magnus Peterson has more than 40 years' experience conducting biological surveys in Australia, including many years working in the Southern Goldfields. Ms Weerheim has 10 years' experience conducting fauna surveys in Australia, including 6 years in Western Australia.
Proportion of Fauna Identified or recorded	The majority of fauna records are birds, which are easy to record during a reconnaissance visit. Since no trapping was involved, small mammals were not recorded. Reptile activity during the day was low due to cold nights. Since no night work was involved, there were no records of nocturnal animals such as owls and nightjars, and no records of species often picked up during spotlight surveys such as geckoes. Since no anabat recordings were made, there are no records of bats.
Availability of Information	Sufficient contextual information was available for the survey area, including reports from earlier fauna surveys in the Goldfields area and extensive database records on the flora and fauna of the vicinity of the project area and the Southern Cross subregion.
Proportion of task achieved and further work may be required	The survey covered the entire tenement, including all vegetation communities described in an earlier flora and vegetation survey of Golden Orb. For the purpose of a reconnaissance exercise, sufficient information was collected.

Potential Limitation	Discussion
Timing	The timing of the survey in early spring was relatively early for reptiles, with night time temperatures close to zero. The weather during the daytime surveys was good, with no rain or heavy winds affecting detection of bird species. Since it was a reconnaissance survey, only a short snap-shot was taken from a single season.
Disturbances	The centre of the tenement is heavily disturbed by exploration drilling, which is associated with clearing and flattening of vegetation. However, the size of the disturbed area is small relative to the entire tenement and the survey results were unlikely to be affected. There was no evidence of recent fire in the area.
Survey Intensity	Scope and intensity of survey were suitable to achieve the project aims. Survey intensity was appropriate for the project areas size and proportion of habitats
Resources.	The field staff had adequate resources to plan and complete the survey including reports of earlier flora and fauna surveys in the area, information on conservation significant species and spatial data supplied by the client.
Access	There were no access issues. A good quality road runs through the centre of the project and the rests of the tenement could be reached easily on foot.

5. RESULTS

5.1. DESKTOP SURVEY RESULTS

The combined search of databases, survey reports and published literature indicated that a total of 185 species of vertebrate fauna have been recorded from within 80 km of the project area. These were 31 mammal species (24 native, 7 introduced) including 8 bats, 51 reptile species, two frog species and 101 bird species. Results of the database searches are included in Appendix II.

The available habitats in the project area (section 5.2.1) are not suitable for 13 of these species due to the absence of open water, salt lakes, large caves, dense spinifex patches and deep sand. When taking habitat into account, 29 mammal species, 48 reptile species, two frog species, and 93 bird species have the potential to occur in the project area.

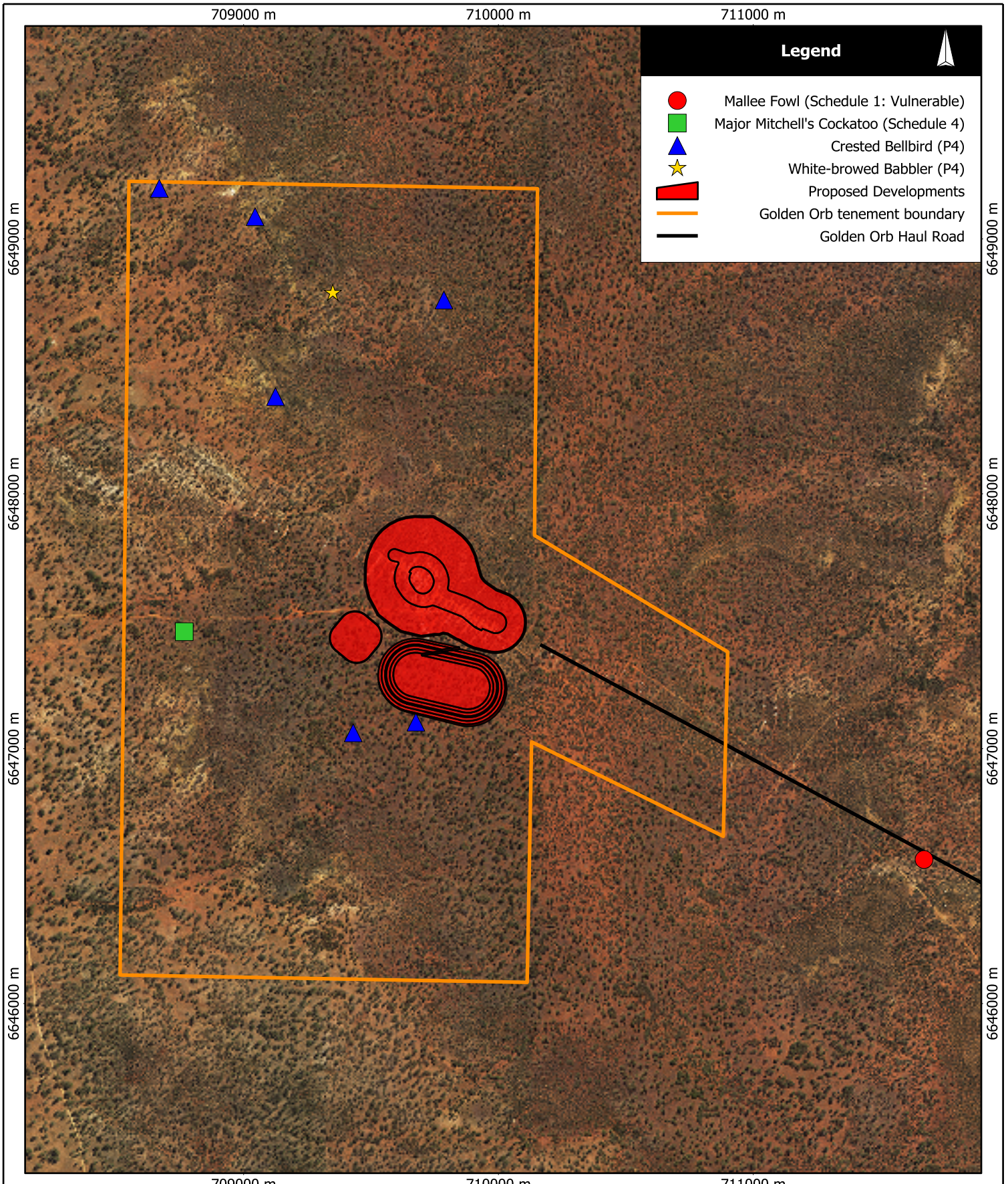
5.1.1. SPECIES OF CONSERVATION SIGNIFICANCE

The desktop search identified 19 vertebrate species of conservation significance that have the potential to occur in the project area. The likelihood of these species occurring in the project area are discussed in Table 4 and in the text below. Three of the species identified in the desktop were recorded in the project area during the reconnaissance survey. These were the Malleefowl, Major Mitchell's Cockatoo and the southern subspecies of the Crested Bellbird. The wheatbelt subspecies of the White-browed Babbler potentially occurs in the project area, but the subspecies cannot be identified through field observations alone.

Table 4 Conservation significant fauna with the potential to occur in the project area

Species	Common Name	Status *)		Likelihood of occurring in the project area
		State	Federal	
Mammals				
Dasyurus geoffroii	Chuditch	S1	V	**Medium** – Closest record from Bungalbin Hill (Dell *et al*. 1985) 50 km south-east. No recent records in vicinity of project area, but species is highly mobile and regional populations are responding positively to fox baiting programs.
Nyctophilus (timoriensis) sp. 1	Greater Long-eared Bat	P4		**High** – Likely to roost under bark and in dead trees in project area.
Reptiles				
Aspidites ramsayi	Woma	S4 P1		Low – Unlikely to occur in project area. Habitat suitable and prey abundant but no records in the vicinity of the project area. Possibly outside range of species.
Morelia spilota imbricata	Carpet Python	S4 P4		**High** – Recorded within 7 km, habitat suitable and prey abundant.
Birds				
Acanthiza iredalei iredalei	Slender-billed Thornbill		V	Low – Habitat not suitable: No salt lakes or samphire fields.
Apus pacificus	Fork-tailed Swift	S3	M(o, m)	Medium – May forage in sky over project area
Ardea ibis	Cattle Egret	S3	M(w)	Low – No suitable habitat(no rivers or lakes)
Ardea modesta	Eastern Great Egret	S3	M(w)	Low – No suitable habitat(no rivers or lakes)
Ardeotis australis	Australian Bustard	P4		**High** – Habitat suitable and recorded nearby (12 km North of project area)
Bhurhinus grallarius	Bush Stone-curlew	P4		**High** – Habitat suitable, recorded within 100 km of project area.
Calamanthus campestris subsp. *montananellus*	Rufous Fieldwren	P4		Low – Habitat not suitable
Charadrius rubricollis	Hooded Plover	P4		Low – No suitable habitat(no rivers or lakes)
Hylacola cauta subsp. *whitlocki*	Shy Heathwren	P4		Low – No suitable habitat, no nearby records.
Falco peregrinus	Peregrine Falcon	S4 P4		Medium – Occurs throughout WA but habitat not optimal for species.
Leipoa ocellata	Malleefowl	S1	V	**High** – Habitat suitable and species recorded in project area in 2011.
Lophochroa leadbeateri	Major Mitchell's Cockatoo	S4 P4		**High** – Recorded in project area during reconnaissance survey.
Merops ornatus	Rainbow Bee-eater		M(o, m)	**High** – Recorded 12 km from project area.
Oreoica gutturalis gutturalis	Crested Bellbird (Southern)	P4		**High** – Recorded in project area during reconnaissance survey.
Pomatostomus superciliosus ashbyi	White-browed Babbler (wheatbelt)	P4		Medium – Species recorded in project area not possible to distinguish between subspecies through field observations alone: trapping required.

Conservation Status:
S1: Schedule 1 - rare or likely to become extinct
S3: Schedule 3 – Migratory birds protected under an international agreement.
S4: Schedule 4 - other specially protected fauna
P1: Priority 1 – Poorly known taxa.
P4: Priority 4 – Rare, near threatened and other taxa in need of monitoring
E: Endangered V: Vulnerable M: Migratory o: overfly m: marine area w: wetland



Rapallo

Original size: A4 Scale: 1:20,000
Datum: MGA94(50)

0 500 m

Golden Orb tenement with conservation significant species and proposed developments

Southern Cross Goldfields (SXG)

Figure 5.

5.2. RECONNAISSANCE SURVEY RESULTS

5.2.1. FAUNA HABITAT RECORDED IN THE PROJECT AREA

A total of 11 habitat types were identified within the project area. To an extent these conformed with the vegetation communities mapped by Botanica (2011); however there were some differences:

- five sub-communities were identified that had not been described previously;
- the actual area size and occurrence of several vegetation communities were different from those mapped by Botanica (2011).

The fauna habitats recorded in the project area are listed in Table 5. For the purpose of this report the fauna habitat descriptions largely follow the Botanica (2011) vegetation types and the same names are used where appropriate.

Table 5 Habitat types recorded in the in the Survey Area

Code	Fauna Habitat Type / Vegetation Community	Area *)		Described by Botanica (2011)
		ha	%	
1	**Salmon Gum and Gimlet Woodland**	425	79%	Yes
1a	Sub: Acacia thickets	2	<1%	Yes
1b	Sub: Melaleuca tall trees			No
2	**Casuarina woodland**	62	12%	Yes
2a	Sub: Calytrix on granitoid ridge			No
2b	Sub: Triodia grassland	0.1	<1%	Yes
3	**Mixed mallee woodland**	21	4%	Yes
3a	Sub: Callitris open woodland			No
3b	Sub: Mixed dense heathland			No
4	**Casuarina low woodland on breakaways, ridges and slopes**	26	5%	Yes
4a	Sub: Leptospermum on granite outcrop			No

*) Area sizes and percentages based on shape files provided by Botanica in 2011.

Habitat type	Code	Plate	Vegetation and soil	Suitability for fauna species
Salmon Gum and Gimlet Woodland	1	Plate 1	This is the most common habitat type in the project area, comprising 79% of the tenement. Mixed eucalypt open woodland dominated by Salmon Gum (*Eucalyptus salmonophloia*) and Gimlet (*E. salubris*), with patches of tall sheoaks (*Allocasuarina dielsiana*), over eremophilas, acacias and saltbushes (*Atriplex* spp.). Soil varies from loamy clay to stony clay with surface cover of small quartz and lateritic ironstone rocks. Several small quartz fields occur in this community as well as patch of granitoid boulders in the southern part of the tenement. Older patches of this vegetation community have large fallen trees and logs with hollows.	Boulder piles and areas with large fallen trees and hollow logs offer shelter for small mammals and reptiles such as the skink *Cryptoblepharus buchanani* and the crested dragon (*Ctenophorus cristatus*). Tree trunks and fallen timber also provide foraging habitat for the Rufous Treecreeper (*Climacteris ru*fa). The older decaying logs offer shelter for soil burrowing skinks such as *Lerista timida* and invertebrates. Tracks and scats of introduced mammal species cattle (**Bos taurus*), horses (**Equus caballus*) and rabbits (**Oryctolagus cuniculus*) were common, as were tracks and scats of native kangaroos (*Macropus* sp.). The soil is suitable for **Malleefowl** to construct their mounds, with the understorey and leaf litter providing further mound building material. Thirty-five (35) bird species were recorded in this vegetation community, including the **Crested Bellbird**.. The tall eucalypts offer nesting hollows for **Major Mitchell's Cockatoos,** with numerous suitable nest hollows recorded (Terrestrial Ecosystems 2011).
Acacia thickets	1a	Plate 2	Patches of dense acacias (*Acacia* sp. narrow phyllode) which occur interspersed throughout the Salmon Gum / Gimlet woodland (Type 1). This type has a much wider occurrence than reported by Botanica (2011). It occurs throughout the tenement in areas that receive water runoff such as lower edges of rises (occurring as a band marking the lower edge) and along drainage lines. The soil varies from moist loamy soil with mosses and lichens to ironstone pisolith and sand in drainage lines. Some fallen logs, often in a progressed state of decay, occur on the ground.	The dense thickets offer shelter to large reptiles such as the Black-headed Monitor (*Varanus tristis*), small mammals, and ground-dwelling birds. such as the Little Button-quail (*Turnix velox*). The fallen logs provide habitat for soil-burrowing skinks such as *Lerista timida*, and nesting habiat for the Chestnut Quail-thrush (*Cinclosoma castanotus*). Gilbert's Whistler (*Pachycephala inornata*) was recorded in the dense thickets lining a drainage line in the south-western corner of the tenement. The dense vegetation provides highly suitable foraging and dispersal habitat for **Malleefowl** and offers sufficient shelter to support mounds, although none were recorded during the survey.
Melaleuca tall trees	1b	Plate 3	Small patches of tall (6-8 m) melaleucas at the base of rocky rises and granite outcrops. surrounded by Salmon Gum and	Three bird species were recorded, as well as the soil-burrowing skink *Lerista timida*. The rocky rise may offer shelter for reptiles

Habitat type	Code	Plate	Vegetation and soil	Suitability for fauna species
			Gimlet woodland (type 1).	and **SRE invertebrates**, while invertebrates and geckoes may shelter under the bark of the melaleucas.
Casuarina woodland	2	Plate 4	Casuarina woodland dominated by Northern Sheoak (*Allocasuarina dielsiana*) with mallee eucalypts (*Eucalyptus oleosa*, *E. corrugata*), York Gum (*E. loxophleba*) and Redwood (*E. transcontinentalis*), over acacias and cotton bush (*Ptilotus obovatus*). This vegetation community has a wider occurrence than shown in the Botanica (2011) vegetation maps. In the northern part of the tenement it occurs on the upper slopes of granitoid stony rises, often with acacia thickets (Type 2) on the lower slopes. The soil consists of red to black gravel covered in quartz and laterite ironstone pebbles and stones. In the central part of the tenement, along the main access roads it forms several large patches with a dense understorey of acacias on shallow clay with lateritic ironstone cover. The central patch is heavily impacted by drilling and associated clearing of vegetation. In the undisturbed areas fallen logs and patches of tree bark occur scattered on the ground. About half of the logs are in an advanced state of decay.	The casuarinas provide a food source for **Major Mitchell's Cockatoo**, which were observed foraging in this area. Fallen logs and tree bark provide shelter to small mammals, reptiles and invertebrates. On the ridges the hard stony soil offers few opportunities for burrowing reptiles, but in the central part the soil is softer and would allow for burrows to be dug. Eighteen species of bird were recorded in this habitat including the southern subspecies of the **Crested Bellbird**. In several places scats were found of the introduced mammal species cattle and rabbits.
Calytrix on granitoid ridge	2a	Plate 5	Small patch of open shrubland dominated by *Calytrix* sp. (50 - 60 plants) with *Atriplex nummularia* and *Dodonea lobulata*. The soil is a low heavily weathered granitoid ridge covered in lichens.	Grantoid ridges are often hotspots for **SRE invertebrates**. Additionally, small rodents such as *Pseudomys bolami* will utilise rock/plain interzones for foraging and shelter. Reptiles utilise the stony soil to bask and shelter under rocks.
Triodia grassland	2b	-	Small patch of *Triodia scariosa* grassland within the casuarina woodland habitat type.	The *Triodia* clumps may provide some shelter for reptiles and invertebrates. Since the patch is isolated and clearly different from the surrounding vegetation, it could form a refugium for **SRE invertebrates** or spinifex specialists such *Ningaui yvonnea*.
Mixed mallee woodland	3	-	Mixed eucalypt woodland dominated by tall mallees (*E. oleosa, E. corrugata, E. clelandii*), over acacias and	The loamy soil offers good opportunities for digging burrows by small mammals, reptiles and invertebrates. The understorey is

Habitat type	Code	Plate	Vegetation and soil	Suitability for fauna species
			saltbushes (*Atriplex* sp.). The soil is shallow loamy clay with pisolitic iron gravel.	relatively open and may be less suitable for **Malleefowl**.
Callitris open woodland	3a	Plate 6	Open woodland dominated by *Callitris* sp. (native pine) and scattered mallee eucalypts over acacias and eremophilas. Two patches of this vegetation community were found during the reconnaissance survey, the largest one occurring within mallee woodland (Type 3) along the access road on the eastern side of the tenement. Soil is shallow loamy clay. This vegetation community was not described or mapped by Botanica.	The soil is very suitable for burrowing. A western netted dragon (*Ctenophorus reticulatus*) was found living in a deep burrow.
Mixed dense heathland	3b	Plate 7	The vegetation is dense heath dominated by pink-flowering grevillea (*Grevillea paradoxa*), melaleucas (*Melaleuca atriviridis*) and peas, over smaller eremophilas and peas. The soil is lateritic orange clay. This vegetation community occurs within mixed mallee woodland (type 3) woodland (Type 3) along the access road on the eastern side of the tenement. It is not described or mapped by Botanica.	The numerous small dense shrubs provide habitat for Splendid Fairy-wrens (*Malurus splendens*). Emu and kangaroo tracks were also found in this sub-community. Several spider burrows (Lycosidae sp.) were found, indicating the potential for this community to also support **SRE invertebrates**. The dense heath is highly suitable for **Malleefowl**, offering shelter and foraging habitat, as well as material for constructing mounds. Malleefowl was recorded along the access road into the tenement, in similar vegetation. Malleefowl is therefore highly likely to occur in this habitat type.
Casuarina low woodland on breakaways, ridges and slopes	4	Plate 8	Casuarina low woodland dominated by *Allocasuarina campestris* and *A. acutivalvis* with York Gum (*Eucalyptus loxophleba*), over mixed shrubs with occasional sandalwood (*Santalum spicatum*), over *Leptospermum macgillivrayi* (P1), *Styphelia* sp. Bullfinch (P3), eremophilas and acacias. This vegetation type occurs on rocky ridges and slopes and is not limited to breakaways, as suggested by Botanica (2011). The soil ranges from heavily weathered granitoids to gravely/stony clay. This vegetation community occurs more extensively than mapped in the flora survey including in two large dense patches in the central part of the tenement where they are incorrectly mapped as *Allocasuarina dielsiana* / *E.*	Shallow caves offer shelter for reptiles and invertebrates. Hollow logs on the ground provide shelter for reptiles, small mammals and invertebrates. The dense sheoak and acacia thickets provide shelter for larger reptiles such as the Western Blue-Tongue (*Tiliqua occipitalis*). The occurrence of priority flora species suggests there is potential to find **SRE invertebrates** in this vegetation community. Five bird species were recorded in this vegetation community, including the southern subspecies of the **Crested Bellbird**. The dense vegetation highly suitable for **Malleefowl** foraging and mound building.

Habitat type	Code	Plate	Vegetation and soil	Suitability for fauna species
			oleosa woodland (Type 2). Patches of this vegetation community that occur in the central part of the tenement are partially impacted by drilling (but most is still intact) and fall within the proposed mining pit.	
Leptospermum on granite outcrop	4a	Plate 9	The tops of the rocky rises consist of granitoid outcrops covered in mosses and lichens, with shallow caves. A ring of melaleucas (type 1b) surrounds the outcrops. Vegetation consists of low shrubs dominated by *Leptospermum macgilivrayi* (Priority 1).	This sub-community occurs in several small pockets and supports at least one priority flora species, indicating the potential for supporting SRE invertebrates. Several Australian Admiral Butterflies (*Vanessa itea*) were found foraging around one of the outcrops. Small caves offer shelter for reptiles and invertebrates. This community has good potential to support **SRE invertebrates**.

Plate 1 **Salmon gum and Gimlet Woodland – Habitat type 1**

Plate 2 **Acacia thickets – Habitat type 1a**

Plate 3 Melaleuca tall trees – Habitat type 1b

Plate 4 Casuarina woodland – Habitat type 2

Plate 5 Calytrix on granitoid ridge – Habitat type 2a

Plate 6 Callitris open woodland – Habitat type 3a

Plate 7 Mixed dense heathland – Habitat type 3b

Plate 8 Casuarina over mixed shrubs on breakaway – Habitat type 4

Plate 9 Melaleuca and Leptospermum on granite outcrop – Habitat type 4a

5.2.2. FAUNA SPECIES RECORDED IN THE RECONNAISSANCE SURVEY

Fifty-one species of vertebrate fauna were recorded during the survey. The vertebrate fauna included 41 species of bird, 7 reptiles (1 gecko, 3 skinks, 2 dragons and 1 monitor) and four mammal species of which three introduced.

Three species of conservation significance were recorded; these are the Malleefowl (*Leipoa ocellata*) listed Schedule 1 under the *Wildlife Conservation Act 1950* and Vulnerable under the EPBC Act, Major Mitchells Cockatoo (*Cacatua leadbeateri*) listed Schedule 4 under the *Wildlife Conservation Act 1950* and Priority 4 by the DEC, and the southern subspecies of the Crested Bellbird (O*reoica gutturalis gutturalis*), listed Priority 4 by the DEC. A fourth species, the wheatbelt subspecies of the White-browed Babbler (*Pomatostomus superciliosus ashbyi*) potentially occurs in the project area; an individual of the species was recorded, but the subspecies cannot be identified through field observations alone.

The vertebrate fauna species recorded in each of the vegetation / habitat types are presented in Table 6. No separate records were possible for subcommunity types 2a and 2b, 3a and 3b and 4a, since these were either very small patches, or it was not possible to distinguish between fauna utilising the sub-community or the main community (e.g types 2, 3 and 4). Records for these sub-communities have been included into those for the relevant main communities.

Table 6 Fauna species recorded during the Reconnaissance Survey

Scientific Name	Common Name	Conservation Status	Habitat					
Birds			**1**	1a	1b	**2**	**3**	**4**
Coracina novaehollandiae	Black-faced Cuckoo-Shrike		1				1	
Lichmera indistincta	Brown Honeyeater		1					
Melithreptus brevirostris	Brown-headed Honeyeater		1	1				
Cinclosoma castanotus	Chestnut Quail-thrush		1	2			1	
Acanthiza uropygialis	Chestnut-rumped Thornbill		1	1			1	1
Oreoica gutturalis gutturalis	Crested Bellbird (Southern)	P4	1	1			1	1
Artamus cyanopterus	Dusky Woodswallow		1					
Dromaius novaehollandiae	Emu			1		1		
Cacatua roseicapilla	Galah		1				1	1
Pachycephala inornata	Gilberts Whistler		2	1				
Cracticus torquatus	Grey Butcherbird		1				1	
Colluricincla harmonica	Grey Shrike-Thrush		1	1			1	1
Chalcites basalis	Horsefields Bronze-cuckoo		1					
Acanthiza apicalis	Inland Thornbill			1				
Microeca fascinans	Jackie Winter		1					
Turnix velox	Little Button Quail			1				
Cracticus tibicen	Magpie		1					
Cacatua leadbeateri	Major Mitchell's Cockatoo	S4, P4	1					
Lophochroa leadbeateri	Malleefowl	V, S1					1	
Dicaeum hirundinaceum	Mistletoebird		1					
Cuculus pallidus	Palid Cuckoo		1	1				
Cracticus nigrogularis	Pied Butcherbird		1					
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		1					
Anthochaera carunculata	Red Wattlebird		1	1	1	1	1	
Todiramphus pyrrhopygius	Red-backed Kingfisher		1	1		1		
Barnardius zonarius	Ringneck Parrot		1					

Scientific Name	Common Name	Conservation Status	Habitat					
Cincloramphus mathewsi	Rufous Songlark		1					
Climacteris rufa	Rufous Treecreeper		1					
Pachycephala rufiventris	Rufous Whistler		1	1				
Lichenostomus virescens	Singing Honeyeater		1				1	
Malurus splendens	Spendid Fairy-wren			1		1		
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		1				1	
Pardalotus striatus	Striated Pardalote		1	1	1	1	1	
Petrochelidon nigricans	Tree Martin		1					
Smicrornis brevirostris	Weebill		1	1	1	1	1	1
Gerygone fusca	Western Gerygone						1	
Pomatostomus superciliosus ?ashbyi	White-browed Babbler	P4*					1	
Lichenostomus leucotis	White-eared Honeyeater		1	1		1	1	
Lalage sueurii	White-winged Triller		1	1				
Rhipidura leucophrys	Willie Wagtail		1				1	
Lichenostomus ornatus	Yellow-plumed Honeyeater		1	1				
Acanthiza chrysorrhoa	Yellow-rumped Thornbill			1			1	
Reptiles			**1**	1a	1b	**2**	**3**	**4**
Cryptoblepharus buchanani	"wall skink"		1					
Ctenophorus cristatus	Crested Dragon		1					
Ctenophorus reticulatus	Western Netted Dragon					1		
Gehyra variegata	Variegated Gecko						1	
Lerista timida	"skink"		1	1	1			
Tiliqua occipitalis	Western Blue-tongue Lizard							1
Varanus tristis	Black-headed Monitor						1	
Mammals			**1**	1a	1b	**2**	**3**	**4**
* *Bos taurus*	Cattle		1				1	
* *Equus caballus*	Horse		1					
Macropus spp.	Kangaroo		2			2		
* *Oryctolagus cuniculus*	Rabbit		1				1	

Conservation Status:
S1: Schedule 1 - rare or likely to become extinct **S4**: Schedule 4 - other specially protected fauna
P1: Priority 1 – Poorly known taxa. **P4**: Priority 4 – Rare, near threatened and other taxa in need of monitoring
E: Endangered **V**: Vulnerable **M**: Migratory **o**: overfly **m**: marine area **w**: wetland

* identification could not be confirmed through field identification

6. DISCUSSION

6.1. HABITATS OF THE PROJECT AREA

Eleven fauna habitat types were identified within the project area. The habitats identified in the project area strongly conformed to patterns recorded within the Southern Cross (COO2) IBRA subregion (Cowan *et al*. 2001) and Beard (1990) vegetation descriptions, and match those described in the Biological Survey of the Easter Goldfields (Dell *et al*. 1985).

The majority of the project area comprises flat low plains with eucalypt woodlands; the majority of which comprising tall eucalypts (Salmon Gum and Gimlet) over an understorey of shrubs (type 1), or mallee woodlands (type 3). Other habitats occurring on the flats were tall casuarina woodland (type 2), triodia grassland (type 2b), callitris open woodland (type 3a), and mixed dense heathland (type 3b).

A low ridge runs north-south through the project area, coming to the surface in several places as granite outcropping, rocky ridges, and low breakaways. The tops of the outcrops support *Calytrix* sp., and the priority flora species *Leptospermum macgillivrayi* (P1) and *Styphelia* sp. Bullfinch (P3); several of these outcrops are surrounded by a ring of melaleucas (type 1b) growing around the base of the outcrops. The flatter areas of the ridges and slopes support casuarina low woodland (type 4), while the lower slopes support dense acacia thickets (type 1a). Acacia thickets were also found in areas on the flat plains which received water runoff including a creekline on the southern margin of the project area.

The majority of the project area provides suitable foraging and nesting habitat for the Malleefowl, listed Schedule 1 under the Western Australian Wildlife Conservation Act 1950 and Vulnerable under the federal EPBC Act, with particularly the acacia thickets (type 1a), mixed dense heathland (type 3b) and casuarina low woodland (type 4) being ranked as highly suitable. Malleefowl was recorded in the dense heathland habitat.

The extensive eucalypt woodlands provide suitable nesting habitat for Major Mitchell's Cockatoo, listed Priority 4 by the DEC, and a small flock was recorded foraging in an adjacent patch of tall casuarina woodland (type 2). The wheatbelt subspecies of the White-browed Babbler, listed Priority 4 by the DEC, was also recorded in this habitat type.

The southern subspecies of the Crested Bellbird, listed Priority 4 by the DEC was recorded throughout the project area, primarily associated with eucalypt woodlands (type 1 and type 3) and thickets of acacia (type 1a) and casuarina low woodland (type 4).

The tops and sides of the ridge have a hard rocky soil which does not provide much opportunity for burrowing species. However the rocks and small caves associated with the outcrops have the potential to support SRE invertebrates. Soils on the flat plains provide suitable burrowing substrate for lizard, small mammals and invertebrates, including potential SRE invertebrates.

6.2. FAUNA ASSEMBLAGE OF THE PROJECT AREA

The fauna assemblage of the project area was typical for the Goldfields region. The majority of species recorded were birds (41 species). Five species of diurnally active reptiles (Crested and Western Netted Dragons, wall skink, Western Blue-tongue, and Black-headed monitor) dominated the herpetofauna records. Raking of leaf litter and searching under tree bark yielded two additional reptile species (*Lerista timida* and the variegated gecko), and several invertebrates, none of which were from SRE genera. No mammals were recorded during the survey, however indirect evidence such as tracks and scats were found of kangaroos (*Macropus* sp.) and the introduced cattle, horse and rabbit.

Four species of conservation significance, all birds, were recorded during the survey, while the desktop search identified a further 15 species which may occur in the project area. These species, and their likelihood of occurrence, are discussed in sections 6.3, 6.4 and 6.5 below.

6.3. MAMMALS OF CONSERVATION SIGNIFICANCE

6.3.1. CHUDITCH

The Chuditch or Western Quoll (*Dasyurus geoffroii*) is Western Australia's largest native predator. Male Chuditch have a home range of approximately 15 square kilometres which can overlap with other males and females have a home range of three to four square kilometres (Serena & Soderquist 1989, Soderquist & Serena 2000). The species is carnivorous and will feed on mammals and birds (up to the size of a bandicoot or parrot), reptiles and invertebrates (Van Dyke & Strahan 2008).

The Chuditch is listed under the EPBC Act as Vulnerable, and under the *Wildlife Conservation Act 1950* as Schedule 1 – Fauna that are rare or likely to become extinct. Chuditch previously occupied habitat in a variety of climatic zones across Australia. Chuditch are now restricted to the south-west of Western Australia (SEWPaC 2012), occurring in the Goldfields, Midwest, Wheatbelt, South Coast, Swan, South West and Warren DEC regions (DEC 2012). In its current range, the species occurs in low densities throughout the Jarrah forest and more patchily in the drier woodlands and mallee shrublands of the southern Wheatbelt and near Hopetown on the south coast (Orell & Morris, 1994).

The Chuditch has experienced drastic population declines, a result of fox predation and habitat degradation (Serena & Soderquist 1989, Soderquist & Serena, 2000). The decline of the Chuditch can be attributed to (Serena *et al*. 1991):

- habitat loss and fragmentation due to clearing for agriculture or residential development;
- habitat alteration and degradation from the removal of suitable den logs and den sites following land clearing, grazing, and increased densities of rabbits and domestic stock;
- altered fire regime;
- competition for food and predation by fox and cats;and,
- hunting, poisoning, vehicle collisions.

Chuditch require large areas of suitable habitats to survive; male Chuditch have a home range of approximately 15 square kilometres which can overlap with other males and females have a home range of three to four square kilometres (Serena & Soderquist 1989, Soderquist & Serena 2000). Clearing removes den sites, protective cover and reduces the availability of prey. Concurrently direct mortality from baits, rabbit traps, possible predation by domestic dogs, cats and vehicle collision is expected to increase; and increased densities of rabbits and domestic stock on cleared land results in increased local densities of foxes which may compete with or predate upon Chuditch (Serena *et al.* 1991).

The project area is located within the know range of the Chuditch and provides suitable habitat for the species. The closest record to the project area is a skull found at Bungalbin Hill, located 50 km to the south-east (Dell *et al.* 1985). However the species has responded positively to fox control programs run by the Departments of Agriculture and DEC, and had recently been recorded on the Swan Coastal Plain for the first time in decades (SEWPaC 2012d). Additionally, translocations of the species appear to have met with success (i.e. Cape Arid National Park) (Van Dyke & Strahan 2008).

Given the species response to fox control programs, the fact that the project area is well connected to a large patch of non-cleared vegetation and the species propensity to disperse large distances it is considered that there is a medium chance that Chuditch could utilise the habitats of the project area.

However, in the absence of fox control in the local area, it is unlikely self-sustaining populations will establish on the project area.

6.3.2. GREATER (CENTRAL) LONG-EARED BAT

The taxonomy of the Greater Long-eared Bat (*Nyctophilus timoriensis* spp.) is species is under investigation though it is clear that several species are included within the "*timoriensis*" (IUCN 2012). The population in far south-western Australia is morphologically distinct and may be recognised as a separate species in the future (IUCN 2012). DEC list the central subspecies of the Long-eared Bat (under *N. timoriensis*) as Priority 4 – taxa in need of monitoring.

The species is cryptic and probably more common than records suggest. Secure populations exist in the Jilbadji, Mount Manning, Dundas and Nuytsland Nature Reserves of Western Australia (Van Dyke & Strahan 2008). The species is common but patchy in mixed eucalypt woodlands with prominent shrub strata, and around the fringes of she-oak and wattle thickets that surround old dams in these woodlands. In woodland habitats it roosts in tree crevices, foliage or under loose bark. The species' preferred habitat is congruent with the majority of the project area, comprising various types of eucalypt woodland with shrubby understorey (Van Dyke & Strahan 2008). As the majority of the project area is covered by eucalypts woodlands, there is a high chance that the species could roost under bark and in dead trees in the project area.

6.4. REPTILES OF CONSERVATION SIGNIFICANCE

6.4.1. WOMA

The Woma (*Aspidites ramsayi*) is listed as Schedule 4 – Other Specially Protected Fauna under the *Wildlife Conservation Act 1950*, and as Priority 1 – Poorly known taxa by the DEC. The species occurs in arid zones of Western Australia in woodland habitats, heathland and shrubland habitats often containing spinifex. The Woma is typically a desert and sandhill inhabitant of the arid interior (Cogger 2000). Womas appear to favour sandy soils vegetated with spinifex, woodlands and shrubs. They shelter in abandoned goanna and mammal burrows and may be active during day or night, dependent on temperature (Thompson & Thompson 2006).

Woma were formerly abundant in the Western Australian south-western sand plain habitats (Storr *et al.* 2002) but the species has declined as a consequence of agricultural clearing and possibly cats and foxes (Thompson & Thompson 2006). The south-western Wheatbelt population appears to be threatened while the northern populations appear to be stable (Storr *et al.* 2002).

Distribution maps of the Woma (Wilson & Swann 2010) indicate that the project area is situated on the northern edge of the distribution of the south-western population. The habitat in the project area is suitable, and there are abundant prey items, but the species has not been recorded in the vicinity of the project area in any of the survey reports and databases reviewed. The likelihood of the Woma occurring in the project area is considered to be low.

6.4.2. SOUTH WEST CARPET PYTHON

The south-western subspecies of the Carpet Python (*Morelia spilota imbricata*) is listed under the *Wildlife Conservation Act 1950* as Schedule 4 – Other protected fauna, and as Priority 4 – Rare, near threatened or otherwise in need of monitoring by the DEC.

In Western Australia, the Carpet Python is distributed over a broad range and a variety of habitats from Northampton in the north, throughout the south west and to Kalgoorlie in the east. It feeds on a variety of

small to medium sized mammal species and birds. The south-western subspecies shows extreme sexual dimorphism; females can weigh up to 4.5 kilograms and measure close to four metres while males rarely reach more than 1.1 kilograms (Cogger 2000). The species is particularly vulnerable to habitat destruction and altered fire regimes (Cogger *et al*. 1993). The South West Carpet Python has been recorded from semi-arid coastal and inland habitats, banksia woodland, eucalypt woodlands, and grasslands.

A single Carpet Python was recorded as an opportunistic sighting during surveys for the Koolyanobbing Iron Ore Project, located within 7 km from the project area, although other surveys between 2000 and 2006 failed to record the species from within the Mt Jackson Range or Windarling Range (Cliffs 2009). The project area is located at the northern edge of the species' distribution. Suitable habitat occurs in the project area, and prey items (e.g. rabbits) are abundant. The likelihood of the Carpet Python occurring in the project area is therefore high.

6.5. BIRDS OF CONSERVATION SIGNIFICANCE

6.5.1. MALLEEFOWL

The Malleefowl (*Leipoa ocellata*) is listed under the EPBC Act as Vulnerable, and under the *Wildlife Conservation Act 1950* as Schedule 1 – Fauna that is rare or likely to become extinct. The species belongs to an ancient family called Megapodiidae whose members all build terrestrial mounds for nesting. The Malleefowl is found in semi-arid to arid shrublands and low woodlands, especially those dominated by mallee and/or *Acacia spp*. (Johnstone & Storr 1998).

Historically, the Malleefowl had a wide distribution throughout semi-arid habitat of Australia. This distribution has reduced markedly with the species almost extinct in New South Wales and Victoria. Western Australia supports the largest and most widespread populations of the species (Johnstone & Storr 1998). The species is particularly vulnerable to land degradation, vegetation clearing and predation, especially from introduced feral predators such as cats and foxes (Benshemesh 2000). Altered fire regimes have also been implicated in the species decline.

Malleefowl are renowned for building large nest mounds in which they incubate their eggs. The mounds are highly sophisticated and adult birds manage the temperature of the mounds by increasing or decreasing the amount of organic matter within the mounds substrate (Benshemesh 2000). A sandy substrate and abundance of leaf litter are most commonly used for mound construction and heat regulation (Johnstone & Storr 1998). Drainage capacity of soil is a key determinant for mound site choice. Mounds are most commonly constructed on well drained sandy soils rather than loam and clay. However other studies indicate that soil type may be less important in some areas and gravel-type soils are often associated with mounds (Jones & Göth 2008).

A comprehensive survey of Malleefowl distribution in WA indicated that mounds typically occur in either mallee or *Acacia/Acllocasuarina* shrublands. Mounds were most often built in areas with fairly dense vegetation with a low canopy (<6m), abundant litter, and/or sparse ground cover (Jones & Göth 2008).

Most of the vegetation types in the project area are suitable for the Malleefowl as mound construction and foraging habitat, especially Types 1a, 3b and 4 (Plates 2, 7 and 8) which have a moderately dense to dense understorey.. Malleefowl are omnivorous and exploit a diverse array of organisms including reptiles, invertebrates, fungi, flowers, seeds and other vegetative matter (Jones & Göth 2008). The majority of the project area comprises open woodland of various types, which provides ample leaf litter and woody debris which support a range of suitable food items.

One individual Malleefowl was sighted within the haul road alignment into Golden Orb by SXG personnel (C. Dressler, *pers. comm*. 17 January 2012). The area where the bird was seen comprises dense *Melaleuca* thickets, similar to habitat type 3b in the project area.

There is a high chance of Malleefowl nest mounds occurring on the project area. Current data suggest that the species is already utilising the project area for foraging. The proposed project is highly likely to have localised impacts on the Malleefowl population.

6.5.2. SLENDER-BILLED THORNBILL (WESTERN)

The western subspecies of the Slender-billed Thornbill (*Acanthiza iredalei iredalei*) is listed under the EPBC Act as Vulnerable. It inhabits arid and semi-arid regions of southern Western Australia and western South Australia, where it is sparsely distributed throughout its range (Garnett & Crowley 2000). The western subspecies is currently estimated to occur in seven subpopulations extending in a discontinuous band from Carnarvon in Western Australia to Port Augusta in South Australia (Johnstone & Storr 2004).

The western Slender-billed Thornbill usually occurs in pairs or small flocks of up to ten birds (Recher & Davis 2000). It is a resident bird that feeds primarily on insects (Matthew 1994, Recher & Davis 2000, Higgins & Peter 2002, Johnstone & Storr 2004).

The preferred habitat is treeless chenopod shrubland, which are usually found on saline flats associated with salt lakes (Storr 1985, 1986), particularly where there are samphires (*Tecticornia* spp. and *Sacrocornia* spp.), Bluebush (*Maireana* sp.) or Saltbush (*Atriplex* sp.) (Matthew 1994, Recher & Davis 2000, Johnstone & Storr 2004).

The major recognised threatening process is the degradation of its habitat through over-grazing and trampling by livestock, and over-grazing and ring barking of shrubs by rabbits and goats. Changes in fire regime, and the establishment of a mining operation at one site (Leigh Creek) within the documented range, may have contributed to a historical decline in population size (Matthew 1994, Garnett & Crowley 2000, Recher & Davis 2000).

The habitat in the project area is not suitable for the western Slender-billed Thornbill. There are no samphire or saltbush flats within the tenement and the fringes of the nearest salt lake are located 5 km to the south of the project area. The subspecies is therefore unlikely to occur in the project area.

6.5.3. PEREGRINE FALCON

The Peregrine Falcon (*Falco peregrinus*) is listed under the *Wildlife Conservation Act 1950* as Schedule 4 – Other Specially Protected Fauna, and by the DEC as Priority 4 – Rare, near threatened and other taxa in need of monitoring. The Peregrine Falcon experienced a large population decline as a result of reduced breeding success caused by herbicide and pesticide use. Since the banning of such chemicals, the population has stabilised and expanded. In Western Australia, populations are stable in areas with granite outcrops and cliffs which are its preferred breeding habitat (Johnstone & Storr 1998). In the absence of such habitats, the species has been known to use nests of crows and ravens (*Corvus* spp.) and occasionally tree hollows for nesting (Marchant & Higgins 1993).

Database searches indicate that species is recorded regularly in the vicinity of the project area from a range of localities including Mt Jackson, Lake Deborah (DEC Threatened Fauna Database) and Koolyanobbing (Ecologia 2001), with the nearest Birdata records are 22 km to the north of the project area. Although the project area does not have high rocky outcrops, the species may use the project area for hunting and may nest in the project area if suitable tree hollows are available. The likelihood of the Peregrine Falcon occurring in the project area is medium.

6.5.4. MAJOR MITCHELL'S COCKATOO

The Major Mitchell's Cockatoo (*Lophochroa leadbeateri*) is listed as under the *Wildlife Conservation Act 1950* as Schedule 4 – Other Specially Protected Fauna, and by the DEC as Priority 4 – Rare, near threatened or otherwise in need of protection. It has a widespread but disjunct distribution in arid and semi-arid zones.

The species has a widespread but disjunct distribution throughout Australia. Within its range the Major Mitchell's Cockatoo is generally rare to uncommon and patchily distributed. In Western Australia it occurs in seven disjunct subpopulations. The project area falls within the distribution range of the centra sub-population, which occurs in a crescent-shaped area from 150 km east of Geralton to Lake Barlee (Johnstone & Storr 1998).

The species inhabits lightly or sparsely wooded country (including farmlands, beaches and coastal dunes) near water (including mills and dams) and tall eucalyptus. Major Mitchells Cockatoos nest in tall eucalypts, with pairs avoiding nesting too close to each other; nests are spaced a minimum of 1 km apart, with an average distance of 2.7 km (Rowley & Chapman 1991). The species is highly sensitive to disturbance.

A flock of five Major Mitchell's Cockatoos was recorded foraging in the project area in tall casuarina woodland (vegetation type 2). The species was also recorded opportunistically in the Marda tenement 12 km to the north-east. The likelihood of this species occurring in the project area is therefore high. A cockatoo nest tree survey was completed in the central part of the Golden Orb tenement during the Major Mitchells Cockatoo breeding season. This survey recorded numerous trees with suitable nesting hollows within the project area, but was unable to establish whether cockatoos were nesting at the time (Terrestrial Ecosystems 2011).

6.5.5. AUSTRALIAN BUSTARD

The Australian Bustard (*Ardeotis australis*) is listed by the DEC as Priority 4 – Rare, near threatened or otherwise in need of protection. Garnett and Crowley (2000) indicate that the species meets IUCN criteria to be listed as Near Threatened. The species is widely distributed but has suffered massive historical population declines (REF). It is particularly vulnerable to intensive agricultural practices and fox predation (Garnett & Crowley 2000). The Australian Bustard uses a wide variety of open and semi-open grassy habitats, including tussock grasslands, spinifex (*Triodia* spp.) hummock grassland and grassy woodlands. The species has also been recorded on chenopod flats and in modified habitats such as golf courses. The Australian Bustard feeds on a variety of insects and fruit (Johnstone & Storr 1998).

The project area contains suitable habitat for the Australian Bustard and one individual was recorded opportunistically during reconnaissance drives 12 km to the north of the project area. The likelihood of the Australian bustard occurring in the project area is high. However, the species is highly mobile and there is a low risk of long term detrimental impacts to the local population as a result of the proposed project.

6.5.6. BUSH STONE-CURLEW

The Bush Stone-curlew (*Burhinus grallarius*) is listed as by the DEC as Priority 4 – Rare, near threatened or otherwise in need of protection. Garnett and Crowley (2000) indicate that the species meets IUCN criteria to be listed as Near Threatened. The Bush Stone-curlew population has been decreasing in south-western Australia since the 1920s. Once distributed in all but the most arid areas of Australia, the species has suffered large range contractions and population declines. It is particularly vulnerable to feral animal predation but has also suffered from land clearing and altered fire regimes (Johnstone & Storr 1998).

The species is associated with lightly wooded areas where there is an abundance of fallen logs and leaf litter. It also uses tussock grassland plains and shrub lands of *Acacia* as well as ephemeral drainage systems. Although the Bush Stone-curlew was not recorded during the survey, the habitats of the project area are suitable for the species and it is likely to occur there. The birdata database (Birdlife Australia 2005-2007) shows two records within 100 km of the project area. The species is highly mobile and there are large areas of suitable habitat contiguous to the project area. While the project may have a localised impact on the species, it is unlikely to have a long term negative impact on the regional population of the species.

6.5.7. RUFOUS FIELDWREN (SOUTH-WESTERN)

The south-western subspecies of the Rufous Fieldwren (*Calamanthus campestris montanellus*) is restricted to the western wheatbelt of Western Australia, and is listed by the DEC as Priority 4 – Rare, near threatened or otherwise in need of protection. The population of this subspecies has declined in size by approximately 20% over the last 3 generations with over 50% of its habitat having been cleared for agriculture (Garnett and Crowley, 2000). Grazing, particularly in chenopod shrublands, is also likely to have been detrimental (Reid and Fleming 1992). Although the extent of occurrence has remained the same, there has been a massive reduction in area of occupancy in second half of 20th century (Garnett and Crowley 2000). Subpopulations are probably genetically isolated.

The Rufous Fieldwren occurs in low, sparse heath, saltmarsh or samphire, with or without emergent trees. It feeds on insects, spiders and seeds. They build domed nests near the ground in which they lay 2-3 eggs (Beruldsen 1980, Blakers *et al.* 1984, Garnett & Crowley 2000, Saunders & Ingram 1995).

The Rufous Fieldwren is unlikely to occur in the project area. No suitable habitat for this species was present within the project area.

6.5.8. HOODED PLOVER

The Hooded Plover (*Charadrius rubricollis*) is endemic to Australia. The western Australian subpopulation is listed by the DEC as Priority 4 – Rare, near threatened or otherwise in need of protection. It occurs in the Goldfields, Midwest, Wheatbelt, South Coast, Swan, South West and Warren DEC districts (DEC 2012). The total population in Western Australian is thought to be approximately 3000 mature individuals, but the species is not known to have experienced a historical decline (Garnett & Crowley 2000).

Hooded Plovers live on ocean beaches and beside inland lakes. They nest on the upper levels of the beach, in adjacent sand dunes, or on lake shores. They forage at the water's edge for small invertebrates, with *Coxiella spp.* probably the main food taken around inland lakes (Marchant & Higgins 1993, Singor 1999, Weston & Elgar, 2000). After breeding, inland birds appear to move to lakes near the west coast or shores of southern lakes (Garnett & Crowley 2000).

Although Hooded Plovers have been recorded in the general vicinity (Birdlife Australia 2005–2007) there is no suitable breeding or foraging habitat for them within the project area. Therefore, the project is unlikely to result in impacts to the Hooded Plover.

6.5.9. SHY HEATHWREN (WESTERN)

The western subspecies of the Shy Heathwren (*Hylacola cauta whitlocki*) is listed by the DEC as Priority 4 – Rare, near threatened or otherwise in need of monitoring. More than half of the habitat of this subspecies has been cleared, but there has probably not been a population decline of 20% over in last three generations (Garnett & Crowley 2000).

The western subspecies is endemic to Western Australia, and is currently restricted to small isolated sub-populations in the fragmented habitats of the western wheatbelt, and along the coast as far as Eyre Bird Observatory (Saunders & Ingram 1995, Schodde & Mason, 1999). The main threat is clearing for agriculture, which has removed most of its habitat. Many of the remaining habitat fragments are degraded by stock grazing and weeds, and this has probably reduced the number of fragments occupied, a decline that is likely to continue (Saunders & Ingram 1995).

The Shy Heathwren lives in dense mallee eucalypt woodland and forages on the ground for insects, but sometimes also take seeds (Blakers *et al.* 1984). They nest in shrubs, or on the ground, below dense vegetation (Garnett & Crowley 2000).

The Shy Heathwren is unlikely to occur in the project area as no suitable habitat for this species was recorded within the project area.

6.5.10. CRESTED BELLBIRD (SOUTHERN)

The southern subspecies of the Crested Bellbird (*Oreoica gutturalis gutturalis*) is listed by the DEC as Priority 4 – Rare, near threatened or otherwise in need of monitoring. In Western Australia it is found in the Goldfields, Midwest, Wheatbelt, and South Coast DEC regions (DEC 2012). It formerly occurred across southern Australia but its distribution has contracted inland and to the south-west; the subspecies has currently declined from over 50% of its historical range. Threats include land clearing and habitat fragmentation (Garnett and Crowley 2000).

Crested Bellbirds live in the shrub-layer of eucalypt woodland, mallee, acacia shrubland, Triodia hummock grassland, saltbush and heath, where they feed on a variety of insects and seeds (Garnett & Crowley 2000).

The Crested Bellbird was recorded during the fauna survey and the habitats within the survey area are suitable for its use. The proposed project may impact to the local population of this species through clearing of habitat; however these impacts will be minimal as suitable habitats are contiguous to the proposed impact area.

6.5.11. WHITE-BROWED BABBLER (WHEATBELT)

The wheatbelt subspecies of the White-browed Babbler *Pomatostomus superciliosus ashbyi* has declined or become locally extinct in several locations along the Western Australian wheat belt. It is listed by the DEC as Priority 4 – Rare, near threatened or otherwise in need of monitoring. The species utilises a diverse range of woodland habitats with shrubby understoreys (Johnstone & Storr 2004), which matches the majority of the habitat found in the project area. The wheatbelt subspecies hybridises with the non-listed subspecies *P. superciliosus superciliosus* which is found in the central and southern arid zone and eastern mallee (Schodde & Mason 1999).

Subspecies identification of the White-browed Babbler requires either morphological measurements of captured individuals or DNA sequencing, both requiring mist-netting surveys by an A-class bander. One individual White-browed Babbler was recorded in the project area during the reconnaissance survey. However, since the survey did not include mist netting, is not possible to determine with certainty whether this bird constitutes the listed subspecies. The project area is situated in the overlap zone between the wheatbelt and the central subspecies hence the possibility of the subspecies occurring in the project area is medium.

6.5.12. RAINBOW BEE-EATER

The Rainbow Bee-eater (*Merops ornatus*) is listed as a Migratory Terrestrial Species under the EPBC Act. The Rainbow Bee-eater prefers open or lightly timbered areas, often near water. This species has been recorded in dry open sclerophyll forest, open woodlands and shrublands, including mallee, spinifex tussock grassland with scattered trees, chenopod shrubland with scattered trees and riparian or littoral assemblages. It is often seen around disturbed areas such as quarries, road cuttings and mines where exposed bare soil provides suitable breeding sites (Marchant & Higgins 1993). The Rainbow Bee-eater is a migratory bird and moves north from the southern areas of Australia during winter (Johnstone & Storr 1998). Rainbow bee-eaters were recorded opportunistically 12 km north of the survey area. The likelihood of them occurring in the project area is therefore high.

6.5.13. EASTERN GREAT EGRET

The Eastern Great Egret (*Ardea modesta*) occurs throughout Australia, with the exception of the arid regions. It is listed under the EPBC Act as both a Migratory Marine and Migratory Wetland species. The Eastern Great Egret inhabits terrestrial wetlands, estuarine, littoral habitats and grasslands. It prefers permanent water bodies on floodplains and the shallows of deep permanent lakes (Marchant & Higgins 1993), although it can be seen on any watered area including damp grasslands (Johnstone & Storr 1998).

The Eastern Great Egret is unlikely occur in the project area as it does not contain suitable habitat. The species may temporarily forage in the area after widespread flooding, but is unlikely to use the area regularly. The proposed project is therefore unlikely to impact on this species.

6.5.14. CATTLE EGRET

The Cattle Egret (*Ardea ibis*) is listed as a Migratory Wetland species under the EPBC Act. In Western Australia the Cattle Egret is common in areas of medium to high rainfall. The Cattle Egret uses grasslands, woodlands and wetlands, and is not common in arid areas (Johnstone & Storr 1998).

As for the Eastern Great Egret, the Cattle Egret is unlikely to occur in the project area, except after exceptional widespread flooding. The proposed project is therefore unlikely to impact on this species.

6.5.15. FORK-TAILED SWIFT

The Fork-tailed Swift (*Apus pacificus*) is listed under the EPBC Act as a Migratory Marine species. It breeds in north-east and mid-east Asia and winters in Australia and southern New Guinea. It is a visitor to most parts of Western Australia, arriving in the Kimberley in late September, in the Pilbara and Eucla by November and in the south-west land division by mid-December. The species generally returns to its breeding grounds by April. It ranges from common in the Kimberley; uncommon to moderately common in the north-west, west and south-eastern coasts and rare or scarce elsewhere (Johnstone & Storr 1998).

The closest record to the project area is approximately 50 kms to the north. The Fork-tailed Swift is unlikely to occur in the project area; however they may occasionally visit when adverse weather events occur in their usual habitat.

7. RECOMMENDATIONS

7.1. GENERAL RECOMMENDATIONS

While most birds, larger mammals and reptiles will be able to avoid the impact of clearing for exploration, mining and construction of infrastructure, most small and medium mammals, reptiles and burrowing frogs will be unavoidably killed by the large machinery used for vegetation removal and ground preparation, or by exposure to predators.

In order to minimise the impact of mining activities on vertebrate fauna, a series of general recommendations are given below:

Ground disturbance and rehabilitation management - Before any large-scale clearing is undertaking, the following procedures should be implemented:

- avoidance of unnecessary clearing of vegetation, i.e. beyond that strictly required;
- avoidance of clearing or disturbing habitats that support populations of DEC priority listed fauna;
- avoidance of excessive disturbance and clearing around creeks or minor drainage channels;
- windrows of topsoil, log debris and leaf litter formed during clearing should be retained, as they create extremely good micro-habitat for a large range of fauna, particularly reptiles;
- minimise the mining footprint at any one time by rapidly rehabilitating cleared areas such as laydown sites, access tracks and grid lines where these are no longer required;
- ensure that all drill holes are thoroughly capped to prevent fauna falling in.

Invasive Species Management Program –The project area supports introduced vertebrate species and is carrying a weed load that could impact species of conservation significance. An invasive species management program could include:

- weed control program;
- development of a targeted feral fox and cat population management program for project area;
- rubbish disposal procedures should be applied, especially for food refuse, in order to discourage scavenging by crows, foxes and feral cats. Large numbers of these animals can have an adverse impact on other fauna,

Environmental Awareness and Education Program – to include:

- encourage environmental culture on site by increasing the awareness of the environmental commitments of the project;
- signage on site e.g. feral animal control, litter management, speed;
- site and targeted habitat speed limits on site especially in areas where species of conservation significance are regularly reported.

Habitat Rehabilitation Plan – most habitats found within the proposed impact area are also found outside the impact area. The level of impact caused by mining and construction activity could be reduced by increasing the health of other similar habitats. This could be done by:

- decreasing stock levels;
- undertaking weed control projects;
- fencing off vulnerable habitats;
- implementing a fire management plan.

7.2. FURTHER SURVEYS AND DATA GAPS

Targeted Malleefowl surveys

Large areas of suitable Malleefowl habitat exist on the project area. This habitat could support active nest mounds. Regulatory bodies will require that the project area and surrounding areas vulnerable to secondary impacts be surveyed for Malleefowl following the national guidelines.

Further Seasonal Fauna surveys

Currently the proposed project is under the 50 ha size that would trigger the requirement of a Level 2 Fauna Survey. In the event that the project is enlarged, advice should be sought from regulatory bodies as it is likely the survey will need to be increased.

7.3. REFERRALS

The proposed project has a high likelihood of impacting a species of state and national environmental significance. Such projects often require referral under the EPBC Act and Environmental Protection Act 1987 prior to mining approval being granted. Rapallo strongly recommends that SXG consult with the DEC and EPA about potential obligations under the two pieces of legislation. Early consultation with these regulatory bodies can help avoid project timeline blowouts.

8. REFERENCES

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Appendices

Appendix I: State and Federal Conservation Codes

Conservation Listings under the Environment Protection and Conservation Act 1999 (EPBC Act)

Threatened fauna and flora may be listed in any one of the following categories as defined in Section 179 of the EPBC Act. Section 179 Categories of threatened species

Extinct

(1) A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.

Extinct in the Wild

(2) A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time:

(a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or

(b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.

Critically Endangered

(3) A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.

Endangered

(4) A native species is eligible to be included in the endangered category at a particular time if, at that time:

(a) it is not critically endangered; and

(b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

Vulnerable

(5) A native species is eligible to be included in the vulnerable category at a particular time if, at that time:

(a) it is not critically endangered or endangered; and

(b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.

Conservation Dependent

(6) A native species is eligible to be included in the conservation dependent category at a particular time if, at that time:

(a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or

(b) the following subparagraphs are satisfied:

(i) the species is a species of fish;

(ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised;

(iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory;

(iv) cessation of the plan of management would adversely affect the conservation status of the species.

(7) In subsection (6): fish includes all species of bony fish, sharks, rays, crustaceans, molluscs and other marine organisms, but does not include marine mammals or marine reptiles.

Species listed as 'conservation dependent' and 'extinct' are not matters of national environmental significance and therefore do not trigger the EPBC Act.

Categories and definitions of Threatened Fauna species under the *Wildlife Conservation Act (1950)* of Western Australia, taken directly from the DEC website.

Under the *Wildlife Conservation Act (1950)* the Minister for the Environment may declare species of flora and fauna to be protected if they are considered to be in danger of extinction, rare or otherwise in need of special protection. Schedules 1 and 2 deal with those that are threatened and those that are presumed extinct, respectively.

T: Schedule 1 under the Wildlife Conservation Act 1950

- Threatened Fauna (Fauna that is rare or is likely to become extinct)
- Threatened Flora (Declared Rare Flora - Extant)

Taxa* that have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.

Threatened fauna and flora (Schedule 1) are further ranked by the Department according to their level of threat using IUCN Red List criteria:

- CR: Critically Endangered - considered to be facing an extremely high risk of extinction in the wild.
- EN: Endangered - considered to be facing a very high risk of extinction in the wild.
- VU: Vulnerable - considered to be facing a high risk of extinction in the wild.

X: Schedule 2 under the Wildlife Conservation Act 1950

- Presumed Extinct Fauna
- Presumed Extinct Flora (Declared Rare Flora – Extinct)

Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such.

IA: Schedule 3 under the Wildlife Conservation Act 1950

- Birds protected under an international agreement

Birds that are subject to an agreement between governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction.

S: Schedule 4 under the Wildlife Conservation Act 1950

- Other specially protected fauna

Fauna that is in need of special protection, otherwise than for the reasons mentioned in the above schedules.

Taxa that have not yet been adequately surveyed to be listed under Schedule 1 or 2 are added to the Priority Flora and Priority Fauna Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna. Taxa that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list for other than taxonomic reasons, are placed in Priority 4. These taxa require regular monitoring. Conservation Dependent species are placed in Priority 5.

1: Priority One: Poorly-known taxa

Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.

2: Priority Two: Poorly-known taxa

Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.

3: Priority Three: Poorly-known taxa

Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.

4: Priority Four: Rare, Near Threatened and other taxa in need of monitoring

(a) Rare. Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.

(b) Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.

(c) Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

5: Priority Five: Conservation Dependent taxa

Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxa becoming threatened within five years.

Definitions and criteria for presumed totally destroyed, critically endangered, endangered and vulnerable ecological communities, taken from DEC (2010).

THREATENED ECOLOGICAL COMMUNITIES

A **threatened ecological community** (TEC) is one which is found to fit into one of the following categories; "presumed totally destroyed", "critically endangered", "endangered" or "vulnerable".

Presumed Totally Destroyed (PD)

An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

Critically Endangered (CR)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.

Endangered (EN)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

Vulnerable (VU)

An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

PRIORITY ECOLOGICAL COMMUNITIES

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the **Priority Ecological Community** List under priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community, and evaluation of conservation status, so that consideration can be given to their declaration as threatened ecological communities. Ecological communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

Priority One: Poorly-known ecological communities

Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤ 100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

Priority Two: Poorly-known ecological communities

Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Priority Three: Poorly known ecological communities

(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:

(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;

(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes.

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.

Priority Four: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.

(i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.

(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.

(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.

Priority Five: Conservation Dependent ecological communities

Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Appendix II: Database Search Results

NAME	SOURCE_CODE	SOURCE_ID	NAME_ID	FAMILY	GENUS	SPECIES	INFRARANK	INFRANAME	AUTHOR	VERNACULAR	CONSERVATION	DAY	MONTH	YEAR	LOCALITY	SITE_NAME
Leipoa ocellata	BIRDATLAS1	188781	24557	Megapodiidae	Leipoa	ocellata			Gould	Malleefowl	T	18	09	1979	LAKE DEBORAH	
Leipoa ocellata	TFAUNA	1507	24557	Megapodiidae	Leipoa	ocellata			Gould	Malleefowl	T	25	09	1995	LAKE DEBORAH	Helena and Aurora Range
Leipoa ocellata	BIRDATLAS1	32521	24557	Megapodiidae	Leipoa	ocellata			Gould	Malleefowl	T	28	02	1978	MOUNT JACKSON	
Leipoa ocellata	BIRDATLAS1	279253	24557	Megapodiidae	Leipoa	ocellata			Gould	Malleefowl	T	29	09	1981	MOUNT JACKSON	
Leipoa ocellata	TFAUNA	16114	24557	Megapodiidae	Leipoa	ocellata			Gould	Malleefowl	T	01	01	2007	MOUNT JACKSON	Yeeding Hill
Leipoa ocellata	TFAUNA	5407	24557	Megapodiidae	Leipoa	ocellata			Gould	Malleefowl	T	17	11	2000	MOUNT JACKSON	Mt Jackson
Leipoa ocellata	TFAUNA	15736	24557	Megapodiidae	Leipoa	ocellata			Gould	Malleefowl	T	03	07	2008	MOUNT JACKSON	Bullfinch-Evanston Rd
Falco peregrinus	BIRDATLAS1	188728	25624	Falconidae	Falco	peregrinus			Tunstall	Peregrine Falcon	S	11	09	1979	LAKE DEBORAH	
Falco peregrinus	BIRDATLAS1	188682	25624	Falconidae	Falco	peregrinus			Tunstall	Peregrine Falcon	S	25	04	1980	LAKE DEBORAH	
Falco peregrinus	BIRDATLAS1	279256	25624	Falconidae	Falco	peregrinus			Tunstall	Peregrine Falcon	S	29	09	1981	MOUNT JACKSON	
Falco peregrinus	BIRDATLAS2	412315	25624	Falconidae	Falco	peregrinus			Tunstall	Peregrine Falcon	S	26	11	2000	MOUNT JACKSON	Yokradine Hills
Falco peregrinus	BIRDATLAS1	169981	25624	Falconidae	Falco	peregrinus			Tunstall	Peregrine Falcon	S	06	04	1980	ENNUIN	
Falco peregrinus subsp. macropus	TFAUNA	1508	24475	Falconidae	Falco	peregrinus	subsp.	macropus	Swainson		S	28	09	1995	LAKE DEBORAH	East side of range
Falco peregrinus subsp. macropus	TFAUNA	5403	24475	Falconidae	Falco	peregrinus	subsp.	macropus	Swainson		S	01	11	2000	MOUNT JACKSON	Windarling study area at Site 15
Charadrius rubricollis	TFAUNA	7735	24376	Charadriidae	Charadrius	rubricollis			(Gmelin)	Hooded Plover	4	19	12	2003	MOUNT JACKSON	Hamersley Lakes system, Mt Jackson
Hylacola cauta subsp. whitlocki	TFAUNA	6505	34001	Acanthizidae	Hylacola	cauta	subsp.	whitlocki	Mathews	Shy Heathwren	4	01	12	2000	LAKE DEBORAH	Proposed rail corridor, SSW of Bungalbin
Hylacola cauta subsp. whitlocki	TFAUNA	6504	34001	Acanthizidae	Hylacola	cauta	subsp.	whitlocki	Mathews	Shy Heathwren	4	01	11	2000	MOUNT JACKSON	NW of Mt Jackson (Site 7)

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 24/04/2012

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Species Group All Animals
Method 'By Circle'
Centre 119°11' 54" E,30°17' 38" S
Buffer 40km
Group By Kingdom

Kingdom	Species	Records
Animalia	173	1525
TOTAL	**173**	**1525**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Animalia					
1.	24559	*Acanthagenys rufogularis (Spiny-cheeked Honeyeater)*			
2.	24260	*Acanthiza apicalis (Broad-tailed Thornbill)*			
3.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
4.	24264	*Acanthiza robustirostris (Slaty-backed Thornbill)*			
5.	24265	*Acanthiza uropygialis (Chestnut-rumped Thornbill)*			
6.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
7.	25536	*Accipiter fasciatus (Brown Goshawk)*			
8.	25544	*Aegotheles cristatus (Australian Owlet-nightjar)*			
9.	25241	*Antaresia stimsoni subsp. stimsoni*			
10.	24561	*Anthochaera carunculata (Red Wattlebird)*			
11.	25528	*Aphelocephala leucopsis (Southern Whiteface)*			
12.	24266	*Aphelocephala leucopsis subsp. castaneiventris*			
13.	24285	*Aquila audax (Wedge-tailed Eagle)*			
14.	24353	*Artamus cyanopterus (Dusky Woodswallow)*			
15.	24355	*Artamus minor (Little Woodswallow)*			
16.	24251	*Bos taurus (European Cattle)*			
17.	25245	*Brachyurophis semifasciata*			
18.	25715	*Cacatua roseicapilla (Galah)*			
19.	25717	*Calyptorhynchus banksii (Red-tailed Black-Cockatoo)*			
20.	24039	*Canis lupus subsp. dingo (Dingo)*			
21.	24086	*Cercartetus concinnus (Western Pygmy-possum)*			
22.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
23.	24376	*Charadrius rubricollis (Hooded Plover)*		P4	
24.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
25.	24392	*Cinclosoma castaneothorax subsp. marginatum*			
26.	30956	*Cinclosoma castanotus (Chestnut Quail-thrush)*			
27.	25581	*Climacteris affinis (White-browed Treecreeper)*			
28.	24396	*Climacteris rufa (Rufous Treecreeper)*			
29.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
30.	24613	*Colluricincla harmonica subsp. rufiventris*			
31.	24361	*Coracina maxima (Ground Cuckoo-shrike)*			
32.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
33.	24416	*Corvus bennetti (Little Crow)*			
34.	25592	*Corvus coronoides (Australian Raven)*			
35.	24417	*Corvus coronoides subsp. perplexus*			
36.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
37.	25595	*Cracticus tibicen (Australian Magpie)*			
38.	24422	*Cracticus tibicen subsp. dorsalis (White-backed Magpie)*			
39.	25596	*Cracticus torquatus (Grey Butcherbird)*			
40.	24424	*Cracticus torquatus subsp. torquatus*			
41.	30893	*Cryptoblepharus buchananii*			
42.	25020	*Cryptoblepharus plagiocephalus*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
43.	24871	*Ctenophorus cristatus (Bicycle Dragon)*			
44.	24879	*Ctenophorus maculatus subsp. griseus*			
45.	24886	*Ctenophorus reticulatus (Western Netted Dragon)*			
46.	24889	*Ctenophorus scutulatus*			
47.	25026	*Ctenotus atlas*			
48.	25054	*Ctenotus mimetes*			
49.	25074	*Ctenotus schomburgkii*			
50.	25465	*Ctenotus uber*			
51.	25080	*Ctenotus uber subsp. uber*			
52.	25089	*Cyclodomorphus melanops subsp. elongatus*			
53.	24995	*Delma australis*			
54.	24997	*Delma butleri*			
55.	25295	*Demansia psammophis subsp. cupreiceps*			
56.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
57.	24929	*Diplodactylus granariensis subsp. granariensis*			
58.	24940	*Diplodactylus pulcher*			
59.	24470	*Dromaius novaehollandiae (Emu)*			
60.	25092	*Egernia depressa (Pygmy Spiny-tailed Skink)*			
61.	25095	*Egernia inornata*			
62.	25105	*Egernia striata (Night Skink)*			
63.	24651	*Eopsaltria australis subsp. griseogularis (Western Yellow Robin)*			
64.	25109	*Eremiascincus richardsonii (Broad-banded Sand Swimmer)*			
65.	24368	*Eurostopodus argus (Spotted Nightjar)*			
66.	25621	*Falco berigora (Brown Falcon)*			
67.	24471	*Falco berigora subsp. berigora*			
68.	25622	*Falco cenchroides (Australian Kestrel)*			
69.	24472	*Falco cenchroides subsp. cenchroides*			
70.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
71.	24475	*Falco peregrinus subsp. macropus*		S	
72.	24959	*Gehyra variegata*			
73.	25530	*Gerygone fusca (Western Gerygone)*			
74.	24735	*Glossopsitta porphyrocephala (Purple-crowned Lorikeet)*			
75.	25115	*Hemiergis initialis subsp. initialis*			
76.	24961	*Heteronotia binoei (Bynoe's Gecko)*			
77.	24491	*Hirundo neoxena (Welcome Swallow)*			
78.	24492	*Hirundo nigricans subsp. nigricans*			
79.	34001	*Hylacola cauta subsp. whitlocki (Shy Heathwren)*		P4	
80.	24557	*Leipoa ocellata (Malleefowl)*		T	
81.	25137	*Lerista gerrardii*			
82.	30927	*Lerista kingi*			
83.	25149	*Lerista macropisthopus subsp. macropisthopus*			
84.	25155	*Lerista muelleri*			
85.	30923	*Lerista rhodonoides*			
86.	25005	*Lialis burtonis*			
87.	25659	*Lichenostomus leucotis (White-eared Honeyeater)*			
88.	24576	*Lichenostomus leucotis subsp. novaenorciae*			
89.	24577	*Lichenostomus ornatus (Yellow-plumed Honeyeater)*			
90.	24581	*Lichenostomus virescens (Singing Honeyeater)*			
91.	25661	*Lichmera indistincta (Brown Honeyeater)*			
92.	30935	*Lucasium maini*			
93.	24136	*Macropus rufus (Red Kangaroo)*			
94.	24544	*Malurus lamberti subsp. assimilis*			
95.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
96.	25654	*Malurus splendens (Splendid Fairy-wren)*			
97.	24552	*Malurus splendens subsp. splendens*			
98.	24583	*Manorina flavigula (Yellow-throated Miner)*			
99.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
100.	24586	*Melithreptus brevirostris subsp. leucogenys*			
101.	25184	*Menetia greyii*			
102.	24598	*Merops ornatus (Rainbow Bee-eater)*			
103.	25693	*Microeca fascinans (Jacky Winter)*			
104.	24654	*Microeca fascinans subsp. assimilis*			
105.	24904	*Moloch horridus (Thorny Devil)*			
106.	25190	*Morethia butleri*			
107.	24184	*Mormopterus planiceps (Southern Freetail-bat)*			
108.	24223	*Mus musculus (House Mouse)*			
109.	25426	*Neobatrachus pelobatoides (Humming Frog)*			
110.	30941	*Nephrurus milii (Barking Gecko)*			
111.	24971	*Nephrurus vertebralis*			
112.	24096	*Ningaui yvonneae (Southern Ningaui)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
113.	25748	*Ninox novaeseelandiae (Boobook Owl)*			
114.	24224	*Notomys alexis (Spinifex Hopping-mouse)*			
115.	24229	*Notomys mitchellii (Mitchell's Hopping-mouse)*			
116.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
117.	24196	*Nyctophilus timoriensis subsp. timoriensis (Greater Long-eared Bat)*			
118.	24978	*Oedura reticulata*			
119.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
120.	24624	*Pachycephala rufiventris subsp. rufiventris*			
121.	25254	*Parasuta monachus*			
122.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
123.	25682	*Pardalotus striatus (Striated Pardalote)*			
124.	24630	*Pardalotus striatus subsp. westraliensis*			
125.	24658	*Petroica cucullata (Hooded Robin)*			
126.	24659	*Petroica goodenovii (Red-capped Robin)*			
127.	24409	*Phaps chalcoptera (Common Bronzewing)*			
128.	24593	*Phylidonyris albifrons (White-fronted Honeyeater)*			
129.	24748	*Platycercus varius (Mulga Parrot)*			
130.	24750	*Platycercus zonarius subsp. semitorquatus (Twenty-eight Parrot)*			
131.	24751	*Platycercus zonarius subsp. zonarius*			
132.	25703	*Podargus strigoides (Tawny Frogmouth)*			
133.	24679	*Podargus strigoides subsp. brachypterus*			
134.	24907	*Pogona minor subsp. minor*			
135.	25722	*Polytelis anthopeplus (Regent Parrot)*			
136.	24683	*Pomatostomus superciliosus (White-browed Babbler)*			
137.	24106	*Pseudantechinus woolleyae (Woolley's Pseudantechinus)*			
138.	25261	*Pseudechis australis (Mulga Snake)*			
139.	24232	*Pseudomys bolami (Bolam's Mouse)*			
140.	24237	*Pseudomys hermannsburgensis (Sandy Inland Mouse)*			
141.	25434	*Pseudophryne occidentalis (Western Toadlet)*			
142.	25008	*Pygopus lepidopodus (Common Scaly Foot)*			
143.	25009	*Pygopus nigriceps*			
144.	24278	*Pyrrholaemus brunneus (Redthroat)*			
145.	25271	*Ramphotyphlops australis*			
146.	30824	*Ramphotyphlops bicolor*			
147.	25273	*Ramphotyphlops bituberculatus*			
148.	25613	*Rhipidura fuliginosa (Grey Fantail)*			
149.	24452	*Rhipidura fuliginosa subsp. preissi*			
150.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
151.	24982	*Rhynchoedura ornata (Beaked Gecko)*			
152.	24199	*Scotorepens balstoni (Inland Broad-nosed Bat)*			
153.	25266	*Simoselaps bertholdi (Jan's Banded Snake)*			
154.	30948	*Smicrornis brevirostris (Weebill)*			
155.	24108	*Sminthopsis crassicaudata (Fat-tailed Dunnart)*			
156.	24109	*Sminthopsis dolichura (Little long-tailed Dunnart)*			
157.	24116	*Sminthopsis macroura (Stripe-faced Dunnart)*			
158.	25597	*Strepera versicolor (Grey Currawong)*			
159.	24426	*Strepera versicolor subsp. plumbea*			
160.	24923	*Strophurus assimilis (Goldfields Spiny-tailed Gecko)*			
161.	25269	*Suta fasciata (Rosen's Snake)*			
162.	24185	*Tadarida australis (White-striped Freetail-bat)*			
163.	24331	*Tadorna tadornoides (Australian Shelduck)*			
164.	30870	*Taeniopygia guttata (Zebra Finch)*			
165.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
166.	24851	*Turnix velox (Little Button-quail)*			
167.	30814	*Tympanocryptis cephalus (Pebble Dragon)*			
168.	24386	*Vanellus tricolor (Banded Lapwing)*			
169.	25211	*Varanus caudolineatus*			
170.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
171.	25227	*Varanus tristis subsp. tristis (Racehorse Monitor)*			
172.	24202	*Vespadelus baverstocki (Inland Forest Bat)*			
173.	24206	*Vespadelus regulus (Southern Forest Bat)*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

Australian Government

Department of Sustainability, Environment, Water, Population and Communities

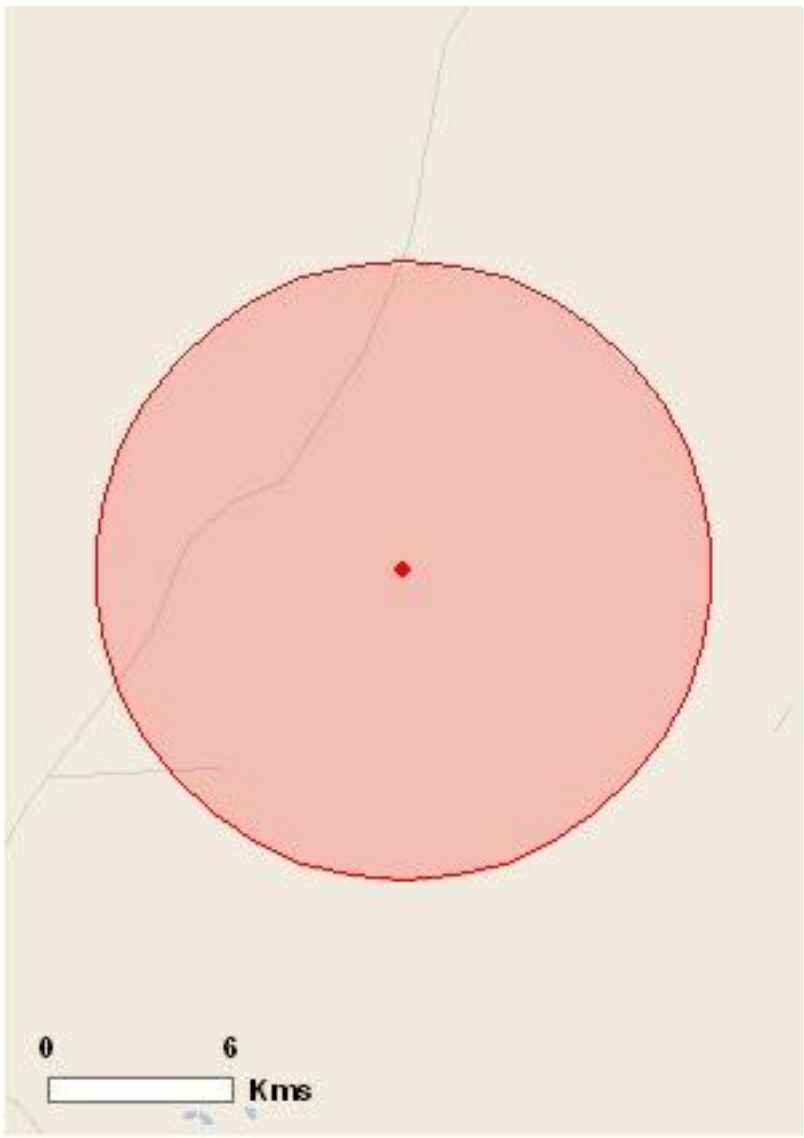
EPBC Act Protected Matters Report

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.

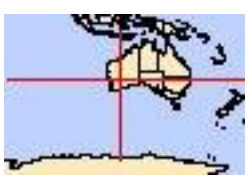
Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.environment.gov.au/epbc/assessmentsapprovals/index.html

Report created: 01/02/12 17:30:45



Coordinates

Buffer: 10.0Km



Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	6
Migratory Species:	7

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 and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage/index.html

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.

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. Information on EPBC Act permit requirements and application forms can be found at http://www.environment.gov.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	4
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

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

Place on the RNE:	None
State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	5
Nationally Important Wetlands:	None

Details

Matters of National Environmental Significance

Threatened Species		[Resource Information]
Name	Status	Type of Presence
BIRDS		
Acanthiza iredalei iredalei		
Slender-billed Thornbill (western) [25967]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
PLANTS		
Leucopogon spectabilis		
Ironstone Beard-heath [83012]	Critically Endangered	Species or species habitat may occur within area
Ricinocarpos brevis		
[82879]	Endangered	Species or species habitat likely to occur within area
Tetratheca harperi		
Jackson Tetratheca [6251]	Vulnerable	Species or species habitat likely to occur within area
Tetratheca paynterae		
Paynter's Tetratheca [66451]	Endangered	Species or species habitat likely to occur within area

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 may occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Migratory Terrestrial Species		
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
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 may occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

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 may occur within area

Name	Threatened	Type of Presence
[Ardea alba](#) Great Egret, White Egret [59541]		Species or species habitat may 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

Extra Information

Invasive Species	[Resource Information]

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

Name	Status	Type of Presence
Mammals		
[Capra hircus](#) Goat [2]		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
[Oryctolagus cuniculus](#) Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
[Vulpes vulpes](#) Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
[Carrichtera annua](#) Ward's Weed [9511]		Species or species habitat likely to occur within area

Coordinates

-30.21096 119.32938

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 Heritage and Register of National Estate properties, Wetlands of International 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

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

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.

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
-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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Bird list for one degree square containing the point 119.20678, -30.30203

Common Name	Scientific Name	Species Profile	Map Species
Emu	Dromaius novaehollandiae	view	map
Australian Shelduck	Tadorna tadornoides	view	map
Australian Wood Duck	Chenonetta jubata	view	map
Grey Teal	Anas gracilis	view	map
Pacific Black Duck	Anas superciliosa	view	map
Australasian Grebe	Tachybaptus novaehollandiae	view	map
Hoary-headed Grebe	Poliocephalus poliocephalus	view	map
Common Bronzewing	Phaps chalcoptera	view	map
Crested Pigeon	Ocyphaps lophotes	view	map
Tawny Frogmouth	Podargus strigoides	view	map
Spotted Nightjar	Eurostopodus argus		map
Australian Owlet-nightjar	Aegotheles cristatus	view	map
White-faced Heron	Egretta novaehollandiae	view	map
Black-shouldered Kite	Elanus axillaris	view	map
Square-tailed Kite	Lophoictinia isura		map
Black-breasted Buzzard	Hamirostra melanosternon	view	map
Brown Goshawk	Accipiter fasciatus	view	map
Collared Sparrowhawk	Accipiter cirrocephalus	view	map
Wedge-tailed Eagle	Aquila audax	view	map
Little Eagle	Hieraaetus morphnoides	view	map
Nankeen Kestrel	Falco cenchroides	view	map
Brown Falcon	Falco berigora	view	map
Australian Hobby	Falco longipennis		map
Peregrine Falcon	Falco peregrinus	view	map
Black-winged Stilt	Himantopus himantopus	view	map
Banded Stilt	Cladorhynchus leucocephalus	view	map
Red-capped Plover	Charadrius ruficapillus	view	map
Black-fronted Dotterel	Elseyornis melanops	view	map
Hooded Plover	Thinornis rubricollis	view	map
Banded Lapwing	Vanellus tricolor	view	map
Red-necked Stint	Calidris ruficollis	view	map
Curlew Sandpiper	Calidris ferruginea	view	map
Little Button-quail	Turnix velox		map
Red-tailed Black-Cockatoo	Calyptorhynchus banksii		map
Major Mitchell's Cockatoo	Lophochroa leadbeateri		map
Galah	Eolophus roseicapillus	view	map
Little Corella	Cacatua sanguinea	view	map
Purple-crowned Lorikeet	Glossopsitta porphyrocephala		map
Regent Parrot	Polytelis anthopeplus	view	map
Australian Ringneck	Barnardius zonarius	view	map
Mulga Parrot	Psephotus varius		map
Budgerigar	Melopsittacus undulatus	view	map
Horsfield's Bronze-Cuckoo	Chalcites basalis	view	map
Black-eared Cuckoo	Chalcites osculans	view	map

Pallid Cuckoo	Cacomantis pallidus	view	map
Southern Boobook	Ninox novaeseelandiae	view	map
Eastern Barn Owl	Tyto javanica	view	map
Red-backed Kingfisher	Todiramphus pyrrhopygius		map
Sacred Kingfisher	Todiramphus sanctus	view	map
Rainbow Bee-eater	Merops ornatus	view	map
White-browed Treecreeper	Climacteris affinis		map
Rufous Treecreeper	Climacteris rufa		map
Splendid Fairy-wren	Malurus splendens		map
White-winged Fairy-wren	Malurus leucopterus		map
Blue-breasted Fairy-wren	Malurus pulcherrimus		map
White-browed Scrubwren	Sericornis frontalis	view	map
Shy Heathwren	Calamanthus cautus		map
Rufous Fieldwren	Calamanthus campestris		map
Redthroat	Pyrrholaemus brunneus		map
Weebill	Smicrornis brevirostris	view	map
Western Gerygone	Gerygone fusca		map
Yellow-rumped Thornbill	Acanthiza chrysorrhoa	view	map
Chestnut-rumped Thornbill	Acanthiza uropygialis		map
Inland Thornbill	Acanthiza apicalis	view	map
Southern Whiteface	Aphelocephala leucopsis		map
Striated Pardalote	Pardalotus striatus	view	map
Pied Honeyeater	Certhionyx variegatus	view	map
Singing Honeyeater	Lichenostomus virescens	view	map
White-eared Honeyeater	Lichenostomus leucotis	view	map
Yellow-plumed Honeyeater	Lichenostomus ornatus	view	map
White-fronted Honeyeater	Purnella albifrons	view	map
Yellow-throated Miner	Manorina flavigula	view	map
Spiny-cheeked Honeyeater	Acanthagenys rufogularis	view	map
Red Wattlebird	Anthochaera carunculata	view	map
Crimson Chat	Epthianura tricolor	view	map
Black Honeyeater	Sugomel niger	view	map
Brown Honeyeater	Lichmera indistincta	view	map
Brown-headed Honeyeater	Melithreptus brevirostris	view	map
White-browed Babbler	Pomatostomus superciliosus	view	map
Chestnut Quail-thrush	Cinclosoma castanotum		map
Chiming Wedgebill	Psophodes occidentalis		map
Varied Sittella	Daphoenositta chrysoptera	view	map
Ground Cuckoo-shrike	Coracina maxima		map
Black-faced Cuckoo-shrike	Coracina novaehollandiae	view	map
White-winged Triller	Lalage sueurii	view	map
Gilbert's Whistler	Pachycephala inornata		map
Golden Whistler	Pachycephala pectoralis	view	map
Rufous Whistler	Pachycephala rufiventris	view	map
Grey Shrike-thrush	Colluricincla harmonica	view	map
Crested Bellbird	Oreoica gutturalis	view	map
Masked Woodswallow	Artamus personatus		map
Black-faced Woodswallow	Artamus cinereus	view	map
Dusky Woodswallow	Artamus cyanopterus	view	map

Little Woodswallow	Artamus minor		map
Grey Butcherbird	Cracticus torquatus	view	map
Pied Butcherbird	Cracticus nigrogularis	view	map
Australian Magpie	Cracticus tibicen	view	map
Grey Currawong	Strepera versicolor	view	map
Grey Fantail	Rhipidura albiscapa	view	map
Willie Wagtail	Rhipidura leucophrys	view	map
Australian Raven	Corvus coronoides	view	map
Little Crow	Corvus bennetti		map
Torresian Crow	Corvus orru	view	map
Magpie-lark	Grallina cyanoleuca	view	map
Jacky Winter	Microeca fascinans	view	map
Red-capped Robin	Petroica goodenovii	view	map
Hooded Robin	Melanodryas cucullata	view	map
Western Yellow Robin	Eopsaltria griseogularis		map
Southern Scrub-robin	Drymodes brunneopygia		map
Rufous Songlark	Cincloramphus mathewsi	view	map
Brown Songlark	Cincloramphus cruralis	view	map
White-backed Swallow	Cheramoeca leucosterna		map
Welcome Swallow	Hirundo neoxena	view	map
Fairy Martin	Petrochelidon ariel	view	map
Tree Martin	Petrochelidon nigricans		map
Mistletoebird	Dicaeum hirundinaceum	view	map
Zebra Finch	Taeniopygia guttata	view	map
Australasian Pipit	Anthus novaeseelandiae	view	map
Crow & Raven species			map

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