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SINOSTEEL MIDWEST CORPORATION
BLUE HILLS PROJECT
LEVEL 1 VERTEBRATE FAUNA SURVEY

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SINOSTEEL MIDWEST CORPORATION

BLUE HILLS PROJECT

LEVEL 1 VERTEBRATE FAUNA SURVEY

中钢澳洲中西矿业公司
SINOSTEEL MIDWEST CORPORATION LIMITED

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ecologia Environment
1025 Wellington Street
WEST PERTH WA 6005
Phone: 08 9322 1944
Fax: 08 9322 1599
Email: admin@ecologia.com.au

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ACRONYMS

BoM	Bureau of Meteorology
CAMBA	China-Australia Migratory Bird Agreement
DEC	Department of Environment and Conservation
DSEWPaC	Department of Sustainability, Environment, Water, Population and Community
DSO	Direct Shipping Ore
EIA	Environmental Impact Assessment
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
IBRA	Interim Biogeographic Regionalisation for Australia
JAMBA	Japan-Australian Migratory Bird Agreement
NHMRC	National Health and Medical Research Centre
SMC	Sinosteel Midwest Corporation
WC Act	*Wildlife Conservation Act 1950*

EXECUTIVE SUMMARY

Sinosteel Midwest Corporation's (SMC) Koolanooka / Blue Hills (Mungada) Direct Shipping Iron Ore (DSO) Project commenced operations in early 2010. The sites are located approximately 160 km south east of Geraldton. The Koolanooka site is located 20 km east of Morawa and the Mungada East and Mungada West mine sites are located 60 km to the east of Koolanooka. Changes to the Project are required, including expansion of the Mungada west and east pits, relocation of the processing facilities, and expansion of waste stockpiles and ore stockpiles.

SMC commissioned *ecologia* Environment to undertake a Level 1 survey of the vertebrate fauna of the Blue Hills Project as part of the environmental impact assessment for the project. The Level 1 survey consisted of a desktop review and field survey to determine fauna habitats within the proposed new impact areas (Project area). The aim of this study was to provide sufficient information to enable an assessment of the impact of the Project on the vertebrate fauna of the area.

The Project area falls within four separate vegetation associations (Shepherd *et al.* 2002), and five different land systems (Curry *et al.* 1994; Payne *et al.* 1998). There are no vegetation associations or land systems restricted, or largely confined, to the Project area. The Project area is in the Tallering sub-region within the Yalgoo IBRA bioregion (DEWHA 2004). Previous survey information, aerial photographs, vegetation and land systems maps of the Project area were studied prior to arriving on site to help determine the potential habitat types of the Project area. Pre-determined survey sites were visited within these areas and a habitat assessment was completed. A total of 17 sites were sampled in habitat representative of both within and outside of the impact area.

The potential fauna assemblage of the Project area was determined using the results of the survey, database searches and records of previous surveys within close proximity of the Project area. The potential species of the Project area consists of 19 native and seven introduced mammal species, 170 native and one introduced bird species, 55 reptile species and three amphibian species. During the current survey a total of five mammals (two native, three introduced), nine reptiles, 34 birds and one amphibian species was recorded.

The habitat assessment revealed four main fauna habitats within, or immediately adjacent to, the Project area - rocky ridge with steep slopes, low slopes with dense acacia shrubs, Eucalypt woodland plain with acacia shrubs, and alluvial plain.

Based on literature review and database searches, a total of one mammal, 17 birds and two reptiles of conservation significance could potentially occur in the Project area. A total of eight species have been assessed as having a high to medium likelihood of occurrence within the Project area:

- Malleefowl (*Leipoa ocellata*); EPBC Act Vulnerable, EPBC Act Migratory, WC Act Schedule 1,
- Peregrine Falcon (*Falco peregrinus*); WC Act Schedule 4,
- Major Mitchell's Cockatoo (*Lophochroa leadbeateri*); WC Act Schedule 4,
- White-browed Babbler (Western Wheatbelt subspecies) (*Pomatostomus superciliosus ashbyi*); DEC Priority 4,
- Crested Bellbird (southern subspecies) (*Oreoica gutturalis gutturalis*); DEC Priority 4 and
- Rainbow Bee-eater (*Merops ornatus*); EPBC Act Migratory
- Gilled Slender Blue-tongue (*Cyclodomorphus branchialis*); EPBC Act Vulnerable, WC Act Schedule 1 and

- Western Spiny-tailed Skink (*Egernia stokesii badia*); EPBC Act Endangered, WC Act Schedule 1)

Due to the data provided in the trapping survey by Bamford Consulting Ecologists (2004) within the Project area, and by Bamford Consulting Ecologists (2006) in close proximity to the Project area, baseline data for the Project area have been assessed initially as sufficient. However, the confirmed presence of conservation significant species within the Project area by previous surveys and/or the high likelihood based on the habitat assessment suggests that a targeted conservation significant fauna survey is required.

1 INTRODUCTION

1.1 PROJECT OVERVIEW

Sinosteel Midwest Corporation's (SMC) Koolanooka / Blue Hills (Mungada) Direct Shipping Iron Ore (DSO) Project commenced operations in early 2010. The Koolanooka mine site is located approximately 160 km south east of Geraldton and 20 km east of Morawa, and the Mungada East and Mungada West mine sites are located 60 km to the east of Koolanooka (Figure 1.1). The project involves the mining, crushing, screening and transport of iron ore from three existing pits in the Koolanooka and Blue Hills region, to the Geraldton Port. Changes to the Project include expansion of the Mungada west and east pits, relocation of the processing facilities, relocation and expansion of waste stockpiles and ore stockpiles.

As a result of changes to the project, SMC commissioned *ecologia* Environment (*ecologia*) to undertake a Level 1 survey of the vertebrate fauna of the expansion of Mungada East and West. The Level 1 survey consisted of a desktop review and field survey to determine fauna habitats within the proposed new impact areas. This report includes an evaluation of the potential impacts on the vertebrate fauna species and habitats of the Project area and the identification of impacts that may significantly affect species, particularly those of conservation significance.

1.2 SURVEY OBJECTIVES

The primary objective of the Level 1 survey is to provide the EPA with more accurate reference data on the diversity of vertebrate species and their habitats both inside and outside the proposed impact area, complementing previous survey work conducted for the Project.

The EPA's objectives with regards to fauna management are to:

- maintain the abundance, species diversity and geographical distribution of terrestrial fauna; and
- protect Specially Protected (Threatened) fauna, consistent with the provisions of the *Wildlife Conservation Act 1950* (WC Act).

Hence, the primary objective of this study was to provide sufficient information for the EPA to assess the impact of the Project on the vertebrate fauna of the area, thereby informing assessment against these objectives.

This report satisfies the requirements documented in *Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA 2010), Guidance Statement No. 56 (EPA 2004) and Position Statement No. 3 (EPA 2002), by providing:

- a review of background information (including literature and database searches) to determine the potential fauna assemblage;
- an inventory of species of biological and conservation significance recorded or likely to occur within the Project area and surrounds;
- a description of fauna habitats occurring in the Project area;
- a description of the characteristics of the faunal assemblage;
- an appraisal of the current knowledge base for the area, including a review of previous surveys conducted in the area that are relevant to the current study; and
- a review of regional and biogeographical significance, including the conservation status of species recorded in the Project area.

1.3 LEGISLATIVE FRAMEWORK

The *Environmental Protection Act 1986* is "an Act to provide for an Environmental Protection Authority, for the prevention, control and abatement of environmental pollution, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing." Section 4a of this Act outlines five principles that are required to be addressed to ensure that the objectives of the Act are addressed. Three of these principles are relevant to native fauna and flora:

- *The Precautionary Principle*

  Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

- *The Principles of Intergenerational Equity*

  The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

- *The Principle of the Conservation of Biological Diversity and Ecological Integrity*

  Conservation of biological diversity and ecological integrity should be a fundamental consideration.

In addition to these principles, projects undertaken as part of the Environmental Impact Assessment (EIA) process are required to address guidelines produced by the Environmental Protection Authority (EPA), in this case Guidance Statement No. 56: *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004), principles outlined in EPA Position Statement No. 3: *Terrestrial Biological Surveys as an Element of Biodiversity Protection* (EPA 2002) and the *Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA 2010).

Native flora and fauna in Western Australia that are formally recognised as rare, threatened with extinction, or as having high conservation value are protected at a federal level under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and at a state level under the *Wildlife Conservation Act 1950* (WC Act). International agreements include the Japan-Australian Migratory Bird Agreement (JAMBA) and the China-Australia Migratory Bird Agreement (CAMBA).

The EPBC Act was developed to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance, to promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources, and to promote the conservation of biodiversity. The EPBC Act includes provisions to protect native species (and in particular to prevent the extinction and promote the recovery of threatened species) and to ensure the conservation of migratory species. In addition to the principles outlined in Section 4a of the EPBC Act, Section 3a of the EPBC Act includes a principle of ecologically sustainable development dictating that decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations. Schedule 1 of the EPBC Act contains a list of species that are considered Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable and Conservation Dependent. Definitions of categories relevant to fauna occurring or potentially occurring in the project area are provided in Appendix A.

The WC Act was developed to provide for the conservation and protection of wildlife in Western Australia. Under Section 14 of this Act, all flora and fauna within Western Australia is protected; however, the Minister may, via a notice published in the *Government Gazette*, declare a list of fauna identified as rare, likely to become extinct, or otherwise in need of special protection (Appendix A). The current listing was gazetted in August 2010.

In addition, the Department of Environment and Conservation (DEC) maintains a Threatened Fauna and Priority Fauna list. Threatened fauna that is listed as Schedule 1 under the WC Act are further ranked by the DEC according to their level of threat using IUCN Red List criteria. Species can be listed as Critically Endangered (CR), Endangered (EN) and Vulnerable (VU). Species that have not yet been adequately surveyed to be listed under Schedule 1 or 2 are listed as Priorities 1, 2 or 3, which are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna. Species that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Conservation Dependent species are placed in Priority 5. The three Threatened Fauna codes and five Priority codes are summarised in (Appendix A).

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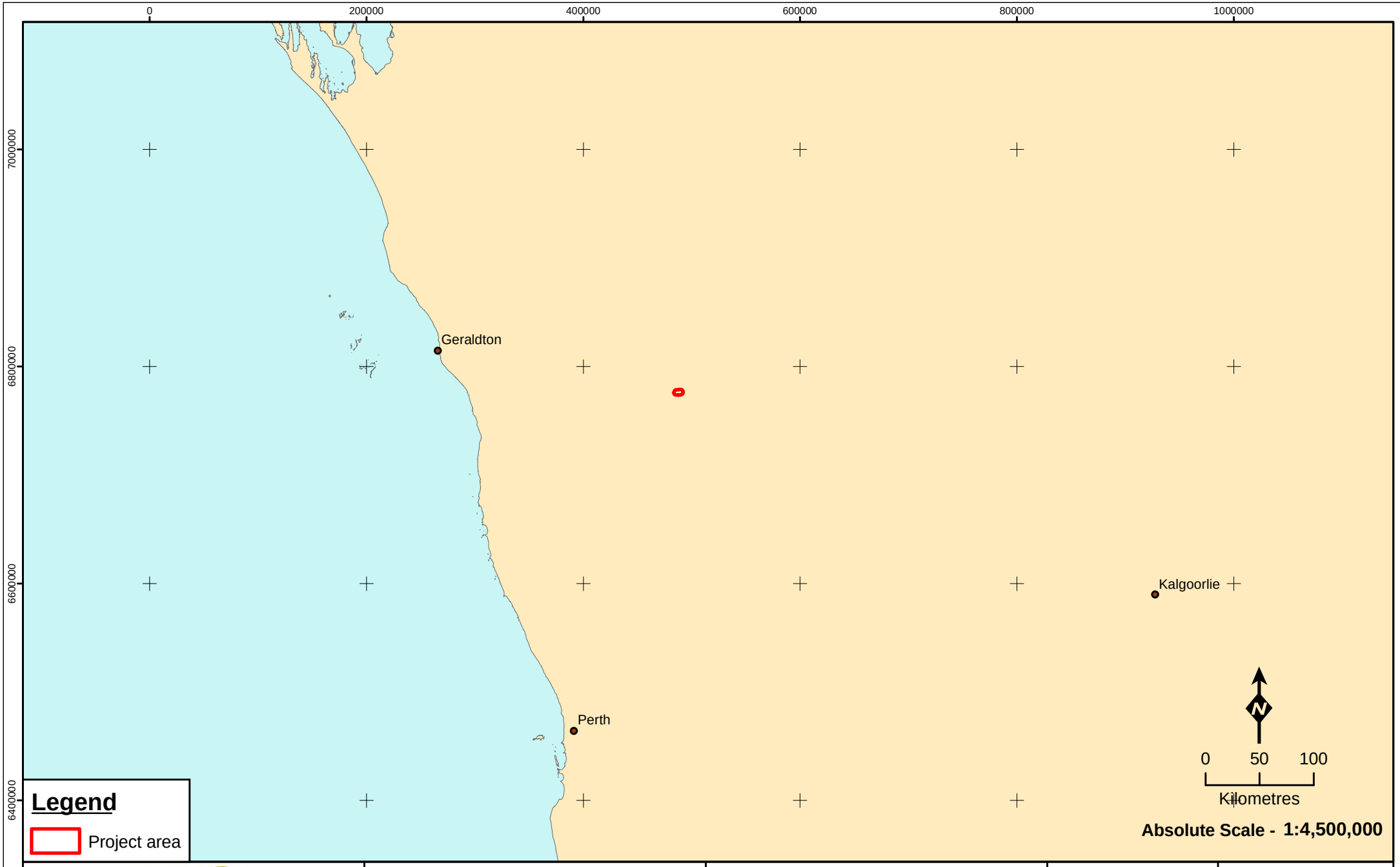

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Location Map of Project area

Figure: 1.1
Project ID: 1369

Drawn: BG
Date: 28/6/11

Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

Unique Map ID: BG185

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2 BIOPHYSICAL ENVIRONMENT

2.1 CLIMATE

The closest Bureau of Meteorology (BoM) weather reading station is at Morawa, approximately 80 km west of the Blue Hills Project area. The local climate is semi-arid to Mediterranean, characterised by dry, hot summers and mild to wet winters. Figure 2.1 displays climate averages for Morawa. The climate is influenced by a band of high pressure known as the sub tropical ridge, which occasionally moves close enough to allow cold fronts to pass over the area, bringing little, if any rain. The reliable rainfall periods are between the months of May and July, with June being the wettest with an average of 59.5 mm rainfall. Over an average of 50 rainfall days, the mean annual rainfall at Morawa is 332.4 mm (BoM, 2011).

December to February is the hottest period of the year, with an average maximum temperature of 36.7°C experienced in January (Table 2.1). The coldest month is July, with an average minimum temperature of 6.2°C. Relative humidity in this area averages a maximum of 67% in June down to 32% in December.

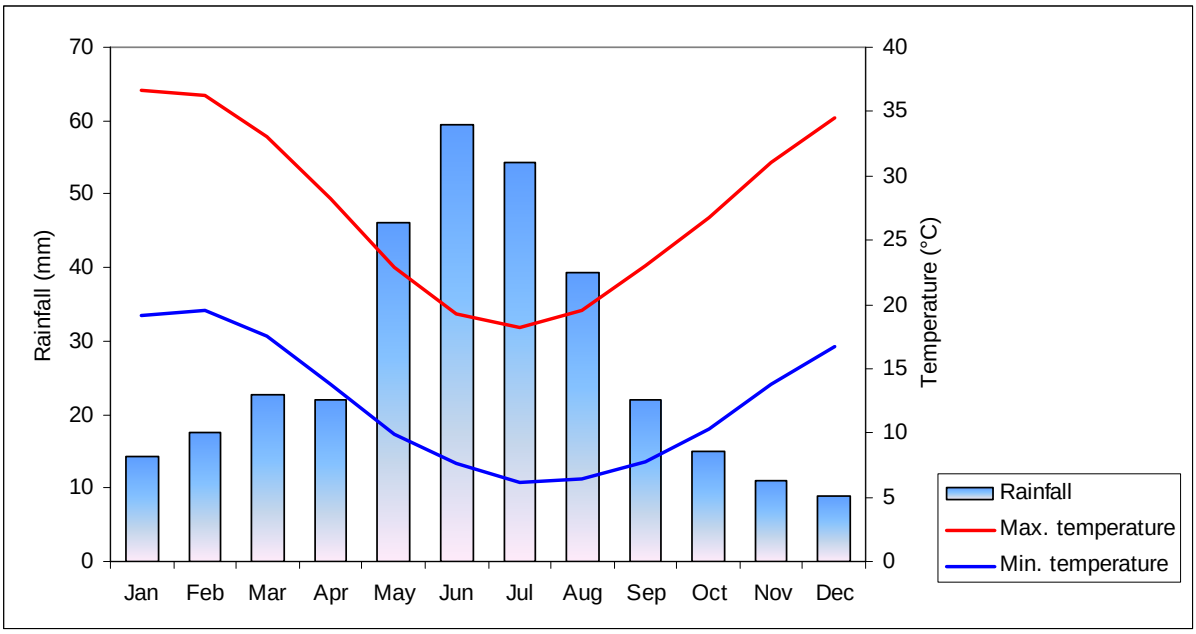


Figure 2.1 – Temperature and Rainfall for Morawa (BoM 2011)

Table 2.1 –Climate Statistics for Morawa (BoM 2011)

Morawa Weather station (008093)				Commenced: 1925				Last Record: 2005				
Latitude: 29.21°S				Longitude: 116.01°E				Elevation: 274 m				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean daily maximum temperature (°C) (1925-2005)												
36.7	36.2	33.1	28.2	22.9	19.3	18.2	19.5	23	26.7	31	34.5	27.4
Mean daily minimum temperature (°C) (1925-2005)												
19.1	19.5	17.5	13.8	9.9	7.6	6.2	6.4	7.8	10.3	13.8	16.7	12.4
Mean monthly rainfall (mm) (1925-2005)												
14.3	17.6	22.6	22	46.2	59.5	54.4	39.3	22	15.1	10.9	8.8	332.4
Mean number of rain days												
1.6	1.9	2.1	3.5	5.9	8.3	8.9	7.4	4.5	2.9	1.9	1.4	50.0
Mean 9am relative humidity (%)												
33	39	40	47	56	67	66	57	46	40	34	32	46
Mean 9am wind speed (km/h)												
14.1	14.8	13.0	11.0	8.3	7.6	7.2	8.3	10.1	13.1	13.6	13.5	11.2

Source: Bureau of Meteorology (August 2011)

2.2 BIOGEOGRAPHY

The Interim Biogeographic Regionalisation for Australia (IBRA v6.1) classifies the Australian continent into regions (bioregions) of similar geology, landform, vegetation, fauna and climate characteristics (Department of the Environment, Water, Heritage and the Arts (DEWHA 2004). The Project area is located in the Yalgoo (YAL) bioregion which is further divided into subregions, with the Project area located in the Tallering subregion (YAL2) (Figure 2.2).

The Tallering subregion is dominated by red sandy plains and sandy earth plains of the western Yilgarn Craton. The predominant land use in the Tallering subregion is grazing on native pastures (approximately 77%) (Payne *et al.* 1998). The Yalgoo bioregion is an interzone between the south-western bioregions and the Murchison bioregion (Desmond and Chant 2001). The Yalgoo bioregion represents the westernmost section of the pastoral land area.

The vegetation of the Yalgoo bioregion is characterised by red sandy plains, supporting low to open woodlands of Eucalyptus, Acacia and Callitris species (Desmond and Chant 2001). The vegetation of the earth to sandy-earth plains is *Acacia aneura, Callitris-Eucalyptus salubris* and *Acacia ramulosa* var. *ramulosa* and *Acacia ramulosa* var. *linophylla* open woodlands and scrubs. Ephemeral species are particularly abundant in this bioregion.

2.3 LAND SYSTEMS

Land systems are described using the biophysical characteristics of geology, landforms, vegetation and soils (Curry *et al.* 1994; Payne *et al.* 1998). The Project area covers three land systems (Table 3.5).

Table 2.2 – Land Systems of the Project Area

Land System	Description	Total Area in WA (km^2)	Area within Project Area (km^2)	Percent of Total Land System (%)
Land type 1 – Hills and ranges with acacia shrublands				
Tallering	Prominent ridges and hills of banded ironstone, dolerite and sedimentary rocks supporting *bowgada* and other acacia shrublands.	329.49	0.663	<1%
Land type 29 - Sandy plains with acacia shrublands and wanderrie grasses				
Tealtoo	Level to gently undulating loamy plains with fine ironstone lag gravel supporting dense acacia shrublands.	693.43	0.008	<1%
Yowie	Sandy plains supporting shrublands of mulga and *bowgada* with patchy wanderrie grasses.	16208.59	0.497	<1%

2.4 VEGETATION

The Project area lies within two different Beard vegetation units (Beard 1976). The vegetation mapping of Beard and Hopkins throughout Western Australia was subsequently digitised and reinterpreted to reflect the National Vegetation Information Systems standards (Shepherd *et al.* 2002). The two Shepherd vegetation associations located within the Project area (Figure 2.4) are:

- 358: Shrublands; bowgada & *Acacia quadrimarginea* on stony ridges; and,
- 355: Shrublands; bowgada & jam scrub with scattered York gum & red mallee.

The extent of these units within WA and the area within the Project area is detailed in Table 2.3.

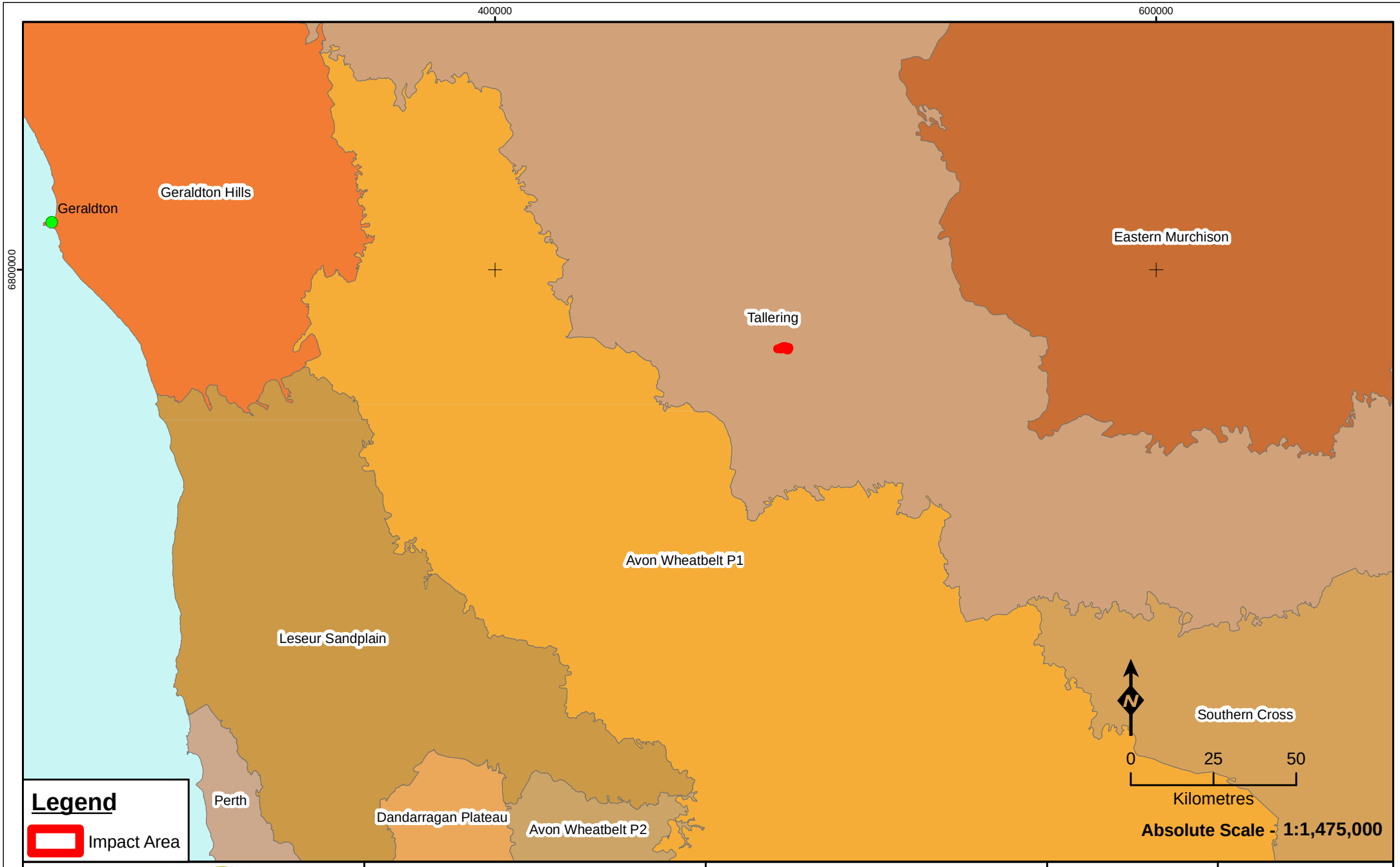
Table 2.3 – Vegetation Associations within the Project Area

Vegetation Association	Shepherd Vegetation Description	Equiv. Beard Unit	Current Extent in WA (ha)	% Pre-European Extent Remaining	% Total within Project Area
358	Shrublands; bowgada & *Acacia quadrimarginea* on stony ridges	a9,14Si	61, 680	90.9	0.15
355	Shrublands; bowgada & jam scrub with scattered York gum & red mallee	e6,22Lr a9,19Si	59522	83.6	0.05

A flora and vegetation survey was undertaken in 2007 (*ecologia* 2008) to assess and map the vegetation within the initial Blue Hills project area. A total of eight vegetation communities were described from within the Blue Hills project area. Each of the vegetation communities are described in Table 2.4.

Table 2.4 – Vegetation communities within the Project Area (*ecologia* 2008)

Vegetation Unit	Vegetation Description
Arr	Tall shrubland of *Acacia* species typically dominated by *Acacia ramulosa* subsp. *ramulosa* over a low open shrubland dominated by *Philotheca sericea* over an open herbland of annual daisies and/or bare ground
Aan	Tall open scrub of mixed Acacia species including *Acacia aneura* over a low open shrubland dominated by *Philotheca saricea* and a herbland with large areas of bare ground
ApCp	Tall open scrub of mixed species typically *Allocasuarina acutivalvis* subsp. *prinsepiana*, *Calycopeplus pauciflorus*, *Malaleuca nematophylla* and *Acacia* species over a very open herbland/grassland or BIF rocks
AaPo	Tall open scrubland of mixed species typically *Acacia assimilis* var. *assimilis* and *Melaleuca nematophylla* over a low open shrubland to open low heath of *Ptilotus obovatus* var. *obovatus* over a herbland of annual daisies
Deg	Degraded areas, mined previously
El	Tall shrubland of *Acacia ramulosa*, *Acacia burkittii*, *Melaleuca leiocarpa* and *Melaleuca uncinata* over a herbland of annual daisies and/or bare ground
Ew	Open shrub mallee of *Eucalyptus ewartiana* over a tall open scrub of *Acacia ramulosa* subsp. *ramulosa* over an open herbland of annual daisies and/or bare ground
Mu	Tall shrubland of *Acacia ramulosa*, *Acacia burkitii*, *Melaleuca leicarps* and *Melaleuca uncinata* over an open herbland of annual daisies, leaf litter and bare rocks



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Biogeograpgic Regions of the Impact area

Figure: 2.2
Project ID: 1369

Drawn: BG
Date: 28/6/11

Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

Unique Map ID: BG185

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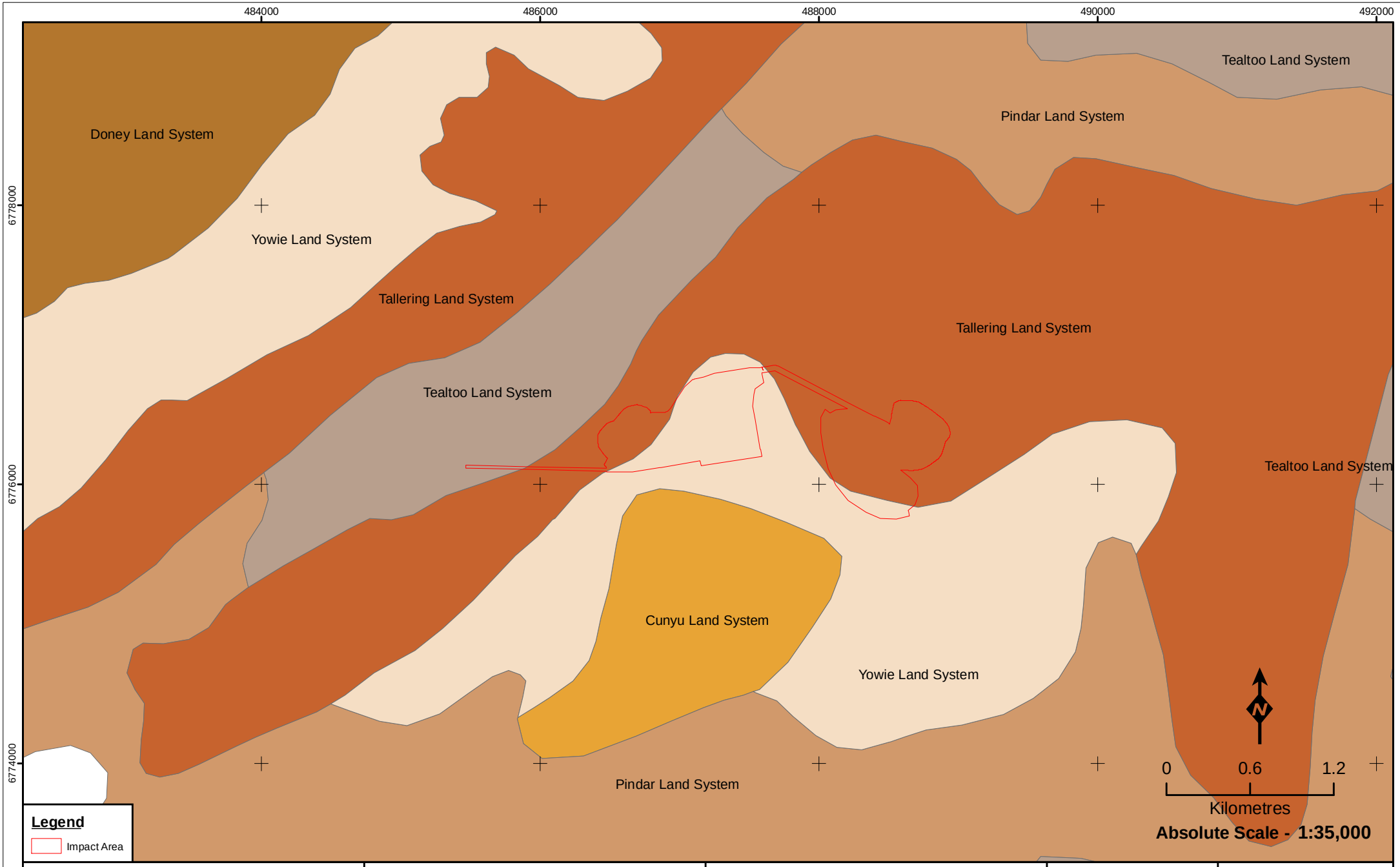

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Land Systems of the Impact area

Figure: 2.3
Project ID: 1369

Drawn: NT
Date: 24/11/11

Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

Unique Map ID: NT

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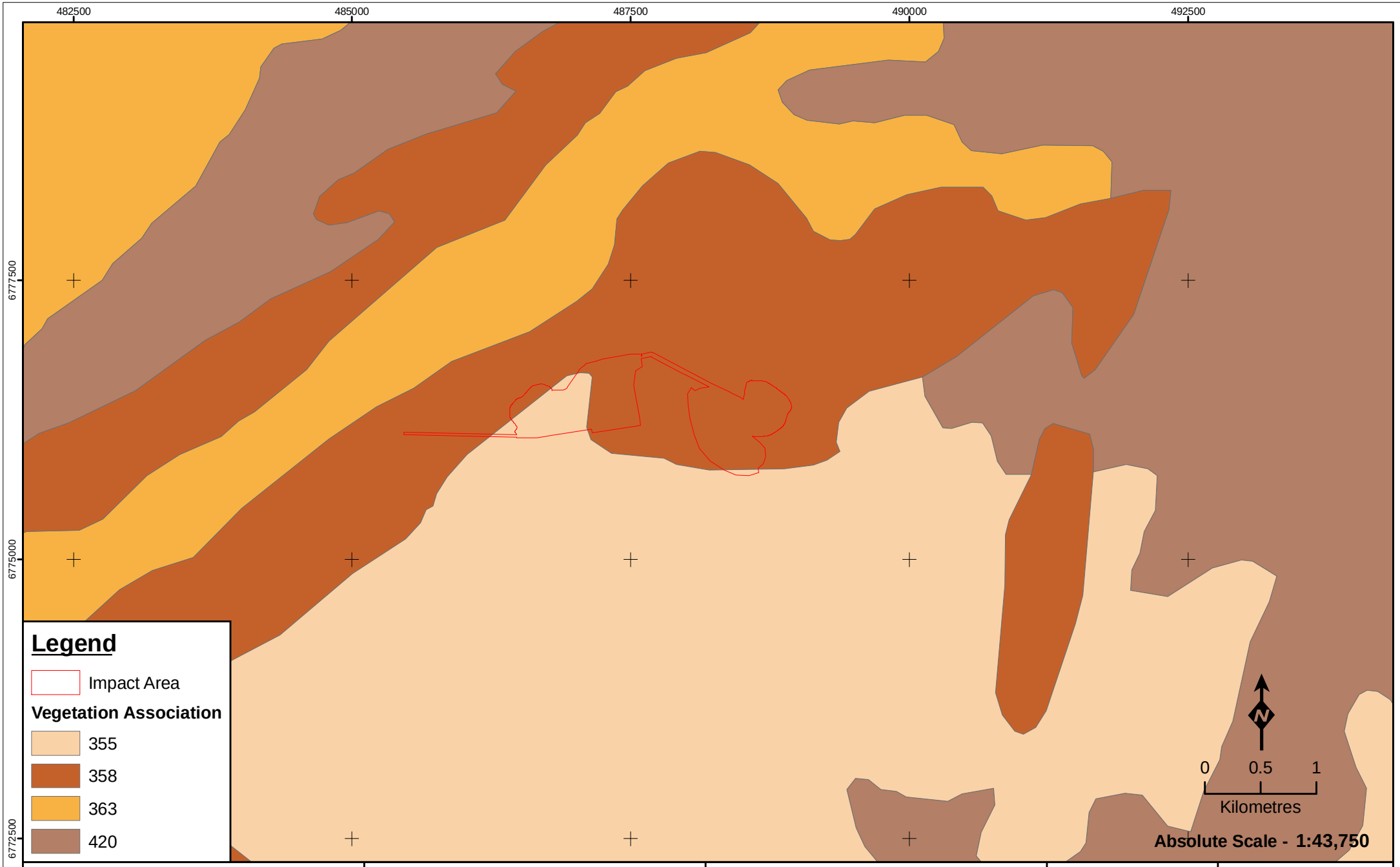

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Vegetation Associations of the Project area

Figure: 2.4
Project ID: 1369

Drawn: ND
Date: 02/12/11

Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

Unique Map ID: ND066

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3 METHODS

3.1 LITERATURE REVIEW AND DATABASE SEARCHES

Five databases were consulted in the preparation of potential fauna (and conservation significant fauna) lists (Table 3.1). In addition, four publications reporting on vertebrate fauna surveys conducted within 65 km of the Project area were consulted (Table 3.2). The results of all database searches and previous surveys are presented in Appendix B.

Table 3.1 – Fauna Databases Searched to Determine the Potential Vertebrate Fauna

Database	Search Details
Department of Environment and Conservation (DEC) Threatened Fauna Database	Records within 50 km of the Project area
DEC NatureMap	Records within 40 km of the Project area
Birds Australia Birdata	Records within 1 degree square of the Project area
Department of Sustainability, Environment, Water, Population and Community (DSEWPaC) protected matters database	Records within 10 km of the Project area

Table 3.2 – Previous Biological Survey Reports within 100 km of the Project Area

Survey Location and Author(s)	Distance to Project Area (km)	Comments
ecologia internal database.	0-65	Three Level one surveys completed.
Blue Hills (Bamford and Wilcox 2004).	0	Single phase Level 2 survey (conducted in February 2004) with five trap sites open for five nights.
Karara and Mungada (Bamford Consulting Ecologists 2006).	0-8	Level 2 survey with three phases (conducted in April, August and October 2006), various trap arrangements open for five nights on each phase.
Koolanooka (ATA Environmental 2004).	65	Single phase Level 2 (conducted in December 2003) survey with seven trap sites open for eight to six nights.
Koolanooka (Tingay and Associates 1996).	65	Single phase Level 2 survey (conducted in June 1996) with 11 sites, only three of which with pitfall traps, open for four to five nights.

3.1.1 Taxonomy and Nomenclature

Nomenclature for mammals, reptiles and amphibians within this report is as per *Western Australian Museum Checklist of the Vertebrates of Western Australia*, birds according to Christidis and Boles (2008). References used for fauna identification are listed in Table 3.3.

Table 3.3 – References used for Identification

Fauna Group	Field Guide
Mammals	Menkhorst and Knight (2009), Van Dyck and Strahan (2008)
Bats	Churchill (1998), Menkhorst and Knight (2009)
Birds	Simpson and Day (2004)
Reptiles	Cogger (2000), Wilson and Swan (2008)
Geckos	Storr et al. (1990), Wilson and Swan (2008)
Skinks	Storr et al. (1999), Wilson and Swan (2008)
Dragons	Storr et al. (1983), Wilson and Swan (2008)
Varanids	Storr et al. (1983), Wilson and Swan (2008)
Legless Lizards	Storr et al. (1990), Wilson and Swan (2008)
Snakes	Storr et al. (2002), Wilson and Swan (2008)
Amphibians	Tyler and Doughty (2009), Cogger (2000)

3.1.2 Conservation Significant Fauna

Following the compilation of results of the literature review, database searches and previous surveys, fauna species that are listed under current legislative frameworks were identified. Three conservation lists have been developed at national (EPBC Act) and state level (WC Act and DEC priority list).

The likelihood of a conservation significant species being present within the project was determined by examining the following:

- fauna habitats and their condition known to exist within the survey area;
- distance between the survey area and locations where conservation significant species were recorded previously ;
- frequency of occurrence of conservation significant species records in the region; and
- time passed since conservation significant species were recorded within, or surrounding, the survey area.

For each conservation significant species potentially occurring in the survey area, the examined factors were collated, and assigned to their corresponding category (Table 3.4).

Table 3.4 – Likelihood of Occurrence Categories

HIGH	Species recorded within, or in proximity to, the Project area within 50 yrs; suitable habitat occurs
MEDIUM	Species recorded outside Project area, but within 100 km; limited suitable habitat occurs
LOW	Species rarely, or not recorded, within 100 km, and/or suitable habitat does not occur

3.2 DETERMINATION OF SURVEY SAMPLING DESIGN AND INTENSITY

Prior to the development of survey methods, a review was undertaken of factors likely to influence survey design and intensity (Table 3.5). Based on this review, it was determined that a Level 1 survey of the Project area, incorporating a desktop assessment and reconnaissance field survey to determine fauna habitats, was suitable.

Table 3.5 – Factors Likely to Influence Survey Design

Factor	Relevance
Bioregion – level of existing survey-knowledge of the region and associated ability to predict accurately.	Previous surveying and reports available include three Level 2 surveys and four Level 1 surveys within 65 km of Project area.
Landform special characteristics/specific fauna/specific context of the landform characteristics and their distribution and rarity in the region.	Landforms typical of the Tallering sub-region.
Lifeforms, life cycles, types of assemblages and seasonality (e.g. migration) of species likely to be present.	Seasonality not applicable to Level 1 survey completed.
Level of existing knowledge and results of previous regional sampling (e.g. species accumulation curves, species/area curves).	Previous surveys and reports suggest adequate baseline data available for region.
Number of different habitats or degree of similarity between habitats within a survey area.	Four separate habitats identified within Project area, none of which are unique to the Project area and all are adequately represented in the surrounding region.
Climatic constraints (e.g. temperature or rainfall that preclude certain sampling methods).	Climatic constraints not applicable to Level 1 survey.
Sensitivity of the environment to the proposed activities.	Habitats within Project area continue outside and in regional area.
Size, shape and location of the proposed activities.	Project area is relatively small with only 1.1km^2 proposed as impact areas.
Scale and impact of the proposal.	Only a small extension to previously mined and disturbed areas.

3.3 SURVEY TIMING

Level 1 fauna assessments are based on habitat assessments and are not affected by climatic factors, as such they can be conducted at anytime of the year. The field survey was conducted in winter between the 4th to 6th July 2011.

3.4 SITE SELECTION

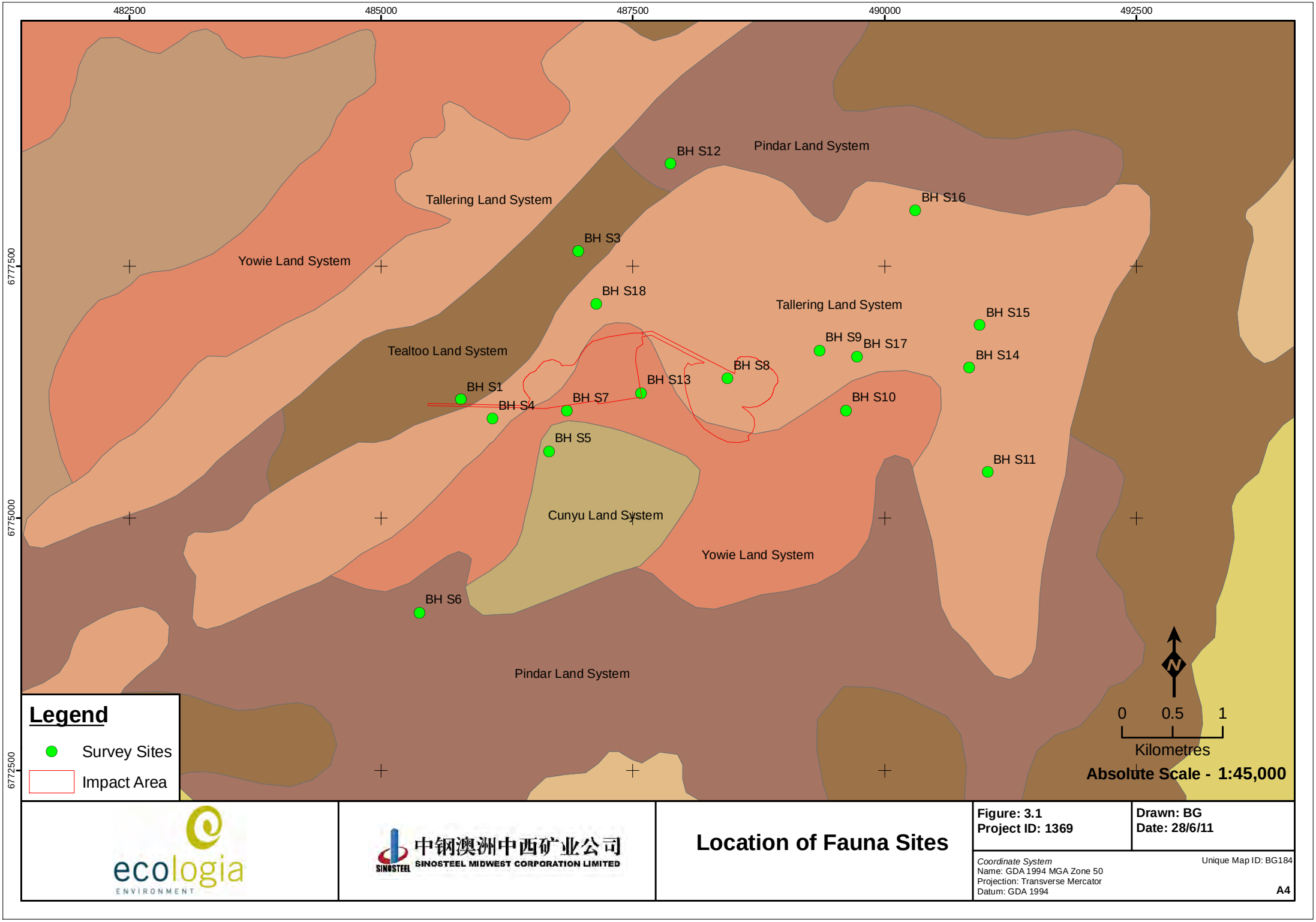
Previous survey information, aerial photographs, vegetation and land system maps of the Project area were studied prior to the survey to determine the potential habitat types of the Project area. Pre-determined survey sites were visited on site within these areas, and a habitat assessment completed. Survey sites were selected so that representative sites existed both within and outside of the impact area.

Survey site waypoints are listed in Table 3.6 and displayed in Figure 3.1. A total of 17 sites were sampled. Pre-determined survey site BH S2 was not sampled due to access constraints.

Table 3.6 – Survey Site Waypoints

Site	Location		Land System
	Easting	Northing	
BH S1	485794	6776181	Tealtoo
BH S3	486962	6777651	Tealtoo
BH S4	486111	6775991	Tallering
BH S5	486671	6775668	Cunyu
BH S6	485382	6774067	Pindar
BH S7	486845	6776071	Yowie
BH S8	488442	6776391	Tallering
BH S9	489357	6776668	Tallering
BH S10	489618	6776075	Yowie
BH S11	491025	6775460	Tallering
BH S12	487878	6778517	Pindar
BH S13	487583	6776246	Yowie
BH S14	490844	6776492	Tallering
BH S15	490947	6776917	Tallering
BH S16	490307	6778058	Tallering
BH S17	489729	6776605	Tallering
BH S18	487137	6777129	Tallering

Datum:WGS 84
Zone: 50



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Location of Fauna Sites

Figure: 3.1
Project ID: 1369

Drawn: BG
Date: 28/6/11

Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

Unique Map ID: BG184

A4

3.5 SURVEY METHODS

The survey methods adopted by *ecologia* are aligned with the EPA's Guidance Statement No. 56 (EPA 2004), Position Statement No. 3 (EPA 2002) and *Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA 2010).

The survey was undertaken using the methods described below.

3.5.1 Fauna Habitat Assessment

The field survey was conducted to ground truth the fauna habitats present in the Project area. There was a particular focus on the suitability of habitat for the potential conservation significant species identified in the desktop survey.

Fauna habitats were determined by assessing land system, vegetation and aerial maps and assessing the surrounding environment during the survey, including, but not limited to,vegetation structure and species composition, soil substrate, geology and landform features. The habitat assessment was conducted at each survey site.

3.5.2 Bird Surveying

Bird species were opportunistically recorded during the site and habitat assessments at each survey site, and through opportunistic encounters within the Project area.

3.5.3 Diurnal Searching

Each site was searched for vertebrate fauna species through active searches. This comprised of searching beneath the bark of dead trees, breaking open old logs, stumps and dead free-standing trees, investigating burrows and over-turning logs and stones. Searches of habitats favoured by identified conservation significant species was the focus of each active search, however all vertebrate fauna species encountered were recorded.

3.6 SURVEY TEAM

Field survey team members are listed in Table 3.7.

Table 3.7 – Field Survey Personnel.

Survey Member	Expertise	Qualification	Experience
B Greatwich	Ornithologist	BSc	4
J Vos	Herpetologist	-	5

4 RESULTS

4.1 SURVEY LIMITATIONS

Limitations of the current survey are summarised in Table 4.1 below. The survey was completed in accordance to the guidelines for a level 1 survey (EPA 2010) and no significant constraints were identified.

Table 4.1 – Summary of Survey Limitations.

Constraint	Relevant (yes/no)	Comment
Competency/ experience of the consultant carrying out the survey.	No	Field staff were experienced in identifying fauna of the local region and assessing habitat requirements.
Scope (what faunal groups were sampled and were some sampling methods not able to be employed because of constraints such as weather conditions).	No	All fauna groups were adequately surveyed in accordance to a Level 1 survey.
Sources of information (previously available information as distinct from new data).	No	One previous survey conducted within Project area with two additional surveys within 100 km. Databases consulted to provide additional regional data.
The proportion of the task achieved and further work which might be needed.	No	Level 1 survey and habitat assessment with literature review completed. Targeted conservation significant species survey within Project area recommended.
Timing/ weather/ season/ cycle.	No	Timing of Level 1 survey not relevant.
Disturbances which affected results of the survey (e.g. fire, flood, accidental human intervention).	No	No disturbances.
Intensity (in retrospect was the intensity adequate).	No	Survey intensity was adequate for a Level 1 survey.
Completeness (e.g. was relevant area fully surveyed).	No	All areas were properly surveyed.
Resources (e.g. degree of expertise available in animal identification to taxon level).	No	Field personnel were experienced in identifying fauna and all appropriate resources available.
Remoteness and/ or access problems.	No	All areas were accessed.
Availability of contextual (e.g. biogeographic) information on the region).	No	Surrounding surveys provide suitable information.
Efficacy of sampling methods (i.e. any groups not sampled by survey methods).	No	Survey methods were compliant with a Level 1 survey.

4.2 LITERATURE REVIEW AND DATABASE SEARCH

Based on the review of relevant literature, the species that could potentially occur in the Project area consisted of 19 native and seven introduced mammal species, 170 native and one introduced bird species, 55 reptile species and three amphibian species. The potential species list is shown in

Appendix B. A comparison of the number of species recorded during previous surveys (identified from the literature review) and the current survey is presented in Table 4.2.

Table 4.2 – Comparison of Results to Previous Fauna Surveys

Survey	Level of Survey	Mammals Native (Introduced)	Birds	Reptiles	Amphibians
Bamford 2004	Level 2 (1 Phase)	8 (4)	33	23	1
Bamford 2006	Level 2 (3 Phase)	12(6)	72	34	1
ATA 2004	Level 2 (1 Phase)	6 (5)	57	23	0
Tingay 1996	Level 2 (1 Phase)	7 (5)	51	9	1
ecologia internal database	Level 1	4 (4)	20	5	0
Naturemap		8	112	34	2
Birdata		-	121 (1)	-	-
This Survey	Level 1	2 (3)	34	9	1
Total Number of Fauna		**19 (7)**	**170 (1)**	**55**	**3**

4.3 SURVEY RESULTS

During the current survey, a total of five mammals (two native, three introduced), nine reptiles, 34 birds and one amphibian species were recorded (Table 4.3).

Table 4.3 – Fauna Species Recorded During the Current Survey

Species Name	Common Name
Mammals	
Tachyglossus aculeatus	Echidna
Macropus rufus	Red Kangaroo
**Felis catus*	Cat
**Oryctolagus cuniculus*	Rabbit
**Capra hircus*	Goat
Reptiles	
Strophurus strophurus	
Gehyra variegata	
Heteronotia binoei	Bynoe's Gecko
Delma australis	
Lerista gerrardii	
Lerista kingi	
Lerista nichollsi	
Neelaps bimaculatus	Black-naped Snake
Simoselaps bertholdi	Jan's Banded Snake
Birds	
Dromaius novaehollandiae	Emu
Leipoa ocellata	Malleefowl
Anas gracilis	Grey Teal
Phaps chalcoptera	Common Bronzewing
Aquila audax	Wedge-tailed Eagle
Falco berigora	Brown Falcon
Eolophus roseicapillus	Galah
Barnardius zonarius	Australian Ringneck
Psephotus varius	Mulga Parrot
Ptilonorhynchus guttatus	Western Bowerbird

Species Name	Common Name
Birds continued	
Malurus splendens	Splendid Fairy-wren
Pyrrholaemus brunneus	Redthroat
Smicrornis brevirostris	Weebill
Gerygone fusca	Western Gerygone
Acanthiza uropygialis	Chestnut-rumped Thornbill
Acanthiza apicalis	Inland Thornbill
Certhionyx variegatus	Pied Honeyeater
Lichenostomus virescens	Singing Honeyeater
Purnella albifrons	White-fronted Honeyeater
Manorina flavigula	Yellow-throated Miner
Acanthagenys rufogularis	Spiny-cheeked Honeyeater
Epthianura tricolor	Crimson Chat
Lichmera indistincta	Brown Honeyeater
Pomatostomus superciliosus	White-browed Babbler
Cinclosoma castaneothorax	Chestnut-breasted Quail-thrush
Pachycephala rufiventris	Rufous Whistler
Colluricincla harmonica	Grey Shrike-thrush
Oreoica gutturalis	Crested Bellbird
Rhipidura albiscapa	Grey Fantail
Corvus coronoides	Australian Raven
Corvus orru	Torresian Crow
Petroica goodenovii	Red-capped Robin
Hirundo neoxena	Welcome Swallow
Petrochelidon nigricans	Tree Martin
Amphibians	
Pseudophryne occidentalis	Western Toadlet

* Introduced species.

4.4 FAUNA HABITATS

The habitat assessment revealed four main fauna habitat types within, or immediately adjacent to, the Project area:

- Rocky ridge with steep slopes;
- Low slopes with dense acacia shrubs;
- Eucalypt woodland plain with acacia shrubs; and
- Alluvial plain.

The habitats of the Project area are described below, mapped in Figure 4.7, with area calculations of habitats within the Project area displayed in Table 4.4.

Table 4.4 – Fauna Habitat area Calculations of the Project area.

Habitat	Area in Project area (km^2)	% of Project area
Rocky ridge with steep slopes	0.25	22
Low slopes with dense acacia shrubs	0.41	35
Eucalypt woodland plain with patches of acacia shrubs	0.51	43
Alluvial plain	0	-

4.4.1 Rocky ridge with steep slopes

This habitat type is distinguished primarily by its landform features which differentiate it from habitats in the surrounding region (Figure 4.1). This habitat type is associated with the Tallering land system. Within the Project area, this habitat type is associated with the Mungada ridge landform feature and is characterised by an elevated rocky ridge top with steep rocky hill slopes running down to the plains of the surrounding landscape. The substrate of this habitat type consists of a continuous surface layer of banded ironstone consisting of numerous solid outcrops interspersed with lose rocky stones and pebbles (Figure 4.2). The vegetation is dominated by a dense shrub layer of small leaf Myrtaceae species, with sparse trees consisting of *Melaleuca* sp., *Acacia* spp. and *Eucalyptus* spp.

Figure 4.1 – Rocky Ridges and Steep Slopes Habitat Type

Figure 4.2 – Example of Rocky Outcrop Within Rocky Ridges and Steep Slopes Habitat Type

4.4.2 Low slopes with dense acacia shrubs

This habitat type is found in association with the rocky ridges and steep slopes habitat type, and is also restricted to the Tallering land system. Low slopes with dense acacia shrubs is determined as a separate habitat type due to the low sloping landform (generally at the foot slopes of the rocky ridges and steep slopes habitat type) and a dense shrub layer (Figure 4.3). The soil substrate in this habitat type typically ranges from continuous stony surface layers of lose pebbles to red loamy soils with few rocks. There is a distinct gradient with the substrate, with rocky areas on the higher slopes, moving downwards towards an almost exclusively loamy soil near the surrounding plains. Vegetation associated with this habitat type is dominated by dense *Acacia* spp. shrubs, typically growing to a maximum height of approximately 1.7 meters, with larger *Acacia* spp. trees scattered throughout.

Figure 4.3 – Low Slopes with Dense Acacia Shrubs

4.4.3 Eucalypt woodland plain with acacia shrubs

Eucalypt woodland plain with acacia shrubs is the dominant habitat type of the Project area (Figure 4.4). It is characterised by a flat plain landscape with stands of mature *Eucalyptus* spp. trees with

Acacia spp. shrubs and trees elsewhere. The land systems of Yowie, Pindar and Tealtoo are associated with this habitat type.

The Eucalypts provide an important feature to this habitat type and the surrounding landscape. Typically a small group of trees are found in close proximity to each other, resulting in abundant leaf and wood litter at the base of these trees (Figure 4.5). The leaf and wood litter provides important microhabitat for a number of species, particularly reptiles, while the many tree hollows provide important nesting areas for many bird species. Soil substrate typically consists of reddish clay loam, with few surface rocks.

Figure 4.4 – Eucalypt Woodland Plain with acacia Shrubs

Figure 4.5 – Example of Abundant Leaf Litter under Eucalypt trees in Eucalypt Woodland Plain with acacia Shrubs Habitat

4.4.4 Alluvial plain.

The alluvial plain habitat type occurs in a small area in the southern section of the Project area. It is associated with the Cunyu land system and consists of a low lying plain that appears to be regularly inundated with water during times of heavy rainfall (Figure 4.6). This habitat type consists of large areas of tussock grass, with scattered *Eucalyptus* spp. and *Melaleuca* spp. trees. The soil substrate

has a higher clay content, compared to the surrounding habitat types, which would aid in retaining surface water.

Figure 4.6 – Alluvial Plain

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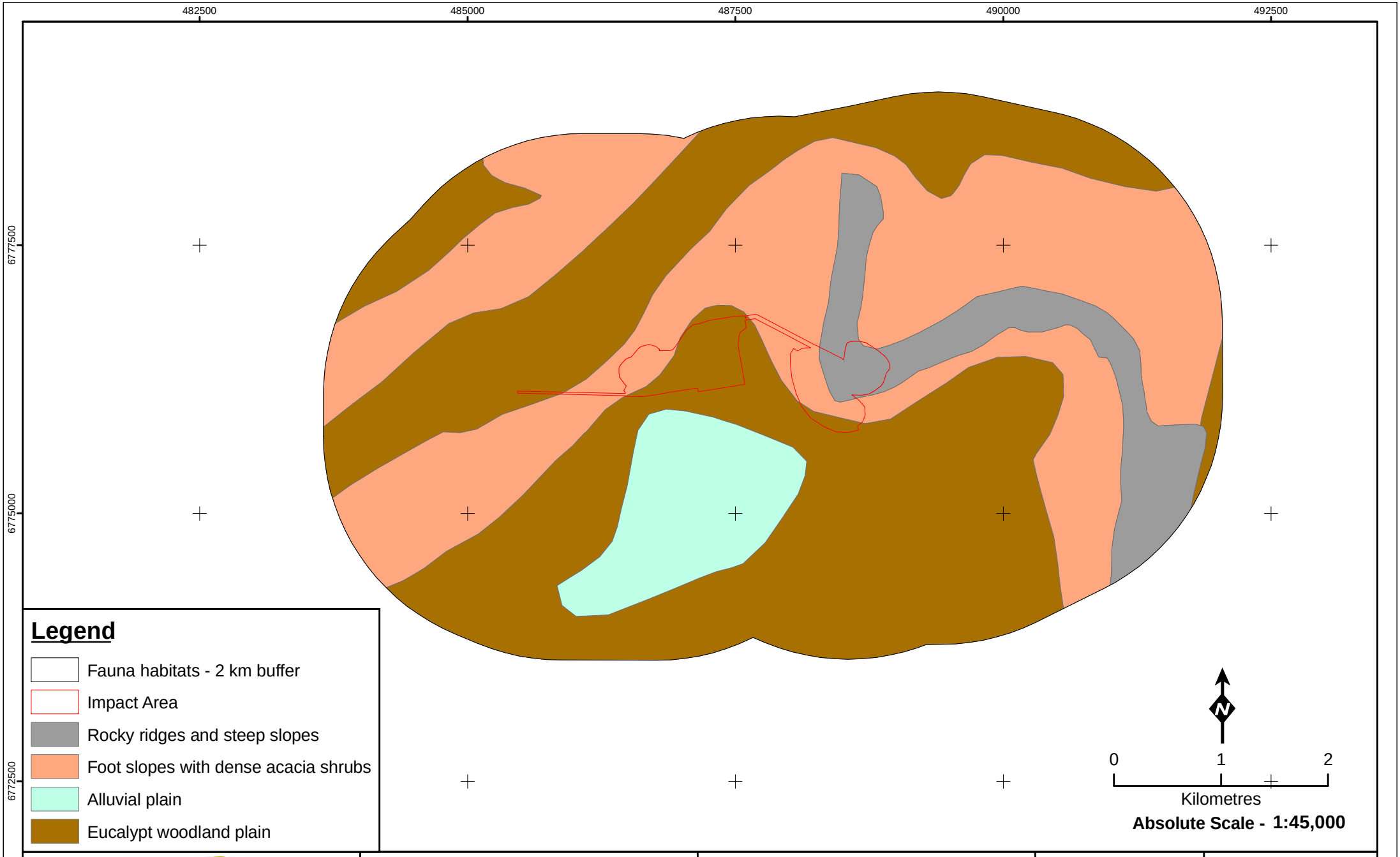

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Fauna Habitats of the Project area

Figure: 4.7
Project ID: 1369

Drawn: BG
Date: 26/08/11

Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

Unique Map ID: BG179

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4.5 CONSERVATION SIGNIFICANT FAUNA

Based on information from the literature review and database searches, a total of one mammal species, 17 bird species and two reptile species of conservation significance could potentially occur within the Project area. Of this total, six bird and two reptile species have been assessed as having a high to medium likelihood of occurrence within the Project area. The remaining twelve species have been assessed as having a low likelihood of occurrence within the Project area. All conservation significant species are summarised in Table 4.5, with species of medium to high likelihood of occurrence discussed in greater detail in Section 5.3.

Of the eight conservation significant species assessed, five species have been recorded within the Project area. The locations of these records are displayed in Figure 4.8 and Figure 4.9.

Table 4.5 – Conservation Significant Fauna Occurring or Potentially Occurring in the Project area

Species	Conservation Significance			Habitat	Previous Records	Likelihood of Occurrence	Regional Impacts
	EPBC Act	WC Act	DEC				
Mammals							
Western Brush Wallaby *Macropus irma*			P4	Dry sclerophyll forest and woodland, including some areas of mallee.	Single record (2006) from DEC threatened fauna database search. Approximately 37 km north of Project Area	**LOW** One relatively recent and nearby record. Suitable habitat present.	**LOW** Species can easily move away from disturbance areas to similar habitat outside Project area if present.
Birds							
Carnaby's Black-Cockatoo *Calyptorhynchus latirostris*	EN	S1	EN	Sandplain woodland, proteaceous scrub, heath, mallee.	Recorded from Birdata	**LOW** No specific records near Project area.	**LOW** If species does temporally occur within Project area, can easily avoid disturbance areas in to adjacent similar habitat.
Night Parrot *Pezoporus occidentalis*	EN, M	S1		Inland plains, breakaways, samphire around salt lakes.	Single record from 1961 from DEC threatened fauna database approximately 35 km south of Project area.	**LOW** Very few records of this cryptic species and unlikely to occur within Project area with absence of typical habitat.	**NONE**
Malleefowl *Leipoa ocellata*	VU, M	S1		Dry inland scrub, mallee	Two active mounds recorded in Project area on current survey with numerous mounds recorded on previous surveys (Bamford Consulting Ecologists 2006).	**HIGH** Species recorded and resident, breeding and active within Project area	**LOW** Due to the small size of the Project area, this species is not expected to be regionally impacted. Local impacts could occur, breeding individuals are present and all active mounds should be avoided.

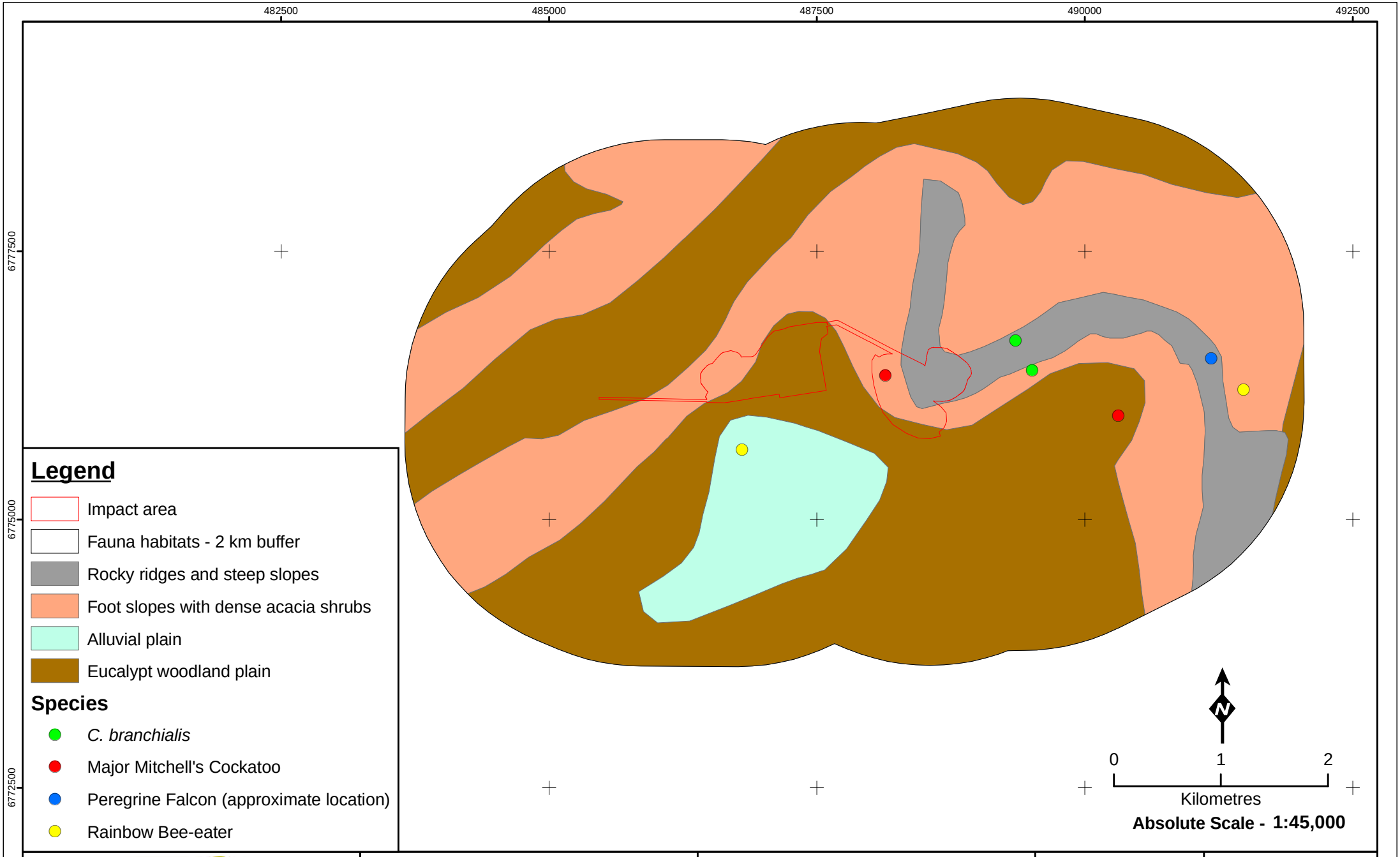
Species	Conservation Significance			Habitat	Previous Records	Likelihood of Occurrence	Regional Impacts
	EPBC Act	WC Act	DEC				
Australian Painted Snipe *Rostratula benghalensis australis*	VU, M	S1		Well vegetated shallows and margins of wetlands, dams, wet pastures and marshy areas.	Single record from NatureMap, approximately 40 km south of Project area, recorded in 1896.	**LOW** Single very old record, however some suitable habitat within alluvial plain areas. Project area far outside species normal distribution.	**NONE**
Slender-billed Thornbill *Acanthiza iredalei (iredalei)*	VU			Treeless or sparsely wooded flatlands, samphire near salt pans.	Recorded approximately 65 km away in 2004 (ATA Environmental 2004).	**LOW** Alluvial plain habitat unlikely to be suitable habitat for this species.	**NONE**
Rainbow Bee-eater *Merops ornatus*	M	S3		Open country, most vegetation types, dunes, banks.	Recorded within Impact area (Bamford and Wilcox 2004) and within Project area (Bamford Consulting Ecologists 2006).	**HIGH** Species recorded on two occasions within Project area.	**LOW** This widespread migratory species will move through the Project area, no suitable nesting habitat. No regional impacts to this species.
Fork-tailed Swift *Apus pacificus*	M	S3		Almost entirely aerial, particularly associated with storm fronts.	Recorded from Birdata and DSEWPaC database search.	**LOW** Widespread aerial species that may occasionally overfly the Project area but will not utilise it directly.	**NONE**
Eastern Great Egret *Ardea modesta*	M	S3		Floodwater, rivers, shallows of wetlands, intertidal mudflats.	Recorded from Birdata and DSEWPaC database search.	**LOW** Absence of typical wetland habitat and few local records. May occur in alluvial plain habitat if conditions are suitable.	**NONE**
Cattle Egret *Ardea ibis*	M	S3		Grassy habitats, shallow water bodies and wetlands.	Recorded from Birdata and DSEWPaC database search.	**LOW** Habitat within alluvial plain suitable, however no specific records within the region.	**NONE**

Species	Conservation Significance			Habitat	Previous Records	Likelihood of Occurrence	Regional Impacts
	EPBC Act	WC Act	DEC				
Peregrine Falcon *Falco peregrinus*		S4		Coastal cliffs, riverine gorges and wooded watercourses.	One individual recorded nesting in 2006 on Mungada ridge in Project area (Bamford Consulting Ecologists 2006).	**HIGH** Species recorded, although limited to one record.	**LOW** Widespread species which can relocate to similar habitat if disturbed.
Major Mitchell's Cockatoo *Lophochroa leadbeateri*		S4		Arid to semi-arid lightly wooded country near water and tall eucalypts.	Two individuals recorded by *ecologia* in 2010 and in large numbers in 2006 (Bamford Consulting Ecologists 2006).	**HIGH** Species recorded on multiple surveys and likely to breed in Eucalypt woodland habitat.	**LOW** Observed to likely be breeding in local area in 2006 (Bamford Consulting Ecologists 2006), breeding habitat (eucalypt woodlands) will not be significantly impacted. No regional impacts to this species are expected.
White-browed Babbler *Pomatostomus superciliosus asbyi*			P4^	Eucalypt woodlands, acacia shrublands.	Species recorded within Project area on current survey and previous surveys (Bamford and Wilcox 2004). However, subspecies is very difficult to discriminate.	**MEDIUM** Species present but not known if conservation significant sub-species, based on location of Project area outside the wheatbelt, unlikely to be conservation significant subspecies.	**LOW** Species is outside typical wheatbelt subspecies distribution. No regional impacts to this species.
Crested Bellbird *Oreoica gutturalis gutturalis*			P4*	Variety of habitats: acacia scrubs, eucalypt, casuarinas woodlands, saltbush and heath shrubland, Triodia grassland.	Recorded within Project area on current survey and on all previous surveys. However, subspecies is very difficult to discriminate.	**MEDIUM** Species present but not known if conservation significant sub-species, based on location of Project area outside the wheatbelt, unlikely to be conservation significant subspecies.	**LOW** Species is outside typical wheatbelt subspecies distribution. No regional impacts to this species.

Species	Conservation Significance			Habitat	Previous Records	Likelihood of Occurrence	Regional Impacts
	EPBC Act	WC Act	DEC				
Australian Bustard *Ardeotis australis*			P4	Open grasslands, plains, chenopod flats and low heathland.	Recorded from Naturemap and Birdata.	**LOW** Scattered records throughout region, suitable habitat, may very occasionally pass through Project area.	**NONE**
Bush Stone-curlew *Burhinus grallarius*			P4	Lightly wooded country next to daytime shelter of thickets or long grass.	Recorded from Birdata.	**LOW** Suitable habitat but no local records.	**NONE**
Hooded Plover *Thinornis rubricollis*			P4	Ocean beaches, coastal lakes and inland salt lakes.	Two records from 1999 from DEC threatened fauna database search and from Birdata. NatureMap record within 35 km of Project area.	**LOW** No suitable wetland habitat within Project area.	**NONE**
Rufous Fieldwren *Calamanthus campestris*			P4#	Heath and low shrublands (including halophytic vegetation) on sandplains and lateritic ridges.	Recorded from Birdata	**LOW** No specific records for this species with no typical habitat within Project area.	**NONE**
Reptiles							
Egernia stokesii badia	EN	S1		Occupies hollow timber logs in south west interior of WA.	Recorded in close vicinity from at least four locations with closest record within five kilometres (EPA 2009). 17 records from DEC threatened fauna database.	**HIGH** Species recorded close by and suitable habitat exists within Project area.	**LOW** Impact areas do not occupy a lot of suitable habitat for this species. If species is present local impacts possible although mitigation is possible.

Species	Conservation Significance			Habitat	Previous Records	Likelihood of Occurrence	Regional Impacts
	EPBC Act	WC Act	DEC				
Gilled Slender Blue-tongue *Cyclodomorphus branchialis*	VU	S1		Semi-arid shrublands on heavy red soils, locally on rocky ridges and slopes.	Recorded at two separate sites within impact zone (Bamford and Wilcox 2004) and at another site seven km from Project area (Bamford Consulting Ecologists 2006).	**HIGH** Species recorded.	**LOW** This species has few records and has a restricted distribution. Due to the small size of the Project area, no regional impacts are anticipated for this species. Impacts to local population may occur.

Note: Description of conservation significant codes provided in Appendix A.
^Only western wheatbelt subspecies (*Pomatostomus superciliosus ashbyi*) listed as P4.
*Only southern subspecies (*Oreoica gutturalis gutturalis*) listed as P4.



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Conservation Significant Fauna (excluding Malleefowl) Recorded

Figure: 4.8
Project ID: 1369

Drawn: BG
Date: 29/08/11

Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

Unique Map ID: BG181

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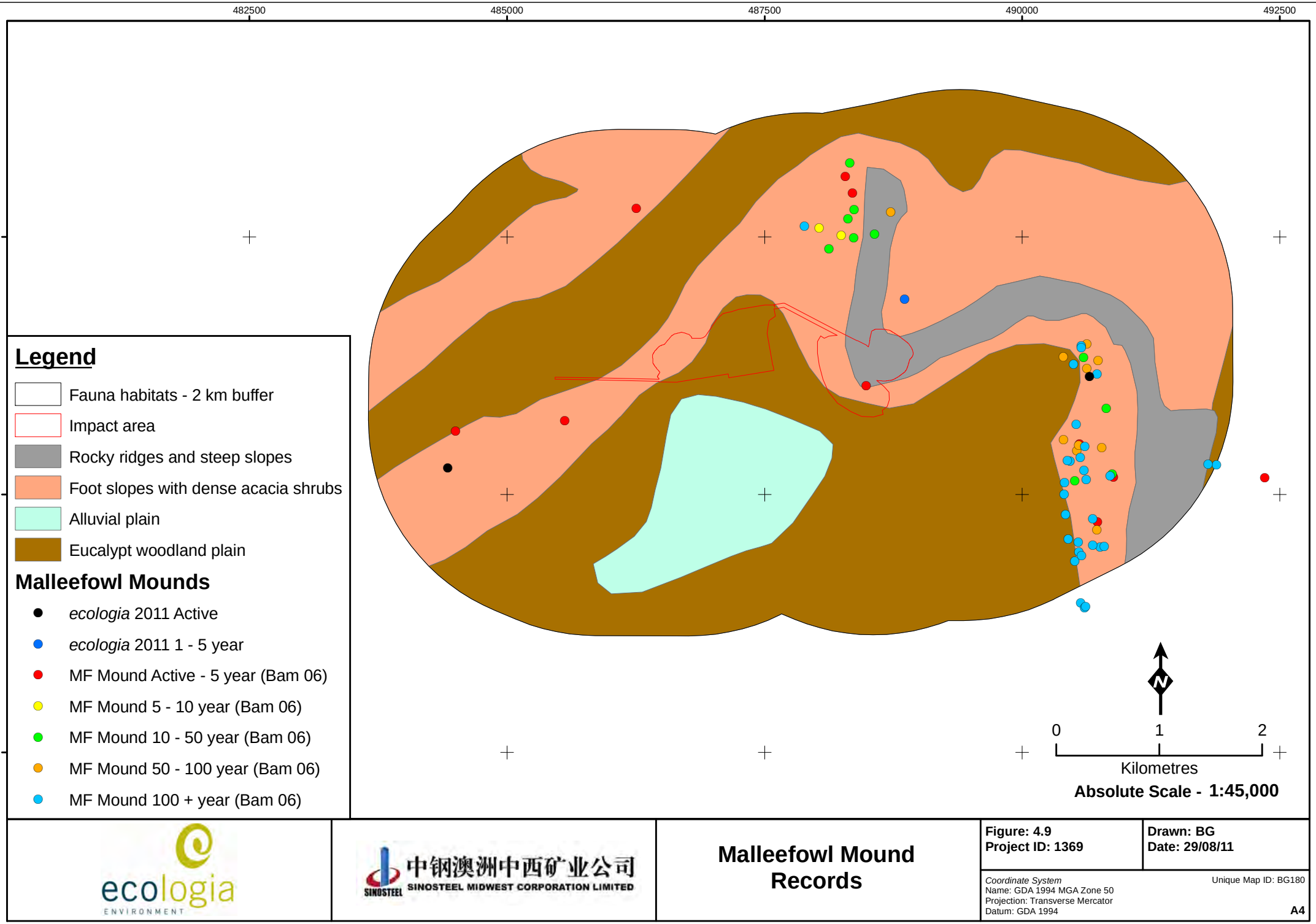

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Malleefowl Mound Records

Figure: 4.9
Project ID: 1369

Drawn: BG
Date: 29/08/11

Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

Unique Map ID: BG180

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5 DISCUSSION

5.1 LITERATURE REVIEW

The literature review has identified all potential species that could occur in the Project area. This consisted of 19 native and seven introduced mammal species, 170 native and one introduced bird species, 55 reptile species and three amphibian species (Appendix B). It is highly likely that the actual number of species occupying the Project area is considerably smaller than what has been identified in the literature review. This is primarily due to the Project area not containing suitable habitat for many species identified in the literature review.

5.1.1 Mammals

Nineteen native and seven introduced mammal species were identified from the literature review. Bats were the dominant group, with the potential of eight species occurring. The remaining mammal assemblage consisted of the Echidna (*Tachyglossus aculeatus*), three dasyurid species (carnivorous marsupials), the Common Brushtail Possum (*Trichosurus vulpecular*), four macropods (kangaroos), two murids (mice) and seven introduced species. The Western Brush Wallaby was the only potential conservation significant mammal species present. Five mammal species were recorded during the survey - two native species, the echidna and red kangaroo, and three introduced species, the cat, goat and European rabbit.

5.1.2 Birds

A total of 170 native and one introduced bird species had the potential to occur in the Project area. The dominant family of species thought to occur in the Project area was the Meliphagidae (honeyeaters and chats), of which there are potentially 19 species. Other dominant bird families include Acanthizidae (13 species), Artamidae (nine species), Accipitridae (10 species) and the waterbirds in Anatidae (11 species). A total of 30 waterbird species that occupy wetland habitats have been identified from the literature review. A number of these species were highly unlikely to occur within the Project area for the majority of time, however when conditions are suitable after heavy rainfall, areas of the Project area, particularly within the Alluvial plain habitat type, may provide suitable habitat for these species. One duck species (Grey Teal) was recorded during the current survey within the Project area in a small area of surface water. A total of 34 bird species were recorded during the current survey, which is a relatively high number, given the lack of survey effort in identifying bird species present. There were 16 bird species of conservation significance potentially occurring in the Project area.

5.1.3 Reptiles

A total of 55 reptile species had the potential to occur in the Project area. Skinks (Scincidae) were the dominant family with 19 potential species. The remaining reptile assemblage was made up of nine gecko species, two pygopods (legless lizards), seven dragons (Agamidae), five goannas (Varanidae), two blind snakes (Typhlopidae), two pythons (Boidae) and nine venomous snakes (Elapidae). Nine reptile species were recorded during the current survey, which - similarly to the bird species - was a relatively high number, given the lack of survey effort searching for reptile species. Included in the species recorded during the current survey was the Black-naped Snake (*Neelaps bimaculatus*). This was an interesting record as this species had not been identified from the literature review as potentially occurring in the area. There were two reptile species of conservation significance potentially occurring in the Project area (Western spiny-tailed Skink and Gilled Slender Blue-tongue).

5.1.4 Amphibians

Three amphibian species have been identified as potentially occurring in the Project area, the water-holding frog, centralian trilling frog and western toadlet. These species belong to three separate families, Hylidae, Limnodynastidae and Myobatrachidae, respectively. One species, the Western Toadlet (*Pseudophryne occidentalis*) was recorded at a number of locations in small pools of water within the Project area.

5.2 FAUNA HABITATS

The habitats of the Project area were typical of the surrounding region, with no unique fauna habitats restricted to the Project area. The dominant habitats of the Project area were the low slopes with dense acacia shrubs and Eucalypt woodland plain with acacia shrubs habitat types. The low slopes with dense acacia shrubs habitat type was specifically restricted to the Tallering land system. Rocky ridge with steep slopes habitat type was also restricted to the Tallering land system, however due to the landform feature of the steep rocky ridge, it was distinctly different to the low slopes with dense acacia shrubs habitat type surrounding it. Eucalypt woodland plain with acacia shrubs habitat type was determined in association with Yowie, Pindar and Tealtoo land systems. The fourth habitat type, alluvial plain, was in association with the Cunyu land system.

5.3 CONSERVATION SIGNIFICANT FAUNA POTENTIALLY OCCURRING IN PROJECT AREA

The eight conservation significant species assessed as having a medium or high likelihood of occurring in the Project area (Table 4.5) are described below with full species background information, their likelihood of occurrence and potential impacts.

5.3.1 Birds

5.3.1.1 Malleefowl (*Leipoa ocellata*)

Conservation Status: EPBC Act Vulnerable, EPBC Act Migratory, WC Act Schedule 1

Distribution and Habitat: Once common and widespread across semi-arid southern Australia, Malleefowl have declined severely in the last century, with a 20% decrease in abundance and 50% decrease in area of occupancy (Garnett and Crowley 2000; Benshemesh 2005). Their current distribution is highly fragmented, increasing the risk of extinction (Benshemesh 2005). Malleefowl prefer habitat consisting of thickets of mallee, mulga or other dense litter-forming shrublands as well as dry forest dominated by other eucalypts, mulga and other acacia species (Johnstone and Storr 1998; Benshemesh 2005). They require sandy substrate with leaf litter to build their nesting mounds (Frith 1976) and hence highest breeding densities appear to occur in vegetation that is at least 40 years post fire (Woinarski 1989; Benshemesh 1990; Benshemesh 1992).

Ecology: Malleefowl are large ground-dwelling birds, well known for constructing large mounds of soil and vegetation in which they incubate their eggs. They rarely breed in vegetation that has been burnt within the last 15 years (Tarr 1965; Crowley *et al.* 1969). Pairs occupy permanent territories (Benshemesh 2005).

The decline is mainly due to loss and fragmentation of habitat due to agricultural clearing, degradation of remnant patches by grazing and predation by foxes (Priddel and Wheeler 1989; Johnstone and Storr 1998; Garnett and Crowley 2000). In the arid zone, cessation of traditional burning practices, homogenisation of the once fine-scale burning mosaic and fires on a unprecedented scale seem to be primary causes of extinctions (Benshemesh 2005).

Likelihood of Occurrence: The Malleefowl has been recorded within the Project area. Records are restricted to the observations of active mounds, with no individuals sighted within the Project area.

Figure 4.9 displays all Malleefowl mound records from previous surveys in the Project area. In 2006 targeted Malleefowl mound transects were conducted in the areas of Mungada ridge (east of impact area) and Terapod (north of impact area) within the Project area (Bamford Consulting Ecologists 2006), which recorded numerous inactive, and eight active to five years old mounds (Figure 4.9). In the current survey, two active Malleefowl mounds were recorded within the Project area (Figure 4.9), a photo of one of the mounds is shown in Figure 5.1. These records indicate the Malleefowl is present and breeding within the Project area.

Figure 4.9 shows Malleefowl mound records are largely distributed over the lower slopes with dense acacia shrubs habitat type. The characteristics of this habitat type, with dense shrubs, abundant leaf and wood litter and suitable soil substrate result in Malleefowl mounds being concentrated in these areas. It appears that targeted surveys such as transects have not been completed within the impact area, where potential habitat exists for this species. As such, due to the many records in similar habitat close by, it can be expected potential active Malleefowl mounds are currently present within the impact area.

Potential Impacts: Due to the small size of the impact area, there are no regional impacts anticipated for the Malleefowl. It is anticipated there will be some local impacts to this species, particularly if breeding individuals are currently utilising habitat within the proposed impact area. Prior to any disturbance, targeted surveys should be conducted within impact areas to determine the presence of any active Malleefowl mounds. If active mounds are located, they should be avoided if possible, and if unavoidable, relocation or captive breeding of chicks within active mound should be completed.

Figure 5.1 – Active Malleefowl Mound Recorded during Current Survey within Project area

5.3.1.2 Peregrine Falcon (*Falco peregrinus*)

Conservation Status: WC Act Schedule 4

Distribution and Habitat: This nomadic or sedentary falcon is widespread in many parts of Australia and some of its continental islands, but absent from most deserts and the Nullarbor Plain. The species is considered to be moderately common in the Stirling Range, uncommon in the Kimberley, Hamersley and Darling Ranges, and rare or scarce elsewhere (Johnstone and Storr 1998). The Peregrine Falcon occurs most commonly near cliffs along coasts, rivers and ranges and around wooded watercourses and lakes.

Ecology: Peregrines feed almost entirely on birds, especially parrots and pigeons. Peregrines primarily nest on ledges on cliffs, granite outcrops and in quarries, but may also nest in tree hollows around wetlands. Eggs are predominantly laid in September (Johnstone and Storr 1998; Olsen *et al.* 2006).

Likelihood of Occurrence: One individual Peregrine Falcon has been recorded within the Project area, (Bamford Consulting Ecologists 2006) nesting on Mungada ridge, although the exact location of the record is unknown. Mungada ridge is part of the rocky ridge and steep slope habitat type of the Project area, and is typical nesting habitat for this species. All surrounding habitats would be utilised as hunting areas for this species, if they are present in the area.

Potential Impacts: No impacts for the Peregrine falcon are expected on a regional scale due to the small extent of the Project area, the ability of the Peregrine Falcon to move away from disturbance if present, and the presence of similar habitat in the surrounding region. Potentially if a breeding pair was disturbed within the impact area, there may be small, temporary, local impacts, however breeding individuals would be able to relocate to similar habitat close by.

5.3.1.3 Major Mitchell's Cockatoo (*Lophochroa leadbeateri*)

Conservation Status: WC Act Schedule 4

Distribution and Habitat: Major Mitchell's Cockatoos are common in the Great Australian Bight, but generally rare to uncommon in Western Australia. The species is widespread, but discontinuous in the arid and semi-arid zones of the state as far north as the Edgar Ranges in the Kimberley. It also occurs in the arid and semi-arid interior of eastern Australia. Preferred habitat is lightly wooded country near water and tall eucalypts, though it also occurs on beaches and coastal dunes.

Ecology: This large Cockatoo is easily recognisable by its orange-red erectile crest with a central yellow band. It feeds on split and germinating wheat seeds, the flower, roots and seeds of the doublegee (*Emex australis*), the flesh and seeds of melons, wild radish and turnip, the heads of native grasses, marri flowers and insect larvae (Johnstone and Storr 1998). It usually occurs in pairs or small flocks and nests in tree hollows (Morcombe 2000). Major Mitchell's Cockatoos feed on grass seeds, herbs, native figs, pinecones, eucalyptus seeds, insect larvae, nuts and flowers and in croplands of wheat and corn (Park 1995). Major Mitchell's Cockatoos are aggressively territorial and are usually found in pairs and small groups. To date, breeding has only been reported in the wheat belt, with females laying three clutches of two eggs between August and September. Both sexes incubate the eggs and brood the chicks (Johnstone and Storr 1998).

Likelihood of Occurrence: Major Mitchell's Cockatoo has been recorded within the Project and Impact area. In 2010 *ecologia* recorded two individuals perched in a Eucalypt tree, while in 2006 individuals and pairs were recorded daily during the survey near Mungada ridge (Bamford Consulting Ecologists 2006). The regular sightings of this species in 2006 suggested that this species was likely to be breeding in the Eucalypt woodland plain habitat type within the Project area (Bamford Consulting Ecologists 2006).

Potential Impacts: There are no regional impacts anticipated for Major Mitchell's Cockatoo. Areas of potential breeding habitat, such as stands of large Eucalypt trees with tree hollows within the Eucalypt plain habitat type of the Project area, should be avoided if possible to avoid any local impacts to this species.

5.3.1.4 White-browed Babbler (Western Wheatbelt subspecies) (*Pomatostomus superciliosus ashbyi*)

Conservation Status: DEC Priority 4

Distribution and Habitat: The Western Wheatbelt subspecies of the White browed Babbler occurs in eucalypt forests and woodlands in the south-west of Western Australia. The Action Plan for Australian Birds (Garnett and Crowley 2000) lists *Pomatostomus superciliosus ashbyi* as near threatened because over half the subspecies' habitat has been cleared. Clearance for agriculture has removed most of the habitat for the White-browed Babbler in the wheatbelt of Western Australia (Saunders and Ingram 1995). The subspecies persists with a much reduced area of occupancy in fragmented habitat within the wheatbelt and in continuous habitat that surrounds the wheatbelt (Blakers *et al.* 1984).

The Western Wheatbelt White-browed Babbler intergrades with *P. s. superciliosus* (the nominate subspecies) between Dongara-Geraldton (Garnett and Crowley 2000).

Ecology: The White-browed Babbler is a gregarious, dark brown noisy bird with down-curved bill and a prominent white eyebrow (Simpson and Day 2004). It forages on and near the ground for insects and seeds (Blakers *et al.* 1984; Saunders and Ingram 1995).

Likelihood of Occurrence: The White-browed Babbler has been regularly recorded within the Project area, including on the current survey and from DEC's threatened fauna database. Due to being included on DEC's threatened fauna database search and the inability of being able to identify the conservation significant subspecies from the nominate race, this species has a medium likelihood of occurrence. However the location of the Project area is much further east then the conservation significant subspecies restricted distribution.

Potential Impacts: There are no anticipated regional or local impacts to this species.

5.3.1.5 Crested Bellbird (southern subspecies) (*Oreoica gutturalis gutturalis*)

Conservation Status: DEC Priority 4

Distribution and Habitat: The southern subspecies of the Crested Bellbird occurs in the south-west of Western Australia to the south of the Nullarbor Plain. This subspecies has been eliminated from much of its former range as a result of vegetation clearing, and it seems sensitive to subsequent fragmentation (Garnett and Crowley 2000).

Ecology: Crested Bellbirds inhabit 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 (Blakers *et al.* 1984; Garnett and Crowley 2000).

Likelihood of Occurrence: The Crested Bellbird has been recorded on all previous surveys, database searches and on the current survey, within the Project area. The conservation significant subspecies is unable to be distinguished from the nominate race, and hence due to the many records within the Project area, is included as medium likelihood of occurrence within the Project area. However the distribution of the conservation significant subspecies is significantly south and west from the Project area.

Potential Impacts: There are no anticipated regional or local impacts to this species.

5.3.1.6 Rainbow Bee-eater (*Merops ornatus*)

Conservation Status: EPBC Act Migratory

Distribution and Habitat: The Rainbow Bee-eater is scarce to common throughout much of Western Australia, except for the arid interior, preferring lightly wooded, preferably sandy, country near water (Johnstone and Storr 1998).

Ecology: In Western Australia the Rainbow Bee-eater can occur as a resident, breeding visitor, post-nuptial nomad, passage migrant or winter visitor. It nests in burrows usually dug at a slight angle on

flat ground, sandy banks or cuttings, and often at the margins of roads or tracks (Simpson and Day 2004). Eggs are laid at the end of the metre long tunnel from August to January (Boland 2004). Bee-eaters are most susceptible to predation.

Likelihood of Occurrence: The Rainbow Bee-eater has been recorded twice within the Project area (Bamford and Wilcox 2004; Bamford Consulting Ecologists 2006) and from database searches. This species is likely to regularly occur within the Project area during its regular migrations through the area. It is unlikely to breed in the Project area, due to a lack of suitable breeding habitat in the form of sandy banks.

Potential Impacts: There are no anticipated regional or local impacts to this species. Any impacts will be restricted to a small loss in suitable foraging habitat for the Rainbow Bee-eater.

5.3.2 Reptiles

5.3.2.1 Gilled Slender Blue-tongue (*Cyclodomorphus branchialis*)

Conservation Status: EPBC Act Vulnerable, WC Act Schedule 1

Distribution and Habitat: The Gilled Slender Blue-tongue is known only from the semi-arid coast and inland of south-western Australia, between the Murchison River and Irwin River, east to about Yalgoo (Wells 2007). They inhabit semi-arid acacia woodlands and shrublands on heavy red soils in lateritic or limestone areas and dense heath on sandy soils (Wells 2007; Wilson and Swan 2008).

Ecology: The Gilled Slender Blue-tongue is a large skink with a base body colour consisting of different shades of brown with black and pale spots. It is predominantly crepuscular and nocturnal, sheltering during the day in spinifex, leaf litter and under fallen timber (Cogger 2000; Wells 2007). It feeds on a variety of arthropods and occasionally snails and small lizards, and gives birth to two or three live young during spring and early summer. The species is considered as vulnerable due to its limited distribution and specialised habitat requirement (Wells 2007).

Likelihood of Occurrence: The Gilled Slender Blue-tongue has been recorded within the Project area. Two individuals were trapped at separate locations in 2004 (Bamford and Wilcox 2004), both locations being within the Impact area (Figure 4.8). A further single individual has been recorded close by from Karara ridge, approximately nine kilometres from the Project area, in 2006 (Bamford Consulting Ecologists 2006). These three records have been restricted to the rocky ridges and steep slopes habitat type. This habitat type is not typically associated with this species, however it appears at least locally that this habitat type supports this species.

Potential Impacts: Due to the small size of the Project area, there are no anticipated regional impacts to this species. Local impacts to this species are anticipated, considering the species has been recorded within the impact area in the rocky ridges and steep slopes habitat type. This habitat type occupies a relatively small area within the surrounding region, and the local population and distribution of this species is unknown. Further surveying within the Project area is recommended for this species in order to determine the population and distribution of this species locally.

5.3.2.2 Western Spiny-tailed Skink (*Egernia stokesii badia*)

Conservation Status: EPBC Act Endangered, WC Act Schedule 1

Distribution and Habitat: The Western Spiny-tailed Skink belongs to the cunninghami group; a group of moderately large, diurnal, lizards (Chapple 2003). Hollow logs and semi arboreal habitats are used as sheltering sites. In *E. stokesii*, members of the same social group generally bask in close proximity and occasionally on top of each other (Duffield and Bull 2002).

This species has a patchy distribution throughout the dry to semiarid habitats of Western Australia (Storr *et al.* 1999). Occurring in York Gum (*Eucalyptus loxophleba*) woodland (Cogger *et al.* 1993), Gimlet (*Eucalyptus salubris*) and Salmon Gum (*Eucalyptus salmonophloia*) woodland.

Ecology: Individuals of the same social group share a common refuge and are generally observed within a core set of tree hollows within the group's home range (Duffield and Bull 2002). The home range overlap between social groups is relatively small (14.1%) and dispersal in and out of *E. stokesii* populations is generally low (Duffield and Bull 2002).

Likelihood of Occurrence: The Western Spiny-tailed Skink, based on surrounding records and suitability of habitat within the Project area, is considered a high likelihood of occurring within the Project area. The Western Spiny-tailed Skink has been recorded from four separate locations from the nearby Karara Iron ore Project (EPA 2009), with the closest record approximately five kilometres from the Project area. In addition, the DEC threatened fauna database search revealed seven recent records from 2010, all from nearby Karara station (approximately 20 km from project area).

The preferred habitat of this species is within the Eucalypt plain habitat type, where patches of large Eucalyptus trees exist, providing suitable habitat in the form of numerous large hollow tree branches and logs. An example of Western Spiny-tailed skink habitat is shown in Figure 5.2.

Potential Impacts: There are no anticipated regional impacts to this species. If this species is present within impact areas then some local impacts to the species could occur. There is suitable habitat inside and outside the Project area, including the direct impact zone. Prior to any disturbance, it is recommended all areas within the Eucalypt woodland plain with acacia shrubs habitat type are surveyed to determine the presence of the Western Spiny-tailed Skink. If any populations are recorded, they should be avoided if possible. If the impact is unavoidable, individuals within the impact area should be relocated to similar habitat close by.

Figure 5.2 – Western Spiny-tail Skink Habitat within Project area

6 RECOMMENDATIONS AND CONCLUSIONS

Due to the data provided by the trapping survey by Bamford Consulting Ecologists (2004) within the Project area, and by Bamford Consulting Ecologists (2006) in close proximity to the Project area, baseline data for the Project area were assessed as sufficient, at least initially. However, confirmed presence by previous surveys and/or the high likelihood of conservation significant species occurring within the Project area suggest that a targeted conservation significant fauna survey is required. A recommended targeted survey for the following species, including the method of surveying, is listed below:

- Malleefowl (*Leipoa ocellata*), EPBC Act Vulnerable, EPBC Act Migratory, WC Act Schedule 1. Walking transects through the foot slopes with dense acacia shrubs and rocky ridges with steep slopes habitat types looking for mounds. This method has proved successful by Bamford Consulting Ecologists (2006) in the Project area and has recorded many mounds, including active mounds. The entire impact area to be searched to determine the level of the species' activity.
- Peregrine Falcon (*Falco peregrinus*), WC Act Schedule 4. Search all ridge lines within impact area to determine any nesting activity. Record any opportunistic sightings.
- Major Mitchell's Cockatoo (*Lophochroa leadbeateri*), WC Act Schedule 4. Search Eucalypt woodland plain habitat within impact area to determine any nesting activity. Record any opportunistic sightings.
- Gilled Slender Blue-tongue (*Cyclodomorphus branchialis*), EPBC Act Vulnerable, WC Act Schedule 1. Conduct trapping survey consisting of drift fences and funnel traps on rocky ridges and steep slopes habitat type. This method proved successful for Bamford Consulting Ecologists (2004) in capturing one individual in a funnel trap, the other individual captured in this survey being from a pitfall trap. Only funnel traps are recommended due to the likely difficulties in installing pitfall traps in this habitat type. In addition, installing funnel traps only would allow a far greater number of trap sites to be installed. Opportunistic surveys for this species also to be carried out, by searching under rocks, logs and spoil heaps.
- Western Spiny-tailed Skink (*Egernia stokesii badia*), EPBC Act Endangered, WC Act Schedule 1. Search all areas of Eucalypt woodland plain habitat type within the impact area. All hollow logs to be searched using head torch and searching for their characteristic latrine scat piles to determine the presence of this species.
- The other conservation significant species, White-browed Babbler (Western Wheatbelt subspecies) (*Pomatostomus superciliosus ashbyi*), DEC Priority 4, Crested Bellbird (southern subspecies) (*Oreoica gutturalis gutturalis*), DEC Priority 4 and Rainbow Bee-eater (*Merops ornatus*), EPBC Act Migratory can all be recorded opportunistically while carrying out other species targeted surveys.

The main conclusions of this survey were:

- SMC commissioned *ecologia* Environment (*ecologia*) to undertake a Level 1 survey of the vertebrate fauna of the Blue Hills Project area as part of the environmental impact assessment for the project;
- The Project area falls within four separate vegetation associations (Shepherd *et al.* 2002), and five different land systems (Curry *et al.* 1994; Payne *et al.* 1998). There were no vegetation associations or Land systems restricted, or largely confined, to the Project area. The Project area was in the Tallering sub-region, within the Yalgoo IBRA bioregion (DEWHA 2004);

- the potential fauna assemblage of the Project area was determined using the results of database searches and records of previous surveys within close proximity of the Project area. The potential species of the Project area consisted of 19 native and seven introduced mammal species, 169 native and one introduced bird species, 55 reptile species and three amphibian species;
- in the current survey, a total of five mammals (two native, three introduced), nine reptiles, 34 birds and one amphibian species was recorded opportunistically while carrying out habitat assessment surveys;
- the habitat assessment has revealed four main fauna habitats within the Project area - rocky ridge with steep slopes, low slopes with dense acacia shrubs, Eucalypt woodland plain with acacia shrubs and alluvial plain;
- one mammal, 16 birds and two reptiles of conservation significance could potentially occur in the Project area. A total of eight species (six bird species; Malleefowl (*Leipoa ocellata*), EPBC Act Vulnerable, EPBC Act Migratory, WC Act Schedule 1, Peregrine Falcon (*Falco peregrinus*), WC Act Schedule 4, Major Mitchell's Cockatoo (*Lophochroa leadbeateri*), WC Act Schedule 4, White-browed Babbler (Western Wheatbelt subspecies) (*Pomatostomus superciliosus ashbyi*), DEC Priority 4, Crested Bellbird (southern subspecies) (*Oreoica gutturalis gutturalis*), DEC Priority 4 and Rainbow Bee-eater (*Merops ornatus*), EPBC Act Migratory and two reptile species; Gilled Slender Blue-tongue (*Cyclodomorphus branchialis*), EPBC Act Vulnerable, WC Act Schedule 1 and Western Spiny-tailed Skink (*Egernia stokesii badia*), EPBC Act Endangered, WC Act Schedule 1) have been assessed as having a high to medium likelihood of occurrence within the Project area; and,
- a targeted conservation significant fauna survey is recommended to determine further the presence or likelihood of conservation significant species, particularly within the impact area.

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APPENDIX A EXPLANATION OF CONSERVATION CODES

Appendix A1 Definitions of relevant categories under the *Environment Protection and Biodiversity Conservation Act*.

Category	Definition
Endangered (EN)	The species is likely to become extinct unless the circumstances and factors threatening its abundance, survival or evolutionary development cease to operate; or its numbers have been reduced to such a critical level, or its habitats have been so drastically reduced, that it is in immediate danger of extinction.
Vulnerable (VU)	Within the next 25 years, the species is likely to become endangered unless the circumstances and factors threatening its abundance, survival or evolutionary development cease to operate.
Migratory (M)	Species are defined as migratory if they are listed in an international agreement approved by the Commonwealth Environment Minister, including: • the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animal) for which Australia is a range state; • the agreement between the Government of Australian and the Government of the Peoples Republic of China for the Protection of Migratory Birds and their environment (CAMBA); or • the agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA).

Appendix A2 Definition of Schedules under the *Wildlife Conservation Act 1950*.

Schedule	Definition
Schedule 1 (S1)	Fauna which are rare of likely to become extinct, are declared to be fauna that is in need of special protection.
Schedule 2 (S2)	Fauna which are presumed to be extinct, are declared to be fauna that is in need of species protection.
Schedule 3 (S3)	Birds which are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction, are declared to be fauna that is in need of species protection.
Schedule 4 (S4)	Declared to be fauna that is in need of species protection, otherwise than for the reasons mentioned above.

Appendix A3 Definition of DEC Threatened Fauna and Priority Fauna Codes.

Threatened	**Definition**
Critically Endangered (CR)	Considered to be facing an extremely high risk of extinction in the wild.
Endangered (EN)	Considered to be facing a very high risk of extinction in the wild.
Vulnerable (VU)	Considered to be facing a high risk of extinction in the wild.
Priority	**Definition**
Priority 1 (P1)	*Taxa with few, poorly known populations on threatened lands.* Taxa which are known from few specimens or sight records from one or a few localities, on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
Priority 2 (P2)	*Taxa with few, poorly known populations on conservation lands.* Taxa which are known from few specimens or sight records from one or a few localities, on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
Priority 3 (P3)	*Taxa with several, poorly known populations, some on conservation lands.* Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
Priority 4 (P4)	*Taxa in need of monitoring.* Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could if present circumstances change. These taxa are usually represented on conservation lands.
Priority 5 (P5)	*Taxa in need of monitoring.* Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

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APPENDIX B RESULTS OF LITERATURE REVIEW AND DATABASE SEARCH TO DETERMINE THE POTENTIAL SPECIES OF THE PROJECT AREA

Mammals

Family and Species	Common name	EPBC	WCA	DEC	*ecologia* internal database	Bamford (2004)	Bamford (2006)	ATA (2004)	Tingay & Associates (1996)	Naturemap	DEC Threatened Fauna	DSEWPaC	This Survey
TACHYGLOSSIDAE													
Tachyglossus aculeatus	Echidna					✓	✓	✓	✓	✓			✓
DASYURIDAE													
Pseudantechinus woolleyae	Woolley's Pseudantechinus						✓						
Sminthopsis crassicaudata	Fat-tailed Dunnart									✓			
Sminthopsis dolichura	Little Long-tailed Dunnart					✓	✓	✓					
PHALANGERIDAE													
Trichosurus vulpecula	Common Brushtail Possum						✓						
MACROPODIDAE													
Macropus fuliginosus	Western Grey Kangaroo							✓	✓				
Macropus irma	Western Brush Wallaby			P4						✓	✓		
Macropus robustus	Euro				✓	✓	✓	✓	✓				
Macropus rufus	Red Kangaroo					✓	✓	✓		✓			✓
MOLOSSIDAE													
Tadarida australis	White-striped Freetail Bat					✓	✓		✓				
VESPERTILIONIDAE													
Chalinolobus gouldii	Gould's Wattled Bat				✓	✓	✓		✓	✓			
Nyctophilus geoffroyi	Lesser Long-eared Bat						✓						
Scotorepens balstoni	Inland Broad-nosed Bat				✓								
Scotorepens greyii	Little Broad-nosed Bat						✓						
Vespadelus baverstocki	Inland Forest Bat				✓		✓			✓			
Vespadelus finlaysoni	Finlayson's Cave Bat							✓		✓			
Vespadelus regulus	Southern Forest Bat					✓			✓				
MURIDAE													
Notomys mitchelli	Mitchell's Hopping-mouse					✓							

Family and Species	Common name	EPBC	WCA	DEC	*ecologia* internal database	Bamford (2004)	Bamford (2006)	ATA (2004)	Tingay & Associates (1996)	Naturemap	DEC Threatened Fauna	DSEWPaC	This Survey
Pseudomys hermannsburgensis	Sandy Inland Mouse						✓		✓	✓			
INTRODUCED MAMMALS													
**Mus musculus*	House Mouse						✓		✓				
**Rattus rattus*	Black Rat							✓					
**Canis lupus*	Dog/Dingo						✓						
**Vulpes vulpes*	Red Fox				✓	✓	✓	✓	✓			✓	
**Felis catus*	Cat				✓	✓	✓	✓	✓			✓	✓
**Oryctolagus cuniculus*	Rabbit				✓	✓	✓	✓	✓			✓	✓
**Capra hircus*	Goat				✓	✓	✓	✓	✓			✓	✓

Birds

Family and Species	Common name	EPBC	WCA	DEC	*ecologia* internal database	Bamford (2004)	Bamford (2006)	ATA (2004)	Tingay & Associates (1996)	Naturemap	Birdata	DEC Threatened Fauna	DSEWPaC	This Survey
CASUARIIDAE														
Dromaius novaehollandiae	Emu					✓	✓	✓	✓	✓	✓			✓
MEGAPODIIDAE														
Leipoa ocellata	Malleefowl	VU, M	S1		✓		✓		✓	✓	✓	✓	✓	✓
ANATIDAE														
Oxyura australis	Blue-billed Duck									✓				
Biziura lobata	Musk Duck										✓			
Cygnus atratus	Black Swan									✓	✓			
Tadorna tadornoides	Australian Shelduck						✓	✓	✓	✓	✓			
Chenonetta jubata	Australian Wood Duck									✓	✓			
Malacorhynchus membranaceus	Pink-eared Duck										✓			
Anas rhynchotis	Australasian Shoveler										✓			
Anas gracilis	Grey Teal								✓	✓	✓			✓
Anas castanea	Chestnut Teal													
Anas superciliosa	Pacific Black Duck								✓	✓	✓			
Aythya australis	Hardhead													
PODICIPEDIDAE														
Tachybaptus novaehollandiae	Australasian Grebe							✓			✓			
Poliocephalus poliocephalus	Hoary-headed Grebe								✓	✓	✓			
COLUMBIDAE														
°*Streptopelia senegalensis*	Laughing Dove										✓			
Phaps chalcoptera	Common Bronzewing				✓	✓	✓	✓	✓	✓	✓			✓
Ocyphaps lophotes	Crested Pigeon						✓	✓	✓	✓	✓			
Geopelia cuneata	Diamond Dove										✓			

Family and Species	Common name	EPBC	WCA	DEC	*ecologia* internal database	Bamford (2004)	Bamford (2006)	ATA (2004)	Tingay & Associates (1996)	Naturemap	Birdata	DEC Threatened Fauna	DSEWPaC	This Survey
PODARGIDAE														
Podargus strigoides	Tawny Frogmouth					✓	✓	✓		✓	✓			
EUROSTOPODIDAE														
Eurostopodus argus	Spotted Nightjar					✓	✓	✓	✓	✓	✓			
AEGOTHELIDAE														
Aegotheles cristatus	Australian Owlet-nightjar					✓	✓		✓	✓	✓			
APODIDAE														
Apus pacificus	Fork-tailed Swift	M											✓	
ARDEIDAE														
Ardea pacifica	White-necked Heron										✓			
Ardea modesta	Eastern Great Egret	M	S3								✓		✓	
Egretta novaehollandiae	White-faced Heron									✓	✓			
Ardea ibis	Cattle Egret	M	S3								✓		✓	
THRESKIORNITHIDAE														
Threskiornis spinicollis	Straw-necked Ibis									✓	✓			
Platalea flavipes	Yellow-billed Spoonbill										✓			
ACCIPITRIDAE														
Elanus axillaris	Aus. Black-shouldered Kite													
Lophoictinia isura	Square-tailed Kite													
Hamirostra melanosternon	Black-breasted Buzzard													
Haliastur sphenurus	Whistling Kite										✓			
Milvus migrans	Black Kite													
Accipiter fasciatus	Brown Goshawk						✓	✓		✓	✓			
Accipiter cirrocephalus	Collared Sparrowhawk						✓				✓			
Circus assimilis	Spotted Harrier							✓			✓			

Family and Species	Common name	EPBC	WCA	DEC	*ecologia* internal database	Bamford (2004)	Bamford (2006)	ATA (2004)	Tingay & Associates (1996)	Naturemap	Birdata	DEC Threatened Fauna	DSEWPaC	This Survey
Aquila audax	Wedge-tailed Eagle					✓	✓	✓	✓	✓	✓			✓
Hieraaetus morphnoides	Little Eagle									✓				
FALCONIDAE														
Falco cenchroides	Nankeen Kestrel						✓	✓		✓	✓			
Falco berigora	Brown Falcon						✓	✓		✓	✓			✓
Falco longipennis	Australian Hobby									✓	✓			
Falco subniger	Black Falcon									✓				
Falco peregrinus	Peregrine Falcon		S4				✓					✓		
RALLIDAE														
Porzana fluminea	Australian Spotted Crake										✓			
Tribonyx ventralis	Black-tailed Native-hen										✓			
Gallinula tenebrosa	Dusky Moorhen										✓			
Fulica atra	Eurasian Coot										✓			
OTIDIDAE														
Ardeotis australis	Australian Bustard			P4						✓	✓	✓		
BURHINIDAE														
Burhinus grallarius	Bush Stone-curlew			P4							✓			
RECURVIROSTRIDAE														
Himantopus himantopus	Black-winged Stilt									✓	✓			
Recurvirostra novaehollandiae	Red-necked Avocet									✓	✓			
Cladorhynchus leucocephalus	Banded Stilt									✓	✓			
CHARADRIIDAE														
Charadrius ruficapillus	Red-capped Plover										✓			
Elseyornis melanops	Black-fronted Dotterel										✓			
Thinornis rubricollis	Hooded Plover			P4						✓		✓		
Erythrogonys cinctus	Red-kneed Dotterel										✓			

Family and Species	Common name	EPBC	WCA	DEC	*ecologia* internal database	Bamford (2004)	Bamford (2006)	ATA (2004)	Tingay & Associates (1996)	Naturemap	Birdata	DEC Threatened Fauna	DSEWPaC	This Survey
Vanellus tricolor	Banded Lapwing									✓	✓			
ROSTRATULIDAE														
Rostratula benghalensis australis	Australian Painted Snipe	VU, M	S1									✓		
TURNICIDAE														
Turnix varius	Painted Button-quail						✓		✓					
Turnix velox	Little Button-quail										✓			
CACATUIDAE														
Calyptorhynchus banksii	Red-tailed Black-Cockatoo						✓	✓		✓	✓			
Calyptorhynchus latirostris	Carnaby's Black-Cockatoo	EN	S1											
Lophochroa leadbeateri	Major Mitchell's Cockatoo		S4		✓		✓			✓		✓		
Eolophus roseicapillus	Galah					✓	✓	✓	✓	✓	✓			✓
Cacatua pastinator	Western Corella									✓				
Cacatua sanguinea	Little Corella							✓			✓			
Nymphicus hollandicus	Cockatiel										✓			
PSITTACIDAE														
Glossopsitta porphyrocephala	Purple-crowned Lorikeet						✓			✓				
Polytelis anthopeplus	Regent Parrot						✓			✓	✓			
Barnardius zonarius	Australian Ringneck				✓	✓	✓	✓	✓	✓	✓			✓
Psephotus varius	Mulga Parrot				✓		✓	✓	✓	✓	✓			✓
Melopsittacus undulatus	Budgerigar						✓							
Neopsephotus bourkii	Bourke's Parrot									✓	✓			
Neophema elegans	Elegant Parrot													
Pezoporus occidentalis	Night Parrot	EN, M	S1							✓		✓		
CUCULIDAE														
Chalcites basalis	Horsfield's Bronze-Cuckoo						✓			✓	✓			
Chalcites osculans	Black-eared Cuckoo						✓			✓	✓			

Family and Species	Common name	EPBC	WCA	DEC	*ecologia* internal database	Bamford (2004)	Bamford (2006)	ATA (2004)	Tingay & Associates (1996)	Naturemap	Birdata	DEC Threatened Fauna	DSEWPaC	This Survey
Chalcites lucidus	Shining Bronze-Cuckoo						✓							
Cacomantis pallidus	Pallid Cuckoo									✓	✓			
Cacomantis flabelliformis	Fan-tailed Cuckoo													
STRIGIDAE														
Ninox novaeseelandiae	Southern Boobook						✓			✓				
TYTONIDAE														
Tyto javanica	Eastern Barn Owl									✓				
HALCYONIDAE														
Dacelo novaeguineae	Laughing Kookaburra													
Todiramphus pyrrhopygius	Red-backed Kingfisher									✓	✓			
Todiramphus sanctus	Sacred Kingfisher													
MEROPIDAE														
Merops ornatus	Rainbow Bee-eater	M	S3			✓	✓	✓		✓	✓		✓	
CLIMACTERIDAE														
Climacteris rufa	Rufous Treecreeper					✓				✓				
PTILINORHYNCHIDAE														
Ptilonorhynchus guttatus	Western Bowerbird									✓				✓
MALURIDAE														
Malurus lamberti	Variegated Fairy-wren						✓	✓		✓	✓			
Malurus leucopterus	White-winged Fairy-wren							✓		✓	✓			
Malurus pulcherrimus	Blue-breasted Fairy-wren								✓					
Malurus splendens	Splendid Fairy-wren					✓	✓	✓	✓	✓	✓			✓
ACANTHIZIDAE														
Sericornis frontalis	White-browed Scrubwren										✓			
Calamanthus campestris	Rufous Fieldwren			P4#							✓			

Family and Species	Common name	EPBC	WCA	DEC	*ecologia* internal database	Bamford (2004)	Bamford (2006)	ATA (2004)	Tingay & Associates (1996)	Naturemap	Birdata	DEC Threatened Fauna	DSEWPaC	This Survey
Pyrrholaemus brunneus	Redthroat				✓	✓	✓	✓	✓	✓	✓			✓
Smicrornis brevirostris	Weebill				✓	✓	✓	✓	✓	✓				✓
Gerygone fusca	Western Gerygone						✓			✓	✓			✓
Acanthiza robustirostris	Slaty-backed Thornbill						✓			✓	✓			
Acanthiza chrysorrhoa	Yellow-rumped Thornbill				✓		✓	✓	✓	✓				
Acanthiza uropygialis	Chestnut-rumped Thornbill					✓	✓	✓	✓	✓	✓			✓
Acanthiza inornata	Western Thornbill										✓			
Acanthiza iredalei (iredalei)	Slender-billed Thornbill	VU						✓					✓	
Acanthiza apicalis	Inland Thornbill				✓	✓	✓	✓	✓	✓	✓			✓
Aphelocephala leucopsis	Southern Whiteface						✓		✓	✓	✓			
Aphelocephala nigricincta	Banded Whiteface							✓						
PARDALOTIDAE														
Pardalotus striatus	Striated Pardalote						✓	✓	✓	✓	✓			
MELIPHAGIDAE														
Certhionyx variegatus	Pied Honeyeater							✓		✓	✓			✓
Lichenostomus virescens	Singing Honeyeater				✓	✓	✓	✓	✓	✓	✓			✓
Lichenostomus leucotis	White-eared Honeyeater							✓						
Lichenostomus keartlandi	Grey-headed Honeyeater													
Lichenostomus ornatus	Yellow-plumed Honeyeater										✓			
Lichenostomus plumulus	Grey-fronted Honeyeater									✓				
Purnella albifrons	White-fronted Honeyeater					✓	✓			✓	✓			✓
Manorina flavigula	Yellow-throated Miner					✓	✓	✓	✓	✓	✓			✓
Acanthagenys rufogularis	Spiny-cheeked Honeyeater				✓	✓	✓		✓	✓	✓			✓
Anthochaera carunculata	Red Wattlebird						✓	✓		✓	✓			
Conopophila whitei	Grey Honeyeater										✓			
Epthianura tricolor	Crimson Chat							✓		✓	✓			✓

Family and Species	Common name	EPBC	WCA	DEC	*ecologia* internal database	Bamford (2004)	Bamford (2006)	ATA (2004)	Tingay & Associates (1996)	Naturemap	Birdata	DEC Threatened Fauna	DSEWPaC	This Survey
Epthianura aurifrons	Orange Chat							✓						
Epthianura albifrons	White-fronted Chat									✓				
Sugomel niger	Black Honeyeater									✓	✓			
Glyciphila melanops	Tawny-crowned Honeyeater													
Lichmera indistincta	Brown Honeyeater						✓		✓	✓	✓			✓
Phylidonyris niger	White-cheeked Honeyeater													
Melithreptus brevirostris	Brown-headed Honeyeater						✓	✓		✓				
POMATOSTOMIDAE														
Pomatostomus temporalis	Grey-crowned Babbler									✓	✓			
Pomatostomus superciliosus	White-browed Babbler			P4^		✓	✓	✓	✓	✓	✓	✓		✓
PSOPHODIDAE														
Cinclosoma castanotum	Chestnut Quail-thrush						✓		✓	✓	✓			
Cinclosoma castaneothorax	Chestnut-breasted Quail-thrush									✓	✓			✓
Psophodes occidentalis	Chiming Wedgebill										✓			
NEOSITTIDAE														
Daphoenositta chrysoptera	Varied Sittella						✓				✓			
CAMPEPHAGIDAE														
Coracina maxima	Ground Cuckoo-shrike									✓	✓			
Coracina novaehollandiae	Black-faced Cuckoo-shrike				✓	✓	✓	✓	✓	✓	✓			
Lalage sueurii	White-winged Triller									✓	✓			
PACHYCEPHALIDAE														
Pachycephala inornata	Gilbert's Whistler						✓				✓			
Pachycephala pectoralis	Golden Whistler					✓	✓		✓	✓	✓			
Pachycephala rufiventris	Rufous Whistler				✓		✓	✓		✓	✓			✓
Colluricincla harmonica	Grey Shrike-thrush				✓	✓	✓	✓	✓	✓	✓			✓
Oreoica gutturalis	Crested Bellbird			P4*	✓	✓	✓	✓	✓	✓	✓	✓		✓

Family and Species	Common name	EPBC	WCA	DEC	*ecologia* internal database	Bamford (2004)	Bamford (2006)	ATA (2004)	Tingay & Associates (1996)	Naturemap	Birdata	DEC Threatened Fauna	DSEWPaC	This Survey
ARTAMIDAE														
Artamus personatus	Masked Woodswallow									✓	✓			
Artamus superciliosus	White-browed Woodswallow									✓				
Artamus cinereus	Black-faced Woodswallow						✓	✓	✓	✓	✓			
Artamus cyanopterus	Dusky Woodswallow									✓				
Artamus minor	Little Woodswallow				✓	✓	✓	✓	✓	✓				
Cracticus torquatus	Grey Butcherbird				✓	✓	✓		✓	✓	✓			
Cracticus nigrogularis	Pied Butcherbird					✓	✓	✓	✓	✓	✓			
Cracticus tibicen	Australian Magpie						✓	✓	✓	✓	✓			
Strepera versicolor	Grey Currawong					✓	✓			✓	✓			
RHIPIDURIDAE														
Rhipidura albiscapa	Grey Fantail						✓		✓	✓	✓			✓
Rhipidura leucophrys	Willie Wagtail				✓		✓	✓	✓	✓	✓			
CORVIDAE														
Corvus coronoides	Australian Raven					✓	✓	✓	✓	✓	✓			✓
Corvus bennetti	Little Crow					✓	✓	✓	✓	✓	✓			
Corvus orru	Torresian Crow						✓			✓	✓			✓
MONARCHIDAE														
Grallina cyanoleuca	Magpie-lark							✓	✓	✓	✓			
PETROICIDAE														
Microeca fascinans	Jacky Winter									✓				
Petroica boodang	Scarlet Robin					✓								
Petroica goodenovii	Red-capped Robin					✓	✓	✓		✓	✓			✓
Melanodryas cucullata	Hooded Robin									✓	✓			
Eopsaltria griseogularis	Western Yellow Robin					✓	✓	✓	✓	✓				
Drymodes brunneopygia	Southern Scrub-robin								✓		✓			

Family and Species	Common name	EPBC	WCA	DEC	*ecologia* internal database	Bamford (2004)	Bamford (2006)	ATA (2004)	Tingay & Associates (1996)	Naturemap	Birdata	DEC Threatened Fauna	DSEWPaC	This Survey
MEGALURIDAE														
Cincloramphus mathewsi	Rufous Songlark							✓			✓			
Cincloramphus cruralis	Brown Songlark									✓	✓			
TIMALIIDAE														
Zosterops lateralis	Silvereye									✓	✓			
HIRUNDINIDAE														
Cheramoeca leucosterna	White-backed Swallow								✓	✓	✓			
Hirundo neoxena	Welcome Swallow						✓	✓	✓	✓	✓			✓
Petrochelidon ariel	Fairy Martin									✓	✓			
Petrochelidon nigricans	Tree Martin				✓		✓	✓	✓	✓				✓
NECTARINIIDAE														
Dicaeum hirundinaceum	Mistletoebird						✓			✓	✓			
ESTRILDIDAE														
Taeniopygia guttata	Zebra Finch				✓			✓	✓	✓	✓			
MOTACILLIDAE														
Anthus novaeseelandiae	Australasian Pipit						✓	✓	✓	✓	✓			

*Only southern subspecies (Oreoica gutturalis gutturalis) listed as P4

^Only western wheatbelt subspecies (Pomatostomus superciliosus asbyi) listed as P4

#Only western wheatbelt subspecies (Calamanthus campestris montanellus) listed as P4

°Introduced species

Reptiles

Family and Species	Common name	EPBC	WCA	DEC	*ecologia* internal database	Bamford (2004)	Bamford (2006)	ATA (2004)	Tingay & Associates (1996)	Naturemap	DEC Threatened Fauna	DSEWPaC	This Survey
DIPLODACTYLIDAE													
Diplodactylus granariensis							✓						
Diplodactylus pulcher						✓	✓	✓		✓			
Lucasium squarrosum							✓	✓					
Oedura reticulata							✓						
Rhynchoedura ornata	Beaked Gecko						✓						
Strophurus strophurus								✓					✓
CARPHODACTYLIDAE													
Nephrurus milii	Barking Gecko				✓		✓	✓	✓				
GEKKONIDAE													
Gehyra variegata						✓	✓	✓	✓	✓			✓
Heteronotia binoei	Bynoe's Gecko				✓	✓	✓	✓	✓	✓			✓
PYGOPODIDAE													
Delma australis						✓	✓	✓	✓	✓			✓
Lialis burtonis							✓						
SCINCIDAE													
Cryptoblepharus plagiocephalus	Fence Skink					✓	✓	✓	✓				
Ctenotus mimetes					✓	✓	✓	✓		✓			
Ctenotus pantherinus	Leopard Ctenotus								✓				
Ctenotus severus										✓			
Ctenotus schomburgkii						✓	✓						
Ctenotus uber						✓	✓			✓			
Cyclodomorphus branchialis	Gilled Slender Blue-tongue	VU	S1			✓	✓	✓		✓	✓		
Egernia depressa	Pygmy Spiny-tailed Skink				✓	✓	✓	✓	✓	✓			
Egernia stokesii badia		EN	S1					✓		✓	✓	✓	

Family and Species	Common name	EPBC	WCA	DEC	*ecologia* internal database	Bamford (2004)	Bamford (2006)	ATA (2004)	Tingay & Associates (1996)	Naturemap	DEC Threatened Fauna	DSEWPaC	This Survey
Eremiascincus richardsonii	Broad-banded Sand-swimmer					✓				✓			
Lerista gerrardii					✓	✓		✓	✓	✓			✓
Lerista kingi										✓			✓
Lerista nichollsi										✓			✓
Lerista muelleri						✓	✓						
Lerista timida					✓								
Liopholis inornata	Desert Skink									✓			
Menetia greyii						✓	✓			✓			
Morethia butleri						✓	✓		✓	✓			
Tiliqua occipitalis	Western Blue-tongue						✓						
AGAMIDAE													
Caimanops amphiboluroides	Mulga Dragon					✓	✓			✓			
Ctenophorus ornatus	Ornate Dragon									✓			
Ctenophorus nuchalis	Central Netted Dragon							✓					
Ctenophorus reticulatus	Western Netted Dragon					✓	✓	✓		✓			
Ctenophorus scutulatus	Lozenge-marked Dragon				✓	✓	✓	✓		✓			
Moloch horridus	Thorny Devil									✓			
Pogona minor	Dwarf Bearded Dragon					✓	✓	✓		✓			
VARANIDAE													
Varanus caudolineatus	Stripe-tailed Monitor					✓		✓		✓			
Varanus giganteus	Perentie						✓			✓			
Varanus gouldii	Gould's Monitor					✓	✓	✓		✓			
Varanus panoptes	Yellow-spotted Monitor					✓	✓						
Varanus tristis	Black-headed Monitor						✓			✓			
TYPHLOPIDAE													
Ramphotyphlops hamatus						✓							
Ramphotyphlops waitii										✓			

Family and Species	Common name	EPBC	WCA	DEC	*ecologia* internal database	Bamford (2004)	Bamford (2006)	ATA (2004)	Tingay & Associates (1996)	Naturemap	DEC Threatened Fauna	DSEWPaC	This Survey
BOIDAE													
Antaresia perthensis	Pygmy Python						✓						
Antaresia stimsoni	Stimson's Python							✓					
ELAPIDAE													
Demansia psammophis	Yellow-faced Whipsnake							✓					
Neelaps bimaculatus	Black-naped Snake												✓
Parasuta monachus							✓			✓			
Pseudechis australis	Mulga Snake						✓	✓					
Pseudechis butleri	Spotted Mulga Snake						✓			✓			
Pseudonaja mengdeni	Western Brown Snake							✓		✓			
Pseudonaja modesta	Ringed Brown Snake						✓			✓			
Simoselaps bertholdi	Jan's Banded Snake						✓			✓			✓
Suta fasciata	Rosen's Snake									✓			

Amphibians

Family and Species	Common name	EPBC	WCA	DEC	*ecologia* internal database	Bamford (2004)	Bamford (2006)	ATA (2004)	Tingay & Associates (1996)	Naturemap	DEC Threatened Fauna	DSEWPaC	This Survey
HYLIDAE													
Cyclorana platycephala	Water-Holding Frog									✓			
LIMNODYNASTIDAE													
Neobatrachus centralis	Centralian Trilling Frog					✓							
MYOBATRACHIDAE													
Pseudophryne occidentalis	Western Toadlet						✓		✓	✓			✓