Fauna Assessment

Lake Wells Project Area

Goldphyre Resources Limited

February 2016
Version 1

On behalf of:
Goldphyre Resources Limited
c/- Botanica Consulting
PO Box 2027
BOULDER WA 6432
T: 08 9093 0024

Prepared by:
Greg Harewood
Zoologist
PO Box 755
BUNBURY WA 6231
M: 0402 141 197
T/F: (08) 9725 0982
E: gharewood@iinet.net.au

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

Acronyms/Abbreviations:

BA: Birdlife Australia (Formerly RAOU, Birds Australia).

BC Bill: *Biodiversity Conservation Bill* (2015). WA Government.

CALM: Department of Conservation and Land Management (now DPaW), WA Government.

CAMBA: China Australia Migratory Bird Agreement 1998.

DEC: Department of Environment and Conservation (now DPaW), WA Government.

DEH: Department of Environment and Heritage (now DoE), Australian Government.

DEP: Department of Environment Protection (now DER), WA Government.

DEWHA: Department of the Environment, Water, Heritage and the Arts (now DoE), Australian Government

DER: Department of Environment Regulation (formerly DEC, DoE), WA Government.

DMP: Department of Mines and Petroleum (formerly DoIR), WA Government.

DoE: Department of Environment (now DER/DPaW), WA Government.

DoIR: Department of Industry and Resources (now DMP), WA Government.

DotE: Department of the Environment (formerly SEWPaC, DWEHA, DEH), Australian Government.

DPaW: Department of Parks and Wildlife (formerly DEC, CALM, DoE), WA Government.

EAG: Environmental Assessment Guideline. Published by EPA WA Government.

EP Act: *Environmental Protection Act 1986*, WA Government.

EPA: Environmental Protection Authority, WA Government.

EPBC Act: *Environment Protection and Biodiversity Conservation Act 1999,* Australian Government.

ha: Hectare (10,000 square metres).

IBRA: Interim Biogeographic Regionalisation for Australia.

IUCN: International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union.

JAMBA: Japan Australia Migratory Bird Agreement 1981.

km: Kilometre (1,000 metres).

RAOU: Royal Australia Ornithologist Union.

ROKAMBA: Republic of Korea-Australia Migratory Bird Agreement 2007.

SEWPaC: Department of Sustainability, Environment, Water, Population and Communities (now DoE, formerly DEH, DEWHA), Australian Government.

SRE: Short Range Endemic.

SSC: Species Survival Commission, International.

WA: Western Australia.

WAM: Western Australian Museum, WA Government.

WC Act: *Wildlife Conservation Act 1950*, WA Government.

SUMMARY

This report details the results of a Level 1 fauna assessment of Goldphyre Resources Limited's Lake Wells Potash Project area (Project area) (Figure 1). The assessment reported on here covers three granted exploration licences which form part of the total Project area these being E 38/1903, E 38/2114 and E 38/3021, which combined, have an area of about 7,634 ha (Figure 2).

The assessment was undertaken for the purposes of delineating and characterising the fauna habitats and faunal assemblages present in the target area including significant information gaps or uncertainties relating to possible impacts on fauna.

The broad scale terrestrial fauna habitats within the Project area presented below are based primarily on landforms identified by Botanica (2016) with further often subtle subdivisions possible using vegetation structure. The extent of the identified broad scale fauna habitats within the Project area are shown in Figure 3.

- Closed Depressions - Dense low shrub of *Tecticornia indica* in playa.
  Total Area = ~1,333 ha (~17.5%).

- Clay-Loam Plain - Forest of *Acacia incurvaneura* over heath and open low grass or Forest of *A. caesaneura*/tree mallee of *Eucalyptus lucasii* over low scrub and dense hummock grass of *Triodia desertorum*.
  Total Area = ~1,122 ha (~14.7%).

- Drainage Depressions - Forest of *A. caesaneura* over low scrub and open low grass.
  Total Area = ~200 ha (~2.6%).

- Rocky Hillslopes - Forest of *A. quadrimarginea* over low scrub and open dwarf scrub
  Total Area = ~308 ha (~4.0%).

- Quartz/ Rocky Plains - Open low woodland of *A. caesaneura/A. incurvaneura* over low woodland and open dwarf scrub or very open bunch grass.
  Total Area = ~539 ha (~7.1%).

- Sand Dunes - Low woodland of *A. caesaneura/ A. incurvaneura* over low scrub of and hummock grass of *T. desertorum*.
  Total Area = ~1,257 ha (~16.5%).

- Gypsum Dunes - Forest of *Casuarina pauper* over open low scrub and open dwarf scrub.
  Total Area = ~1,113 ha (~14.6%)

- Sand Loam Plains - Low woodland of *A. caesaneura* over open low scrub and dwarf scrub or hummock grass of *T. desertorum.*
  Total Area = ~646 ha (~8.5%).

- Sandplains - Low woodland of *E. gongylocarpa* over open low scrub and dense hummock grass of *T. desertorum* or Open tree mallee of *E. concinna* over open low scrub and dense hummock grass of *T. desertorum.*
  Total Area = ~260 ha (~3.4%).

- Lake Bed - Salt crust bordered by dense low shrub of *Tecticornia indica* (Unit 1)
  Total Area = ~856 ha (~11.2%)

With respect to native vertebrate fauna, 26 mammals (including 8 bat species), 126 bird, 107 reptile and nine frog species have previously been recorded in the general area and therefore have the potential to occur in the Project area.

The current status on site and/or in the general area of some species is difficult to determine, however, based on the habitats present and in some cases, recent nearby records, 14 vertebrate fauna species of conservation significance were identified as possibly utilising the Project area for some purpose at times. It is however not possible to ascertain the exact status of any of these species in the area without a detailed site specific survey.

The invertebrate assessment indicates that while terrestrial invertebrate SRE species maybe present, most are unlikely to be restricted to the Project area itself given the continuity of most habitats into adjoining areas. However, the lake bed making up Lake Wells does have the potential to harbour "salt lake specialists" such as wolf spiders, tiger beetles, crickets, ants, and earwigs and it is therefore considered possible that if present some of these invertebrates may represent locally endemic species restricted to this area alone. As with vertebrate fauna species it is unclear what terrestrial invertebrate species, if any, may be present or their significance without a suitable field survey.

Groundwater under the lake is hypersaline and therefore it is considered unlikely to be suitable for stygofauna (subterranean, water dwelling species). The high water table levels present also suggest that troglofauna (air breathing/open void dwelling subterranean species) are also unlikely to be present.

The Lake Wells Potash Project is currently still in exploration phase with some resource modelling and hydrogeology work, to assess certain aspects of the viability of establishing a full scale operation, currently being undertaken. As specific details of any final proposal to extract, process and transport potash from the area are not available at this point in time and the exact status of most fauna species of conservation significance in the area is unknown, the potential impacts on fauna is difficult to define with any certainty.

Despite this it is apparent that certain aspects of any future proposal for extracting subsurface brine and the construction of associated infrastructure has the potential to impact on some fauna species.

In particular ground dwelling vertebrates such as the great desert skink, brush-tailed mulgara and the bilby, which have limited dispersal abilities, are most likely to be impacted on by any development. All three species construct burrows that the animals

live in during the day and the destruction of these refuges could have a significant impact on a population's ability to persist in the area. Loss of hollow bearing trees, a limited resource in many areas, also has the potential to impact on obligate hollow nesters such as the princess parrot.

There is also potential for invertebrates with distributions restricted to the Lake and/or habitat bordering to be directly impacted upon. The possible drawdown of the near surface water tables may also affect riparian habitats surrounding the Lake which may also impact on vertebrate and invertebrate fauna species.

It will therefore be important to plan any future proposal for development on or near the Lake so that the above-mentioned potential impacts (and any other subsequently identified potential impacts) do not eventuate. To allow for this planning to progress various information gaps relating to fauna utilisation, habitat requirements, hydrology and surface water flow, for example, may need to be filled.

To assist in obtaining information that will assist in planning and identifying likely impacts the following recommendations are therefore provided:

Terrestrial Vertebrate Fauna Survey

A Level 2 fauna survey should be carried out to provide information on the fauna assemblage present in the area, in particular species of conservation significance and areas of most likely impact. The survey should include but not necessarily be limited to:

- A targeted survey for the great desert skink, brush-tailed mulgara and bilby to determine their status in the area is recommended. This should include ground based searches for burrows tracks, scats and individuals, nocturnal surveys, trapping (cages and Elliot's) and the long term (3 – 4 months) deployment of motion sensing cameras;

- A survey to determine the presence/absence of suitable breeding habitat (i.e. hollow bearing threes) for the princess parrot should carried out; and

- Surveys of a sufficient type and scale to assist in determining the presence/absence of other species of conservation significance listed in Table 3.

Invertebrates

A targeted invertebrate survey across the lake playa should be carried out to rule out or confirm the presence of SREs and endemic salt lake specialists such as but not limited to wolf spiders, tiger beetles, crickets, ants, and earwigs. The survey should include but not necessarily be limited to:

- An invertebrate survey on the Lake and some adjoin areas to address knowledge gaps. This should include active searching and pit trapping;

- If possible regional data points should be included (e.g. Lake Wells to east) to provide better context for Project area data.

Migratory Waders/Other Wetland species

The degree to which migratory waders and other water birds rely on this section of Lake Wells would appear to be very low but information is limited. It is therefore recommended that the following information be gathered during the course of other survey work:

- Recording of all evidence of usage (e.g. species numbers and locations) concurrent with other studies, both on the Lake and nearby freshwater wetlands (if any) (to assist in determining relative importance).

The actual need to carry out some or all of these surveys should be determined after consultation with the relevant regulatory authorities to ensure the information to be collected is actually required as part of any EIA and to confirm the scope of works and resulting data will comply with their requirements.

.

1. INTRODUCTION

This report details the results of a Level 1 fauna assessment of Goldphyre Resources Limited's Lake Wells Potash Project area (Project area) situated about 180 km NNE of Laverton, Western Australia (Figure 1). The assessment reported on here covers three granted exploration licences which form part of the total Project area these being E 38/1903, E 38/2114 and E 38/3021, which combined, have an area of about 7,634 ha (Figure 2).

It is understood that information obtained during this fauna assessment will be used in conjunction with other environmental investigations to guide project planning. It is anticipated that the information presented will also be used by regulatory authorities to assess the potential impact of the proposal on fauna and fauna habitats at the site during any required Project evaluations and approvals.

2. SCOPE OF WORKS

The scope of works was defined as:

1. Carry out a Desktop Level 1 Fauna assessment (in compliance with EPA Guidance statement 56 (EPA 2004));
2. Carry out a Desktop Invertebrate Short Range Endemic (SRE) assessment (in compliance with EPA Guidance statement 20 (EPA 2009), 54A (EPA 2007) and EAG 12 (EPA 2013)); and
3. Provide a report including:
    - Discussion of findings; and
    - Identify potential development constraints relating to fauna including significant information gaps or uncertainties relating to possible impacts on fauna.

3. RELEVANT LEGISLATION

In Western Australia, all fauna are protected by legislation as defined under three government acts:

- *Wildlife Conservation Act (1950)* (WA) (*WC Act*);
- *Environmental Protection Act (1986)* (WA) (EP Act); and

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

The *Wildlife Conservation Act 1950* provides protection for all native fauna species, and is administered by DPaW. Special provision is provided for fauna that are considered rare, threatened with extinction or of high conservation value.

It should be noted that the *Wildlife Conservation Act (1950)* is soon to be repealed and replaced by the *Biodiversity Conservation Bill (2015)* currently before Parliament.

The *Environmental Protection Act (1986)* is administered by the EPA and includes guidelines for reviewing the aspects of proposals that might significantly impact environmental factors. Any operation that has the potential to significantly impact on fauna habitat of potential conservation significance may be subject to formal Environmental Impact Assessment (EIA) under the *EP Act*.

The *Environment Protection and Biodiversity Conservation Act (1999)* is administered by the Commonwealth DotE, to regulate protection of matters of national environmental significance. Any action (including projects, developments, undertakings, activity or series of activities) that is likely to have a significant impact on any matter included in Part 3 of the Act, must be referred to the Minister for decisions on whether the proposed action triggers the *EPBC Act* and requires assessment and approval under the Act.

Formal environmental impact assessment (EIA) under the *Environmental Protection Act 1986* is therefore likely to be required if a proposal may cause significant change to a habitat containing fauna of conservation significance.

4. METHODS

4.1 FAUNA HABITAT ASSESSMENT

Vegetation and landform units identified during the flora and vegetation survey, carried out by Botanica Consulting (Botanica 2016) have been used to define broad fauna habitat types across the Project area.

The main aim of the habitat assessment was to determine if it was likely that any species of conservation significance would be utilising the areas that maybe impacted as a consequence of the proposal proceeding. The habitat information obtained was also used to aid in finalising the overall potential fauna list.

4.2 POTENTIAL VERTEBRATE FAUNA INVENTORY

4.2.1 Database Searches

Searches of the following databases were undertaken to aid in the compilation of a list of vertebrate fauna potentially occurring within the Project area:

- Department of Parks and Wildlife's (DPaW's) NatureMap Database (combined data from DPAW, Western Australian Museum and Birds Australia) (DPAW 2015b); and
- Protected matters search tool (Department of the Environment - DotE 2015).

It should be noted that these lists are based on records compiled from a broader region than the Project area and therefore may include species that would only ever occur as vagrants in the area under investigation due to a lack of suitable habitat or the presence of only marginal habitat. The databases also often included very old records and in some cases the species in question have become locally or regionally extinct.

Information from these sources should therefore be taken as indicative only and local knowledge and information needs also to be taken into consideration when determining what actual species may be present within the specific area being investigated.

4.2.2 Previous Fauna Surveys in the Area

Only a small number of fauna surveys, assessments and reviews have been undertaken in nearby areas in the past, and not all are publically available and/or available for reference. Some of those available have been used as the primary reference material for compiling the potential fauna assemblage for the general area. Those reports referred to included, but were not limited to:

- ecologia (2009a). Tropicana Gold Project. Operational Area Vertebrate Fauna Assessment. Unpublished report for Tropicana Joint Venture. February 2009.
- ecologia (2009b). Tropicana Gold Project. Tropicana-Transline Infrastructure Corridor, Level 1 Fauna Assessment. Unpublished report for Tropicana Joint Venture. July 2009.
- Hall, N. J., McKenzie, N. L. and Keighery, G. J. (eds) (1994). The Biological Survey of the Eastern Goldfields of WA - Pt 10: Sandstone-Sir Samuel and Laverton-Leonora Survey Areas. Records of the WAM, Supplement 47: 1 – 166.

- Harewood, G. (2011). Terrestrial Fauna Survey (Level 1) of Yamarna Gold Project (Central Bore, Attila, Alaric, Haul Road and Khan North). Unpublished report for Gold Road Resources. September 2011.

- Harewood G. (2014). Fauna Assessment (Level 1) Gruyere Project. Unpublished report for Gold Road Resources Ltd. July 2014.

- Kingfisher Environmental Consulting (2014a). Murrin Murrin – Sunrise Dam Infrastructure Corridor Level 1 Fauna Survey. Unpublished report for AngloGold.

- Kingfisher Environmental Consulting (2014b). Sunrise Dam – Tropicana Infrastructure Corridor Level 1 Fauna Survey. Unpublished report for AngloGold.

- Keith Linbeck and Associates (2012). Fauna Assessment (Level 2) Yamarna Project. Unpublished report for Gold Road Resources. October 2012.

- Martnick and Associates Pty Ltd (1996). Environmental Appraisal – Yamarna Gold Project Area. Unpublished report for Zanex NL. January 1996.

- MBS Environmental (2014). Gruyere Project - Desktop Environmental Review and Work Program. Unpublished report for Gold Road Resources. February 2014.

- Rapallo Environmental (2015). Fauna Survey of the Gruyere Project Area. Unpublished report for Gold Road Resources Limited. May 2015.

- Terrestrial Ecosystems (2011). Level 2 Fauna Risk Assessment for the Granny Deeps Project Area. Unpublished report. February 2011.

As with the databases searches some reports refer to species that would not occur in the Project area due to a lack of suitable habitat (extent and/or quality) and this fact was taken into consideration when compiling the potential fauna species list for the Project area. It should also be noted that the NatureMap database is likely to include some records from previous fauna surveys in the area including some of those listed above.

4.2.3 Existing Publications

The following represent the main publications used to identify and refine the potential fauna species list for the Project area:

- Anstis, M. (2013). Tadpoles and Frogs of Australia. New Holland Publishers, Sydney.

- Barrett, G., Silcocks, A., Barry, S., Cunningham, R. and Poulter, R. (2003). The New Atlas of Australian Birds. Royal Australasian Ornithologists Union, Victoria.
- Churchill, S. (2008). Australian Bats. Second Edition, Allen & Unwin.
- Cogger, H.G. (2014). Reptiles and Amphibians of Australia. 7th Edition. CSIRO Publishing.
- Johnstone, R.E. and Storr, G.M. (1998). Handbook of Western Australian Birds: Volume 1 – Non-passerines (Emu to Dollarbird). Western Australian Museum, Perth Western Australia.
- Johnstone, R.E. and Storr, G.M. (2004). Handbook of Western Australian Birds: Volume 2 – Passerines (Blue-winged Pitta to Goldfinch). Western Australian Museum, Perth Western Australia.
- Menkhorst, P. and Knight, F. (2011). A Field Guide to the Mammals of Australia. Third Edition, Oxford University Press, Melbourne.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (1983). Lizards of Western Australia II: Dragons and Monitors. WA Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (1990). Lizards of Western Australia III: Geckos and Pygopods. WA Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (1999). Lizards of Western Australia I: Skinks. Revised Edition, WA Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (2002). Snakes of Western Australia. Revised Edition, WA Museum, Perth.
- Thompson, S. & Thompson, G. (2006). Reptiles of the Western Australian Goldfields. Published by the Goldfields Environmental Management Group.
- Tyler M.J. & Doughty P. (2009). Field Guide to Frogs of Western Australia, Fourth Edition, WA Museum, Perth.
- Van Dyck, S., Gynther, I. & Baker, A. Eds (2013). Field Companion to The Mammals of Australia. Queensland Museum.
- Wilson, S. and Swan, G. (2013). A Complete Guide to Reptiles of Australia. Third Edition, Reed, New Holland, Sydney.

4.2.4 Fauna of Conservation Significance

The conservation significance of fauna species has been assessed using data from the following sources:

- *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*). Administered by the Australian Government Department of the Environment (DotE);
- *Wildlife Conservation Act 1950 (WC Act).* Administered by the Western Australian Department of Parks and Wildlife (DPaW) (Govt. of WA 2015);
- Red List produced by the Species Survival Commission (SSC) of the World Conservation Union (also known as the IUCN Red List - the acronym derived from its former name of the International Union for Conservation of Nature and Natural Resources). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria; and the
- DPaW Priority Fauna list. A non-legislative list maintained by DPaW for management purposes (DPaW 2015a).

The *EPBC Act* also requires the compilation of a list of migratory species that are recognised under international treaties including the:

- Japan Australia Migratory Bird Agreement 1981 (JAMBA);
- China Australia Migratory Bird Agreement 1998 (CAMBA);
- Republic of Korea-Australia Migratory Bird Agreement 2007 (ROKAMBA); and
- Bonn Convention 1979 (The Convention on the Conservation of Migratory Species of Wild Animals).

(Note - Species listed under JAMBA are also protected under Schedule 3 of the *WC Act*.)

All migratory bird species listed in the annexes to these bilateral agreements are protected in Australia as matters of national environmental significance (NES) under the *EPBC Act*.

The conservation status of all vertebrate fauna species listed as occurring or possibly occurring in the vicinity of the Project area has been assessed using the most recent lists published in accordance with the above-mentioned instruments and is indicated as such in the fauna listings of this report. A full listing of conservation codes are provided in Appendix A.

4.2.5 Likelihood of Occurrence – Vertebrate Fauna of Conservation Significance

For vertebrate fauna of conservation significance identified during the literature review as previously being recorded in the general area, each was assessed and

ranked for their likelihood of occurrence within the Project itself. The rankings and criteria used were:

- Unlikely to Occur: Project area is outside of the currently documented distribution for the species in question or the species is generally accepted as being locally/regionally extinct (supported by a lack of recent records), or no suitable habitat (type, quality and extent) was identified as being likely to be present during the field survey and literature review. Individuals of some species may occur occasionally as vagrants/transients especially if suitable habitat is located nearby but the Project area itself would not support a population or part population of the species.
    - Locally Extinct: Populations no longer occur within a small part of the species natural range, in this case within 10 or 20 km of the Project area. Populations do however persist outside of this area.
    - Regionally Extinct: Populations no longer occur in a large part of the species natural range, in this case within the Goldfields region, Populations do however persist outside of this area.
- Possibly Occurs: Project area is within the known distribution of the species in question and habitat of at least marginal quality was identified as being likely to be present during the field survey and literature review, supported in some cases by recent records being documented in literature from within or near the Project area. In some cases, while a species may be classified as possibly being present at times, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.
- Known to Occur: The species in question was positively identified as being present (for sedentary species) or as using the Project area as habitat for some other purpose (for non-sedentary/mobile species) during the field survey. This information may have been obtained by direct observation of individuals or by way of secondary evidence (e.g. foraging debris, scats). In some cases, while a species may be classified as known to occur, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

4.2.6 Taxonomy and Nomenclature

Taxonomy and nomenclature for fauna species used in this report is generally taken from the DPAW's WA Fauna Census Database which is assumed to follow Aplin and Smith (2001) for amphibians and reptiles, and Johnstone (2001) for birds. Jackson and Groves (2015) has been used for mammals.

Common names are taken from the Western Australia Museum (WAM) recognised primary common name listings when specified, though where common names are not provided they have been acquired from other publications. Sources include Cogger (2014), Wilson and Swan (2013), Van Dyck *et al.* (2013), Christidis and Boles (2008), Bush *et al.* (2007), Bush *et al.* (2002), Tyler *et al.* (2000) and Glauret (1961). Not all common names are generally accepted.

4.3 INVERTEBRATE FAUNA OF CONSERVATION SIGNIFICANCE

The assessment of conservation significant invertebrates has been undertaken with reference to the EPA guidance statements relevant to SRE, terrestrial and subterranean invertebrate fauna, these being:

- Environmental Protection Authority (EPA) (2003). Guidance for the Assessment of Environmental Factors – Consideration of Subterranean Fauna in groundwater and caves during environmental assessment in Western Australia. Guidance Statement No 54. EPA, Perth. (Now superseded by EAG 12 – EPA 2013).

- Environmental Protection Authority (EPA) (2007). Guidance for the Assessment of Environmental Factors – Sampling Methods and Survey Considerations for Subterranean Fauna in Western Australia. Guidance Statement No 54A (Technical Appendix to GA 54). EPA, Perth.

- Environmental Protection Authority (EPA) (2009). Sampling of Short Range Endemic Invertebrate fauna for Environmental Impact Assessment in Western Australia. Guidance Statement 20. EPA, Perth.

- Environmental Protection Authority (EPA) (2013). Environmental Assessment Guideline for consideration of subterranean fauna in environmental impact assessment in Western Australia. EAG 12. EPA, Perth. (Note: This document supersedes Guidance Statement 54 – EPA 2003).

Regarding the requirements for a desktop assessment, the EPA guidance states that desktop studies should address (with documented evidence):

- Characteristics of the fauna of the region (based on existing sampling results);

- Geological, hydrogeological and other information suggesting local habitat is [suitable or] unsuitable for fauna; and

- Ways in which the local fauna population is likely to differ from the regional characteristics.

4.3.1 Literature Review

Searches of the following databases were undertaken to identify any invertebrate fauna of conservation significance previously recorded in the general area:

- Department of Parks and Wildlife's NatureMap Database (combined data from DPAW, Western Australian Museum and Birds Australia) (DPAW 2015b);
- Protected matters search tool (Department of the Environment - DotE 2015); and
- Western Australian Museum Taxonomic Service – Database Search (arachnids, crustaceans and molluscs).

These source do however have limitations and therefore the results and conclusions of several terrestrial short range endemic and stygofauna studies carried out for various fauna assessments undertaken in other sections of the Great Victoria Desert have been also been used as a reference in determining the likelihood of SRE/subterranean invertebrate species being found within the Project area itself. The reports have included:

- KLA (2012). Fauna Assessment (Level 2) Yamarna Project. Unpublished report for Gold Road Resources. October 2012.
    - Burger, M., Castalanelli, M.A and Harvey M.S. (2012). Arachnids from Yamarna, 140 km East of Laverton, Western Australia. Report to Keith Lindbeck and Associates by Western Australian Museum. May 2012.
    - Volschenk, E. (Scorpion ID) (2012). Yamarna Scorpion Identification Report. Unpublished report for Keith Linbeck and Associates.
    - Whisson, C. (2012). Land snails from Yamarna, Western Australia. Unpublished Report, April 2012. Department of Aquatic Zoology, Western Australian Museum, Welshpool, WA.
- Rapallo Environmental (2015). Fauna Survey of the Gruyere Project Area. Unpublished report for Gold Road Resources Limited. May 2015.
    - Phoenix Environmental Sciences (2015). Identification and assessment of short-range endemism of invertebrates from Yamarna Station, Western Australia. Unpublished report prepared for Rapallo Ltd.

  - Volschenk, E. (Scorpion ID) (2015). Taxonomic Report for Invertebrates Surveyed from Yamarna Station. Unpublished report prepared for Rapallo Ltd.

- Harewood, G. (2016). Short Range Endemic Invertebrate Survey Gruyere Project Area. Unpublished report for Gold Road Resources Limited.

  - Phoenix Environmental Sciences (2015b). Identification and assessment of short-range endemism of trapdoor spiders from Gruyere Project (Yamarna Station), Western Australia. Unpublished report prepared for Greg Harewood (on behalf of GRRs).

  - Volschenk, E. (Scorpion ID) (2015b). Taxonomic and Short-Range Endemism Assessment of Invertebrates Surveyed from Yamarna Station (November 2015). Unpublished report prepared for Greg Harewood (on behalf of GRRs). November 2015.

  - Judd, S. (2015). Terrestrial Isopod Identification for the Gruyere, Project. Unpublished report prepared for Greg Harewood (on behalf of GRRs). November 2015.

- Bennelongia Environmental Consultants (2013). Yamarna Project Subterranean Fauna Assessment. Unpublished report for Gold Road Resources. October 2013.

- ecologia (2009d). Tropicana Gold Project. Stygofauna survey report. Ecologia Environment Pty Ltd. Unpublished report prepared for AngloGold Ashanti Australia Pty Ltd.

- Subterranean Ecology (2009). Stygofauna survey Tropicana Gold Project Minigwal water supply area. Subterranean Ecology Pty Ltd. Unpublished report prepared for AngloGold Ashanti Australia Ltd, Independence Group NL.

4.3.2 Invertebrate Habitat Assessment

Potential habitat for terrestrial SRE invertebrate species is likely to be associated with:

- Sheltered Habitats and Microhabitats: SREs are most likely to be encountered in sheltered relatively mesic environments such as slopes with south-west facing aspects, rock piles, drainage systems, deep gorges, natural springs, fire refuge areas such as cliffs/isolated rock piles and other similar habitats (EPA 2009).

- Habitat Isolates: Habitat isolates are more likely to support SREs than extensive swathes of contiguous habitat. Examples of habitat isolates that potentially support SRE species include boulder piles, isolated sandstone/limestone outcrops in exposed dolomites or calcretes, isolated birridas, lakes and sheltered rocky scree (EPA 2009).

Subterranean fauna are defined as fauna which live their entire lives (obligate) below the surface of the earth. They are divided into two groups:

- stygofauna - aquatic and living in groundwater; and
- troglofauna - air-breathing and living in caves and voids

The presence of subterranean fauna is strongly linked to geology and hydrology, and the availability of suitable micro-habitats, e.g. air-filled voids or caves for troglofauna, or aquifers that are not hypersaline for stygofauna. Despite these known associations between subterranean fauna, geology and hydrology, it is difficult to predict the presence of subterranean fauna with confidence due to the lack of understanding of habitat requirements.

Some types of geology have a high likelihood of comprising subterranean fauna habitat as pores or voids are present (and also groundwater in the case of stygofauna).

The types of geology known to have a high likelihood of supporting stygofauna include:

Groundwater and voids present, e.g. -

- karst limestone;
- calcretes;
- alluvial formations (particularly when associated with palaeochannel aquifers); and
- fractured rock.

The types of geology known to have a high likelihood of supporting troglofauna include:

Geology with cavities, voids and caves, e.g. -

- karstic limestone;
- channel iron deposits, particularly pisolite in inverted landscape geomorphology;
- groundwater calcrete formations above water table;

- alluvium/colluvium habitats in valley-fill settings;
- banded ironstone formations, especially where hydrated zones occur or there is a lot of jointing or fracturing; and
- sandstone, where weathered and/or fractured (EPA 2013).

5. ASSESSMENT CONSTRAINTS

The conclusions presented are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of the field assessments. Also it should be recognised that site conditions can change with time. No seasonal sampling has been carried out as part of this fauna assessment.

Some fauna species are reported as potentially occurring within the Project area based on there being suitable habitat (quality and extent) in the defined area or immediately adjacent.

The habitat requirements and ecology of many of the species known to occur in the wider area are often not well understood or documented. It can therefore be difficult to exclude species from the potential list based on a lack of a specific habitat or microhabitat within the Project area. As a consequence of this limitation the potential fauna list produced is most likely an overestimation of those species that actually utilise the Project area for some purpose. Some species may be present in the general area but may only use the Project area itself on rare occasions or as vagrants.

In recognition of survey limitations, a precautionary approach has been adopted for this assessment. Any vertebrate fauna species that would possibly occur within the Project area (or immediately adjacent), as identified through ecological databases, publications, discussions with local experts/residents and the habitat knowledge of the Author, has been assumed to potentially occur.

6. RESULTS

6.1 FAUNA HABITAT ASSESSMENT

The broad scale terrestrial fauna habitats within the Project area presented below are based primarily on vegetation and associated landforms identified by Botanica (2016). The extent of the identified vegetation communities are shown in Figure 3 with a summary description based on landform given below.

Additional information can be found in the flora and vegetation report for the site (Botanica 2016).

Table 1: Main Terrestrial Fauna Habitats within the Project Area.

No.	Fauna Habitat Description	Example Image
1	Closed Depressions Dense low shrub of *Tecticornia indica* in playa. Total Area = ~1,333 ha (~17.5%)	
2	Clay-Loam Plains Forest of *Acacia incurvaneura* over heath of *Eremophila margarethae* and open low grass of *Eriachne mucronata/ Eragrostis eriopoda* or Forest of *A. caesaneura/* tree mallee of *Eucalyptus lucasii* over low scrub of *Eremophila latrobei* and dense hummock grass of *Triodia desertorum* (pictured). Total Area = ~1,122 ha (~14.7%)	
3	Drainage Depressions Forest of *A. caesaneura* over low scrub of *Senna artemisioides* and open low grass of *E. eriopoda.* Total Area = ~200 ha (~2.6%)	

No.	Fauna Habitat Description	Example Image
4	Rocky Hillslopes Forest of *A. quadrimarginea* over low scrub of *S. artemisioides* / *Senna* sp and open dwarf scrub of *Ptilotus obovatus*. Total Area = ~308 ha (~4.0%)	
5	Quartz/ Rocky Plains Open low woodland of *A. caesaneura/A. incurvaneura* over low woodland of *A. burkittii/ Eremophila fraseri* and open dwarf scrub of *P. obovatus*/ very open bunch grass of *E. eriopoda*. Total Area = ~539 ha (~7.1%)	
6	Sand Dunes Low woodland of *A. caesaneura/ A. incurvaneura* over low scrub of *A. ramulosa/ Melaleuca interioris* and hummock grass of *T. desertorum.* Total Area = ~1,257 ha (~16.5%)	
	Gypsum Dunes Forest of *Casuarina pauper* over open low scrub of *A. burkittii* and open dwarf scrub of *Atriplex vesicaria/ Rhagodia eremaea*. Total Area = ~1,113 ha (~14.6%)	

No.	Fauna Habitat Description	Example Image
7	Sand Loam Plains Low woodland of *A. caesaneura* over open low scrub of *A. burkittii* and dwarf scrub of *Maireana pyramidata*/ hummock grass of *T. desertorum.* Total Area = ~646 ha (~8.5%)	
7	Sandplains Low woodland of *E. gongylocarpa* over open low scrub of *Eremophila platythamnos* and dense hummock grass of *T. desertorum* (pictured) or Open tree mallee of *E. concinna* over open low scrub of *Aluta maisonneuvei / Dodonaea viscosa* and dense hummock grass of *T. desertorum.* Total Area = ~260 ha (~3.4%)	
8	Lake Bed Salt crust bordered by dense low shrub of *Tecticornia indica* (Unit 1) Total Area = ~856 ha (~11.2%)	

6.2 POTENTIAL VERTEBRATE FAUNA INVENTORY

6.2.1 Vertebrate Fauna

A list of expected vertebrate fauna species likely to occur in the Project area was compiled from information obtained during the literature review and after consideration of the fauna habitats present, the results of which are presented in Appendix B. The results of some previous fauna surveys carried out in the general area are summarised in this species listing as are the DPaW NatureMap database search results. The raw database search results from NatureMap

(DPaW 2015b) and the Protected Matters Search Tool (DotE 2015) are contained within Appendix C.

Table 2 summarises the numbers of vertebrate fauna species which may be present within areas of suitable habitat within the Project area based on the detailed list held Appendix B.

Table 2: Summary of Potential Vertebrate Fauna Species (as listed in Appendix B)

Group	Total number of potential species	Potential number of specially protected species	Potential number of migratory species	Potential number of priority species
Amphibians	9	0	0	0
Reptiles	107	1	0	1
Birds	126	1	6	2
Non-Volant Mammals	23[5]	0	0	1
Volant Mammals (Bats)	8	0	0	0
Total	**273[5]**	**2**	**6**	**4**

Superscript = number of introduced species included in total.

Not all species listed in existing databases and publications as potentially occurring within the region (i.e. *EPBC Act's* threatened fauna and migratory species lists, DPAW's NatureMap fauna database and various publications) are likely to be present within the Project area. The list of potential fauna takes into consideration that firstly the species in question is not known to be locally extinct and secondly that suitable habitat for each species, as identified during the habitat assessment, is present within the Project area, though compiling an accurate list has limitations (see Section 5 above).

It should be noted that even if some additional species were omitted the resulting list would still very likely represent an over estimation of the fauna species utilising the Project area (either on a regular of infrequent basis) as a result of the precautionary approach adopted for the assessment.

6.2.2 Vertebrate Fauna of Conservation Significance

A review of the *EPBC Act* threatened/migratory fauna list, DPAW's fauna database and priority lists, unpublished reports and scientific publications identified a number of threatened, specially protected, migratory or priority fauna

species as having been previously recorded or as being potentially present in the general vicinity of the Project area.

The current status on site and/or in the general area of some species is difficult to determine, however, based on the habitats present and, in some cases, recent nearby records, the following species of conservation significance can be regarded as possibly utilising the Project area for some purpose at times, these being:

- **Buff-snouted Blind Snake *Anilios margaretae*** – P2 (DPaW Priority Species)
  The status of this species in the Project area is difficult to determine, however given that suitable habitat occurs (i.e. playa and sheoak, sand dunes and sand plains) its presence cannot be discounted.

- **Great Desert Skink *Liopholis kintorei*** – S3 *(WC Act),* Vulnerable *(EPBC Act)*
  The status of this species in the Project area is difficult to determine as there are no nearby recent records. Habitat in some sections of the Project area does however appear superficially suitable (clay loam plains, sand loam plains, sand plains and sand dunes vegetated with spinifex) and the site falls within the historical range of the species.

- **Peregrine Falcon *Falco peregrinus*** – S7 (*WC Act*)
  The species potentially utilises some sections of the Project area as part of a much larger home range for foraging purposes only. At any one time it would however only be represented by a very small number of individuals (one or two) and then only for limited periods.

- **Migratory Shorebirds** – S5 (*WC Act*), Migratory (*EPBC Act*)
  Several migratory waders are listed as potential species based on available information, though frequency of occurrence would be very low and opportunistic.

- **Princess Parrot *Polytelis alexandrae*** – P4 (DPaW Priority Species), Vulnerable (*EPBC Act*)
  The species may frequent the Project area at times, but given it is highly nomadic, its frequency of occurrence would be very low and generally temporary. Areas containing *Euclayptus gongylocarpa* woodland are of most significance as they have the potential to contain larger trees with hollows that may represent potential breeding habitat.

- **Rainbow Bee-eater *Merops ornatus*** – S5 (*WC Act*), Migratory (*EPBC Act*)
  The rainbow bee-eater is a very common and widespread seasonal visitor to the southern half of WA and would not be specifically attracted to the site. Nests within burrows made into soil and therefore some

potential for the species to breed in parts of the Project area where ground conditions are suitable.

- **Striated Grasswren (sandplain) *Amytornis striatus striatus*** – P4 (DPaW Priority Species)
  While records in the general area are sparse (DpaW 2015b) the striated grasswren can be considered a potential species given the presence of suitable habitat.

- **Brush-tailed Mulgara** *Dasycercus blythi* – P4 (DPaW Priority Species)
  Current status in the Project area is difficult to determine and there is a paucity of records of this species in the wider area, the closest (35 km south west), most recent being from 1994 (De La Poer Range NR – DPaW 2015b). Habitat in some sections of the Project area does however appear suitable (e.g. sand plains, sand ridges, Acacia shrubland on loamy sand) and therefore it must be considered a potential species.

- **Bilby *Macrotis lagotis*** – S3 (WC Act), Vulnerable (EPBC Act)
  Current status in the Project area is difficult to determine and there is a paucity of records of this species in the wider area, the closest (35 km south west), most recent being from 1994 (De La Poer Range NR – DPaW 2015b). Habitat in some sections of the Project area does however appear suitable (e.g. sand plains, sand ridges, Acacia shrubland on loamy sand) and therefore it must be considered a potential species.

It should be noted that while habitats onsite for one or more of the species listed above are considered possibly suitable, some or all may be marginal in extent/quality and therefore the fauna species considered as possibly occurring may in fact only visit the area for short periods as infrequent vagrants.

A number of other species of conservation significance, while possibly present in the general area and/or the Great Victoria Desert region are not listed as potential species due to the Project area being outside of their main currently recognised range, a lack of suitable habitat or known/very likely local or regional extinction (and no subsequent recruitment from adjoining areas).

Additional details on these species and others, along with reasons for the omission of some from the potential listing are provided in Table 3 and Appendix D.

Table 3: Likelihood of Occurrence – Vertebrate Fauna Species of Conservation Significance (continues on following pages)

Species	Conservation Status (see Appendix A for codes)			Habitat Present	Likelihood of Occurrence
	EPBC Act	*WC Act*	DPaW Priority		
Buff-snouted Blind Snake *Anilios margaretae*	-	-	P2	Yes	Possible though no nearby, recent records.
Great Desert Skink *Liopholis kintorei*	Vulnerable	S3	-	Yes	Possible though no nearby, recent records.
Malleefowl *Leipoa ocellata*	Vulnerable	S3	-	No	Unlikely. Habitat unsuitable. No recent records. Very occasional transients only.
Eastern Great Egret *Ardea alba*	Migratory	S5	-	No/Very Marginal	Unlikely. Outside main documented range. No previous records in the wider area. Very occasional transients only after significant rain events.
Peregrine Falcon *Falco peregrinus*	-	S7	-	Yes	Possible, though frequency of occurrence and probability of breeding would be low.
Grey Falcon *Falco hypoleucos*	-	S3	-	No/Marginal	Unlikely but may occur very occasionally (foraging only).
Migratory Shorebirds	Migratory/Various	S5	-	Yes/Marginal	Possible but only very occasionally as transients only after significant rain events.
Oriental Plover *Charadis veredus*	Migratory	S5	-	No/Marginal	Unlikely but may occur very occasionally
Night Parrot *Pezoporus occidentalis*	Endangered	S2	-	Yes	Unlikely. Species appears to be locally/regionally extinct.
Princess Parrot *Polytelis alexandrae*	Vulnerable	-	P4	Yes	Possible.
Rainbow Bee-eater *Merops ornatus*	Migratory	S5	-	Yes	Possible
Striated Grasswren (sandplain) *Amytornis striatus striatus*	-	-	P4	Yes	Possible.
Grey Wagtail *Motacilla cinerea*	Migratory	S5	-	No	Unlikely. Rarely recorded in this area and habitat is unsuitable.
Yellow Wagtail *Motacilla flava*	Migratory	S5	-	No	Unlikely. Rarely recorded in this area and habitat is unsuitable.

Species	Conservation Status (see Appendix A for codes)			Habitat Present	Likelihood of Occurrence
	EPBC Act	*WC Act*	DPaW Priority		
Brush-tailed Mulgara *Dasycercus blythi*	-	-	P4	Yes	Possible
Southern Marsupial Mole *Notoryctes typhlops*	-	-	P4	Yes/Marginal	Unlikely. Habitat appears to be marginal, isolated and limited in extent.
Sandhill Dunnart Sminthopsis psammophila	Endangered	S2	-	Nol	Unlikely. Habitat appears to be unsuitable.
Bilby *Macrotis lagotis*	Vulnerable	S3	-	Yes	Possible

6.3 INVERTEBRATE FAUNA OF CONSERVATION SIGNIFICANCE

6.3.1 Literature Review

The NatureMap database search of the area (40km radius) only returned two invertebrate species records (DPaW 2015b). Both species (*Isopeda leishmanni* – a spider, and *Urodacus yaschenkoi – a scorpion)* are widespread terrestrial species that are unlikely to represent SREs.

The Protected Matters Search Tool (DotE 2015) contained no reference to invertebrates.

The WAM invertebrate database search, filtered for potential SREs, returned 26 records of nine species. Most of these specimens (15) were collected well outside (>100km) of the Lake Wells Project area. The closest record (35km south west) is of a scorpion (*Urodacus* "`SCO005, De La Poer") collected in 2009 from the De La Poer Nature Reserve. The next closest records (~75km south west) are of seven specimens of the scorpion *Urodacus* "SCO018, laverton4" collected in 2006/2007, north east of Duketon. Further south near Erlistoun a trapdoor spider (*Aname*`sp. (juvenile, ?MYG216)`) and two specimens of pseudoscorpion (*Synsphyronus*`sp. nov. Laverton`) have also been recorded.

A Level 2 fauna survey was carried out by Keith Linbeck and Associates in 2011and 2012 (KLA 2012) at Yamarna Station (120km south east of the Lake Wells Project area) during which time 54 individual invertebrates were collected and passed onto specialists at the WAM for identification and an assessment of SRE status.

Taxonomic identifications (Burger *et al.* 2012, Volschenk 2012 and Whisson 2012) were somewhat inclusive but indicated that the specimens submitted represented two potential SRE species, comprising one species of Mygalomorph

spider and one species of pseudoscorpion. The status of the remaining three species (two Mygalomorph spiders and one species of pseudoscorpion) was unclear.

Another Level 2 fauna survey within Yamarna Station carried out in late 2014 (Rapallo 2015) resulted in the collection of a total of 37 invertebrate specimens, comprised of eight spiders, 27 scorpions, and two pseudoscorpions.

Taxonomic identifications (Phoenix 2015a and Volschenk 2015a) revealed that the specimens contained six potential SRE species, comprising three species of Mygalomorph spider, and three species of scorpion.

A targeted terrestrial short range endemic invertebrate survey was undertaken within Yamarna Station in 2015 (Harewood 2016). This survey resulted in the collection of 249 specimens representing 20 species from the targeted SRE groups including scorpions, spiders, pseudoscorpions, isopods and centipedes.

Eight of the 20 species were identified as representing potential SREs. These are comprised of two species of scorpion, four species of spider, one species of isopod and one species of centipede (Note: some species possibly conspecific with those collected previously by Rapallo 2015).

A detailed assessment of subterranean invertebrate fauna (stygofauna and troglofauna) was also carried out within Yamarna Station by Bennelongia in 2013 (Bennelongia 2013).

Thirty-three stygofauna species representing eight higher level groups (predominantly copepods) were collected during the assessment, mainly within a potential borefield area situated over the Yeo Palaeochannel.

Of the 33 stygofauna species collected, two species (*Nematoda* sp. and *Turbellaria* sp.) were assessed as not requiring environmental impact assessment, four species of copepod were known to be relatively widespread across the Murchison, and a further three species were higher level identifications for which ranges could not be determined. The remaining 24 species are known only from the Yamarna Station area and many of them are expected to occur only in the calcrete unit lying in the Yeo Palaeochannel (Bennelongia 2013).

Only five species of troglofauna representing four Classes and four Orders of invertebrates were collected during the assessment by Bennelongia, indicating a depauperate troglofauna community (i.e. few species are present).

A stygofauna survey undertaken by ecologia in 2009 at the Tropicana Gold Project (250 km south of the Lake Wells Project area) yielded no stygofauna (ecologia 2009d). The salinities of bores that were sampled ranged from fresh to saline (salinity 0.0002–31.9 g/L respectively) and averaged 16.5 g/L, 3.33 g/L and

12.04 g/L in each of the three sampling seasons. Depth to standing water table of sample bores ranged from about 6.75 m to 51.4 m, averaging 32.6 m.

An additional stygofauna survey by Subterranean Ecology within the Minigwal water supply area of the Tropicana Gold Project also did not detect any stygofauna (Subterranean Ecology 2009). The bores surveyed had salinities ranging from 25.6 to 133 g/L and depth to water averaging 49 m.

6.3.2 Invertebrate Habitat Assessment

Sheltered habitats and microhabitats specifically referred to by the EPA (2009) and considered most likely to be harbouring SREs appear to be absent for the Lake Wells Project area. No mesic environments such as slopes with south-west facing aspects, rock piles, drainage systems, deep gorges, natural springs, fire refuge areas such as cliffs/isolated rock piles and other similar habitats were identified as being present. While the Project area does contain "drainage depressions" these would typically be dry and have only subtle differences is soil structure and vegetation composition compared to adjoining habitats (e.g. quartz rocky plains and rocky hillslopes and therefore are not considered of special significance to SREs.

The apparent absence of these habitat types does not totally preclude the presence of terrestrial invertebrate SREs but as the habitats that are present (e.g. sand plains, clay loam plains, sand loam plains) appear to be common and widespread in the general area it is very unlikely that any SREs, if in fact present, would be totally restricted to the Project area itself.

The lake bed itself does however represent a "habitat isolate" and can be considered more likely to support SREs than the extensive swathes of contiguous habitat which surround it (EPA 2009). In addition to some of the primary invertebrate groups often with SRE representatives (scorpions, myglamorph spiders, pseudoscorpions, isopods, centipedes, millipedes and snails) the lake bed also has the potential to harbour "salt lake specialists" such as wolf spiders, tiger beetles, crickets, ants, and earwigs which appear to be the typical invertebrate assemblage of playas in Western Australia (Phoenix 2013a). It is therefore possible that if present some of these invertebrates may represent locally endemic species restricted to the lake bed area alone.

With respect to the lake beds subsurface geology, historic and recent Goldphyre drilling has revealed a variable regolith horizon consisting of surficial or near surface evaporite and sand/silt, silcrete +- laterite, common lake clays with some well sorted sand units and puggy lacustrine clays with minor sand/silt. Archaean basement rocks including transitional porphyry, granite, ultramafic and amphibolite types.

Groundwater under the lake is hypersaline and therefore it is considered unlikely to be suitable for stygofauna (subterranean, water dwelling species) given most

species cannot persist where concentrations exceed 60,000 mg/l (EPA 2007). This coupled with the typically low porosity of the dominant lacustrine sediments (e.g. puggy clays) also suggests stygofauna are unlikely to be present.

Lake Wells is an ephemeral salt lake and is therefore dry for most of the year except for short periods after rainfall. The lake does however have a very shallow water table positioned just below the surface and as a consequence the underlying sedimentary units are permanently saturated with salt brine. Troglofauna (air breathing/open void dwelling subterranean species) are therefore considered very unlikely to occur at Lake Wells given the lack of suitable habitat.

7. CONCLUSION & RECOMMENDATIONS

The Level 1 fauna assessment of the Lake Wells Potash Project area reported on here was undertaken for the purposes of providing baseline data on the fauna assemblages present, to identify possible development constraints and to allow for the identification of information gaps.

With respect to native vertebrate fauna, 26 mammals (including 8 bat species), 126 bird, 107 reptile and nine frog species have previously been recorded in the general area and therefore have the potential to occur in the Project area.

The current status on site and/or in the general area of some species is difficult to determine, however, based on the habitats present and, in some cases, recent nearby records, 14 vertebrate fauna species of conservation significance were identified as possibly utilising the Project area for some purpose at times. It is however not possible to ascertain the exact status of any of these species in the area without a detailed site specific survey.

The invertebrate assessment indicates that while terrestrial invertebrate SRE species maybe present, most are unlikely to be restricted to the Project area itself given the continuity of most habitats into adjoining areas. However, the lake bed making up Lake Wells does have the potential to harbour "salt lake specialists" such as wolf spiders, tiger beetles, crickets, ants, and earwigs and it is therefore considered possible that if present some of these invertebrates may represent locally endemic species restricted to this area alone. As with vertebrate fauna species it is unclear what terrestrial invertebrate species, if any, may be present or their significance without a suitable field survey.

Groundwater under the lake is hypersaline and therefore it is considered unlikely to be suitable for stygofauna (subterranean, water dwelling species). The high water table levels present also suggest that troglofauna (air breathing/open void dwelling subterranean species) are also unlikely to be present.

The Lake Wells Potash Project is currently still in exploration phase with some resource modelling and hydrogeology work, to assess certain aspects of the viability of establishing a full scale operation, currently being undertaken. As specific details of any final proposal to extract, process and transport potash from the area are not available at this point in time and the exact status of most fauna species of conservation significance in the area is unknown, the potential impacts on fauna is difficult to define with any certainty.

Despite this it is apparent that certain aspects of any future proposal for extracting subsurface brine and the construction of associated infrastructure has the potential to impact on some fauna species.

In particular ground dwelling vertebrates such as the great desert skink, brush-tailed mulgara and the bilby, which have limited dispersal abilities, are most likely to be impacted on by any development. All three species construct burrows that the animals live in during the day and the destruction of these refuges could have a significant impact on a population's ability to persist in the area. Loss of hollow bearing trees, a limited resource in many areas, has the potential to impact on obligate hollow nesters such as the princess parrot.

There is also potential for invertebrates with distributions restricted to the Lake and/or habitat bordering to be directly impacted upon. The possible drawdown of the near surface water tables may also affect riparian habitats surrounding the Lake which may also impact on vertebrate and invertebrate fauna species.

It will therefore be important to plan any future proposal for development on or near the Lake so that the above-mentioned potential impacts (and any other subsequently identified potential impacts) do not eventuate. To allow for this planning to progress various information gaps relating to fauna utilisation, habitat requirements, hydrology and surface water flow, for example, may need to be filled.

To assist in obtaining information that will assist in planning and identifying likely impacts the following recommendations are therefore provided:

Terrestrial Vertebrate Fauna Survey

A Level 2 fauna survey should be carried out to provide information on the fauna assemblage present in the area, in particular species of conservation significance and areas of most likely impact. The survey should include but not necessarily be limited to:

- A targeted survey for the great desert skink, brush-tailed mulgara and bilby to determine their status in the area is recommended. This should include ground based searches for burrows tracks, scats and individuals, nocturnal surveys, trapping (cages and Elliot's) and the long term (3 – 4 months) deployment of motion sensing cameras;

- A survey to determine the presence/absence of suitable breeding habitat (i.e. hollow bearing threes) for the princess parrot should carried out; and

- Surveys of a sufficient type and scale to assist in determining the presence/absence of other species of conservation significance listed in Table 3.

Invertebrates

A targeted invertebrate survey across the lake playa should be carried out to rule out or confirm the presence of SREs and endemic salt lake specialists such as but not limited to wolf spiders, tiger beetles, crickets, ants, and earwigs. The survey should include but not necessarily be limited to:

- An invertebrate survey on the Lake and some adjoin areas to address knowledge gaps. This should include active searching and pit trapping;

- If possible regional data points should be included (e.g. Lake Wells to east) to provide better context for Project area data.

Migratory Waders/Other Wetland species

The degree to which migratory waders and other water birds rely on this section of Lake Wells would appear to be very low but information is limited. It is therefore recommended that the following information be gathered during the course of other survey work:

- Recording of all evidence of usage (e.g. species numbers and locations) concurrent with other studies, both on the Lake and nearby freshwater wetlands (if any) (to assist in determining relative importance).

The actual need to carry out some or all of these surveys should be determined after consultation with the relevant regulatory authorities to ensure the information to be collected is actually required as part of any EIA and to confirm the scope of works and resulting data will comply with their requirements.

8. BIBLIOGRAPHY

(not necessarily cited)

Adams, M., Cooper, N. and Armstrong, J. (2002). Revision of Dasycercus Systematics. Unpublished Report: South Australian Department for Environment and Heritage.

Anstis, M. (2013). Tadpoles and Frogs of Australia. New Holland Publishers, Sydney.

Aplin, K. P. and Smith, L.A. (2001). Checklist of the frogs and reptiles of Western Australia, Records of the Western Australian Museum Supplement No. 63, 51-74.

ASRIS (2014). Atlas of Australian Soils Database. Australian Soil Resource Information System.

Atlas of Living Australia (ALA) (2016). www.ala.org.au. Accessed February 2016.

Barrett, G., Silcocks, A., Barry, S., Cunningham, R. and Poulter, R. (2003). The New Atlas of Australian Birds. Royal Australasian Ornithologists Union, Victoria.

Barton, B. & Cowan, M. (2001). Great Victoria Desert 1 (GVD1 – Great Victoria Desert Shield subregion). In; A Biodiversity Audit of Western Australia. Eds McKenzie, N.L., May, J.E. and McKenna, S. Department of Conservation and Land Management, Perth.

Beard, J. S. (1990). Plant life of Western Australia. Kangaroo Press, NSW.

Bennelongia Environmental Consultants (Bennelongia) (2013). Yamarna Project Subterranean Fauna Assessment. Unpublished report for Gold Road Resources. October 2013.

Benshemesh, J. (2004). Recovery Plan for Marsupial Moles *Notoryctes typhlops* and *N. caurinus*, 2005-2010. [Online]. Northern Territory Department of Natural Resources, Environment and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/marsupial-moles.html.

Botanica Consulting (Botanica) (2016). Level 1 Flora & Vegetation Survey of the Lake Wells Potash Project Area. Unpublished report for Goldphyre Resources Limited. January 2016.

Burbidge, A. (2004). Threatened Animals of Western Australia.

Burbidge, A. A., K. A. Johnson, P. J. Fuller, & R. I. Southgate (1988). Aboriginal knowledge of the mammals of the central deserts of Australia. Australian Wildlife Research. 15:9-39.

Bush, B., Maryan, B., Browne-Cooper, R. & Robinson, D. (2007). Reptiles and Frogs in the Bush: Southwestern Australia. UWA Press, Nedlands.

Cale, B. (2000). Thick-billed Grasswren (western subspecies) (*Amytornis textilis textilis*), Interim Recovery Plan. 2000-2002. WA Department of Conservation and Environment.

Christidis, L. and Boles, W.E. (2008). Systematics and Taxonomy of Australian Birds. CSIRO Publishing, Melbourne

Churchill, S. (2008). Australian Bats. Second Edition, Allen & Unwin.

Cogger, H.G. (2014). Reptiles and Amphibians of Australia. 7th Edition. CSIRO Publishing.

Cogger, H. G., Cameron E. E., Sadlier R. A. & Eggler, P. (1993). The Action Plan for Australian Reptiles. [Online]. Canberra, ACT: Australian Nature Conservation Agency. Available from: http://www.environment.gov.au/biodiversity/threatened/action/reptiles/index.html

Department of the Environment (DotE) (2013). Matters of National Environmental Significance. Significant Impact Guidelines 1.1*, EPBC Act* 1999.

Department of the Environment (DotE) (2015). *EPBC Act* Protected Matters Report: Point Search -27.28792 122.97744 (0km Buffer). Available from: http://www.environment.gov.au. Accessed 21 December 2015.

Department of Parks and Wildlife (DPaW) (2015a). Threatened and Priority Fauna Rankings. 3 November 2015.

Department of Parks and Wildlife (DPaW) (2015b). NatureMap Database Search – "By Circle" 122°58' 39" E, 27°17' 16" S (40km Buffer). Accessed 21 December 2015.

Duncan, Anne. & Baker, G. B. & Montgomery, Narelle. & Natural Heritage Trust (Australia) (1999). The action plan for Australian bats / edited by Anne Duncan, G. Barry Baker and Narelle Montgomery; with assistance from Lindy Lumsden *et al*. Natural Heritage Trust, Canberra.

ecologia (2009a). Tropicana Gold Project. Operational Area Vertebrate Fauna Assessment. Unpublished report for Tropicana Joint Venture. February 2009.

ecologia (2009b). Tropicana Gold Project. Tropicana-Transline Infrastructure Corridor, Level 1 Fauna Assessment. Unpublished report for Tropicana Joint Venture. July 2009.

ecologia (2009c). Neale Junction Reserve Fauna Assessment in collaboration with DEC. Unpublished report for Tropicana Joint Venture.

ecologia (2009d). Tropicana Gold Project. Stygofauna survey report. Ecologia Environment Pty Ltd. Unpublished report prepared for AngloGold Ashanti Australia Pty Ltd.

Environmental Protection Authority (EPA) (2002). Terrestrial Biological Surveys As An Element of Biodiversity Protection. Position Statement No. 3. EPA, Perth.

Environmental Protection Authority (EPA) (2003). Guidance for the Assessment of Environmental Factors – Consideration of Subterranean Fauna in groundwater and caves during environmental assessment in Western Australia. Guidance Statement No 54. EPA, Perth.

Environmental Protection Authority (EPA) (2004). Guidance for the Assessment of Environmental Factors - Terrestrial fauna surveys for environmental impact assessment in Western Australia. Guidance Statement No 56 EPA, Perth.

Environmental Protection Authority (EPA) (2007). Guidance for the Assessment of Environmental Factors – Sampling Methods and Survey Considerations for Subterranean Fauna in Western Australia. Guidance Statement No 54A (Technical Appendix to GA 54). EPA, Perth.

Environmental Protection Authority (EPA) (2009). Guidance for the Assessment of Environmental Factors – Sampling of Short Range Endemic Invertebrate Fauna for Environmental Impact in Western Australia. Guidance Statement No 20. EPA, Perth.

Environmental Protection Authority (EPA) (2013). Environmental Assessment Guideline for Consideration of subterranean fauna in environmental impact assessment in Western Australia. Environmental Assessment Guideline No. 12. EPA, Perth.

Environmental Protection Authority (EPA) and Department of Environment and Conservation (DEC) (2010). Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessments (eds B.M. Hyder, J. Dell and M.A. Cowan), Perth Western Australia.

Gaikhorst and Lambert (2008). Sandhill Dunnart Survey of the proposed Operational Area and Infrastructure Corridors (Pinjin and Bypass). Prepared for AngloGold Ashanti Australia.

GHD (2010). Second Round Sandhill Dunnart Surveys of the Proposed Operational Area and Infrastructure Corridor. Prepared for Tropicana Joint Venture.

Garnett, S.T., Szabo, J.K., Dutson, G. (2011). The Action Plan for Australian Birds 2010. CSIRO Publishing, Melbourne.

Glauret, L. (1961). A Handbook of the Lizards of Western Australia. Handbook 6, Western Australian Naturalists Club, Perth.

Greer, A.E. (2006). Encyclopaedia of Australian Reptiles. Australian Museum Online http://www.amonline.net.au/herpetology/research/encyclopedia.pdf Version date: 7 August 2006.

Government of Western Australia (2015). *Wildlife Conservation Act 1950*. Wildlife Conservation (Specially Protected Fauna) Notice 2015. Government Gazette, WA. 9 November 2015.

Hall, N. J., McKenzie, N. L. and Keighery, G. J. (eds) (1994). The Biological Survey of the Eastern Goldfields of WA - Pt 10: Sandstone-Sir Samuel and Laverton-Leonora Survey Areas. Records of the WAM, Supplement 47: 1 – 166.

Harewood, G. (2011). Terrestrial Fauna Survey (Level 1) of Yamarna Gold Project (Central Bore, Attila, Alaric, Haul Road and Khan North). Unpublished report for Gold Road Resources. September 2011.

Harewood G. (2014). Fauna Assessment (Level 1) Gruyere Project. Unpublished report for Gold Road Resources Ltd. July 2014.

Harewood G. (2015a). Southern Marsupial Mole (*Notoryctes typhlops*) – Additional Information on Presence/Absence - Gruyere Project Area. Unpublished letter report for Gold Road Resources Ltd. June 2015.

Harewood G. (2015b). Southern Marsupial Mole (*Notoryctes typhlops*) – Northern Borefield Area. Unpublished letter report for Gold Road Resources Ltd. November 2015.

Harewood G. (2015c). Terrestrial Invertebrate Survey – Gruyere Project Area. Unpublished letter report for Gold Road Resources Ltd. December 2015.

Hart, R.P. and Kitchener, D.J., 1986. First Record of *Sminthopsis psammophila* (Marsupialia: Dasyuridae) from Western Australia. Records of the Western Australian Museum 13(1): 139-144.

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

How, R., Cooper, N.K. and Bannister, J.L. (2001). Checklist of the mammals of Western Australia, Records of the Western Australian Museum Supplement No. 63, 91-98.

Jackson, S. & Groves, C. (2015). Taxonomy of Australian mammals. CSIRO Publishing.

Johnson, K.A. & Walton, D.W. (1989). *Notoryctidae*. In: Walton, D.W. & Richardson, B.J, eds. Fauna of Australia. Mammalia. 1B:591-602. Canberra: Australian Government Publishing Service.

Johnstone, R.E. (2001). Checklist of the birds of Western Australia, Records of the Western Australian Museum Supplement No. 63, 75-90.

Johnstone, R.E. and Storr, G.M. (1998). Handbook of Western Australian Birds: Volume 1 – Non-passerines (Emu to Dollarbird). Western Australian Museum, Perth Western Australia.

Johnstone, R.E. and Storr, G.M. (2004). Handbook of Western Australian Birds: Volume 2 – Passerines (Blue-winged Pitta to Goldfinch). Western Australian Museum, Perth Western Australia.

Judd, S. (2015). Terrestrial Isopod Identification for the Gruyere Project area, Yamarna Station. Unpublished report prepared for Greg Harewood (on behalf of GRRs). November 2015.

Keighery, B.J. (1994). Bushland Plant Survey: a Guide to Plant Community Surveys for the Community. Wildflower Society of Western Australia (Inc.) Nedlands, Western Australia.

Keith Lindbeck and Associates (KLA) (2012). Fauna Assessment (Level 2) Yamarna Project. Unpublished report for Gold Road Resources. October 2012.

Kingfisher Environmental Consulting (2014a). Murrin Murrin – Sunrise Dam Infrastructure Corridor Level 1 Fauna Survey. Unpublished report for AngloGold.

Kingfisher Environmental Consulting (2014b). Sunrise Dam – Tropicana Infrastructure Corridor Level 1 Fauna Survey. Unpublished report for AngloGold.

Martnick and Associates Pty Ltd (1996). Environmental Appraisal – Yamarna Gold Project Area. Unpublished report for Zanex NL. January 1996.

Masters, P., Dickman, C. R., and Crowther, M. (2003). Effects of cover reduction on mulgara *Dasycercus cristicauda* (Marsupialia: Dasyuridae), rodent and invertebrate populations in central Australia: implications for land management. Austral Ecology 28, 658-665.

MBS Environmental (2014). Gruyere Project Desktop Environmental Review and Work Program. Unpublished report for Gold Road Resources. February 2014.McKenzie, N.L. and Hall, N.J. (1992). The Biological Survey of the Eastern Goldfields of WA - Pt 8: Kurnalpi – Kalgoorlie study area. Records of the WAM, Supplement 41: 1 – 125.

McAlpin, S. (2001). A recovery plan for the Great Desert Skink (Egernia kintorei) 2001-2011. Page(s) Jan-24. [Online]. Arid Lands Environment Centre. Arid Lands

Environment Centre, Alice Springs. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/recovery/great-desert-skink/index.html.

Menkhorst, P. and Knight, F. (2011). A Field Guide to the Mammals of Australia. Third Edition, Oxford University Press, Melbourne.

Morcombe, M. (2004). Field Guide to Australian Birds. Steve Parish Publishing, Archerfiled, Queensland.

Muir, B. G., (1977). Biological Survey of the Western Australian Wheatbelt. Pt 2. Vegetation and habitat of the Bendering Reserve. Rec. West. Aust. Mus. Suppl. 3.

Ninox Wildlife Consulting (2009). A Level One Survey of the Vertebrate Fauna, Infrastructure Corridor – Pinjin Option. L 31/57, L 39/185, Pinjin – Tropicana Gold Project. Unpublished report for Tropicana Joint Venture. January 2009.

Pearson, D., P. Davies, N. Carnegie & J. Ward (2001). The Great Desert Skink (*Egernia kintorei*) in western Australia: distribution, reproduction and ethno-zoological observations.:64-68.

Pearson, D.J. and Robinson, A.C. (1989). New records of the Sandhill Dunnart, *Sminthopsis psammophila* (Marsupialia: Dasyuridae) in south and Western Australia. Journal of Australian Mammalogy 13: 57-59.

Phoenix Environmental Sciences (PES) (2013a). Short-range endemic invertebrate fauna survey of the Lake Disappointment Potash Project. Prepared for Botanica Consulting, on behalf of Reward Minerals Ltd. July 2013.

Phoenix Environmental Sciences (PES) (2013b). Subterranean fauna desktop review of the Lake Disappointment Potash Project. Prepared for Botanica Consulting, on behalf of Reward Minerals Ltd. August 2013.

Phoenix Environmental Sciences (2014). Identification and assessment of short-range endemism of trapdoor spiders from Yamana [sic] Station, Western Australia. Unpublished report prepared for Botanica Consulting.

Phoenix Environmental Sciences (2015a). Identification and assessment of short-range endemism of invertebrates from Yamarna Station, Western Australia. Unpublished report prepared for Rapallo Ltd.

Phoenix Environmental Sciences (2015b). Identification and assessment of short-range endemism of trapdoor spiders from Gruyere Project (Yamarna Station), Western Australia. Unpublished report prepared for Greg Harewood (on behalf of GRRs).

Pizzey, G & Knight, F. (2012). The Field Guide to the Birds of Australia. 9th Edition. Harper Collins, Sydney.

Rapallo Environmental (2015). Fauna Survey of the Gruyere Project Area. Unpublished report for Gold Road Resources Limited. May 2015.

Schodde, R. and Mason, I. J. (1999). The Directory of Australian Birds: Passerines. CSIRO, Collingwood, Victoria.

Simpson, K. and Day, N. (2010). Field Guide to the Birds of Australia. Penguin Books, Ringwood.

Storr, G.M., Smith, L.A. and Johnstone R.E. (1983). Lizards of Western Australia II: Dragons and Monitors. WA Museum, Perth.

Storr, G.M., Smith, L.A. and Johnstone R.E. (1990). Lizards of Western Australia III: Geckos and Pygopods. WA Museum, Perth.

Storr, G.M., Smith, L.A. and Johnstone R.E. (1999). Lizards of Western Australia I: Skinks. Revised Edition, WA Museum, Perth.

Storr, G.M., Smith, L.A. and Johnstone R.E. (2002). Snakes of Western Australia. Revised Edition, WA Museum, Perth.

Subterranean Ecology (2009). Stygofauna survey Tropicana Gold Project Minigwal water supply area. Subterranean Ecology Pty Ltd. Unpublished report prepared for AngloGold Ashanti Australia Ltd, Independence Group NL.

Terrestrial Ecosystems (2011). Level 2 Fauna Risk Assessment for the Granny Deeps Project Area. Unpublished report. February 2011.

Thompson, S & Thompson, G (2006). Reptiles of the Western Australian Goldfields. Published by the Goldfields Environmental Management Group.

Tyler M.J. & Doughty P. (2009). Field Guide to Frogs of Western Australia, Fourth Edition, WA Museum, Perth.

Tyler M.J., Smith L.A. and Johnstone R.E. (2000). Frogs of Western Australia, Revised Edition, WA Museum, Perth.

Thackway, R. and Cresswell, I.D. (1995). An Interim Biogeographic Regionalisation for Australia. Australian Nature Conservation Agency, Canberra.

Van Dyck, S., Gynther, I. & Baker, A. Eds (2013). Field Companion to The Mammals of Australia. Queensland Museum.

Van Dyck, S. & Strahan, R. Eds (2008). The Mammals of Australia. Third edition Queensland Museum.

Van Vreeswyk, A.M.E., Gilligan, S. A.., Pringle, H. J.., & Pringle, H. J. (1994). An inventory and condition survey of rangelands in the north-eastern goldfields, Western Australia. Pastoral resources and their management in the north-eastern goldfields, Western Australia, Technical Bulletin No.87. Department of Agriculture Western Australia, South Perth.

Volschenk, E. (Scorpion ID) (2012). Yamarna Scorpion Identification Report. Unpublished report for Keith Linbeck and Associates.

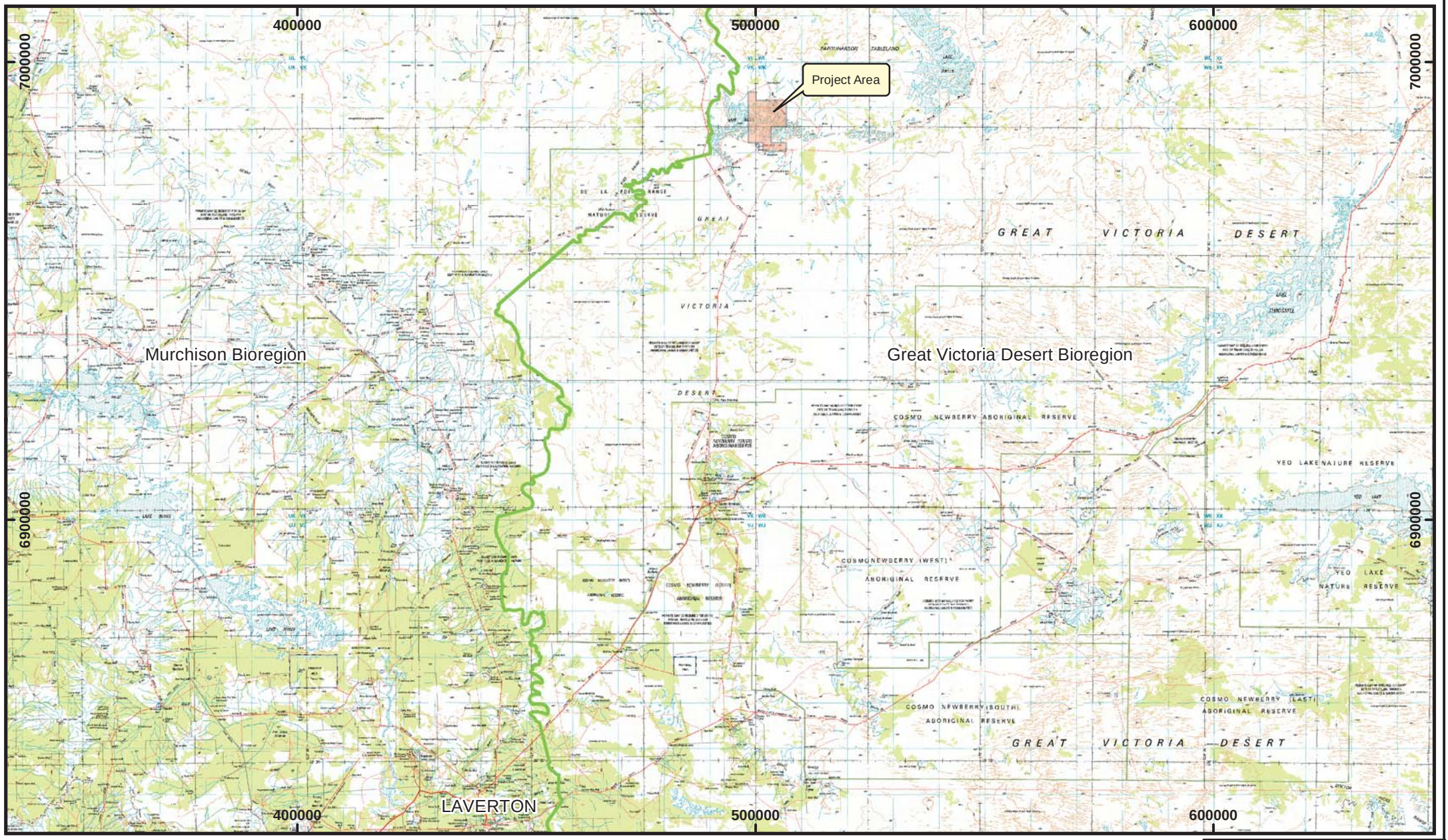
Volschenk, E. (Scorpion ID) (2015a). Taxonomic Report for Invertebrates Surveyed from Yamarna Station. Unpublished report prepared for Rapallo Ltd.

Volschenk, E. (Scorpion ID) (2015b). Taxonomic and Short-Range Endemism Assessment of Invertebrates Surveyed from Yamarna Station (November 2015). Unpublished report prepared for Greg Harewood (on behalf of GRRs). November 2015.

Wilson, S. and Swan, G. (2013). A Complete Guide to Reptiles of Australia. Third Edition, Reed, New Holland, Sydney.

Woinarski, J., Burbidge, A. & Harrison, P. (2014). The Action Plan for Australian Mammals 2012. CSIRO Publishing.

FIGURES



Legend

- Project Area
- Bioregion Boundary

0 10 20 30 40 50

Kilometres

MGA Zone 51

Fauna Survey

DRAWN:G Harewood

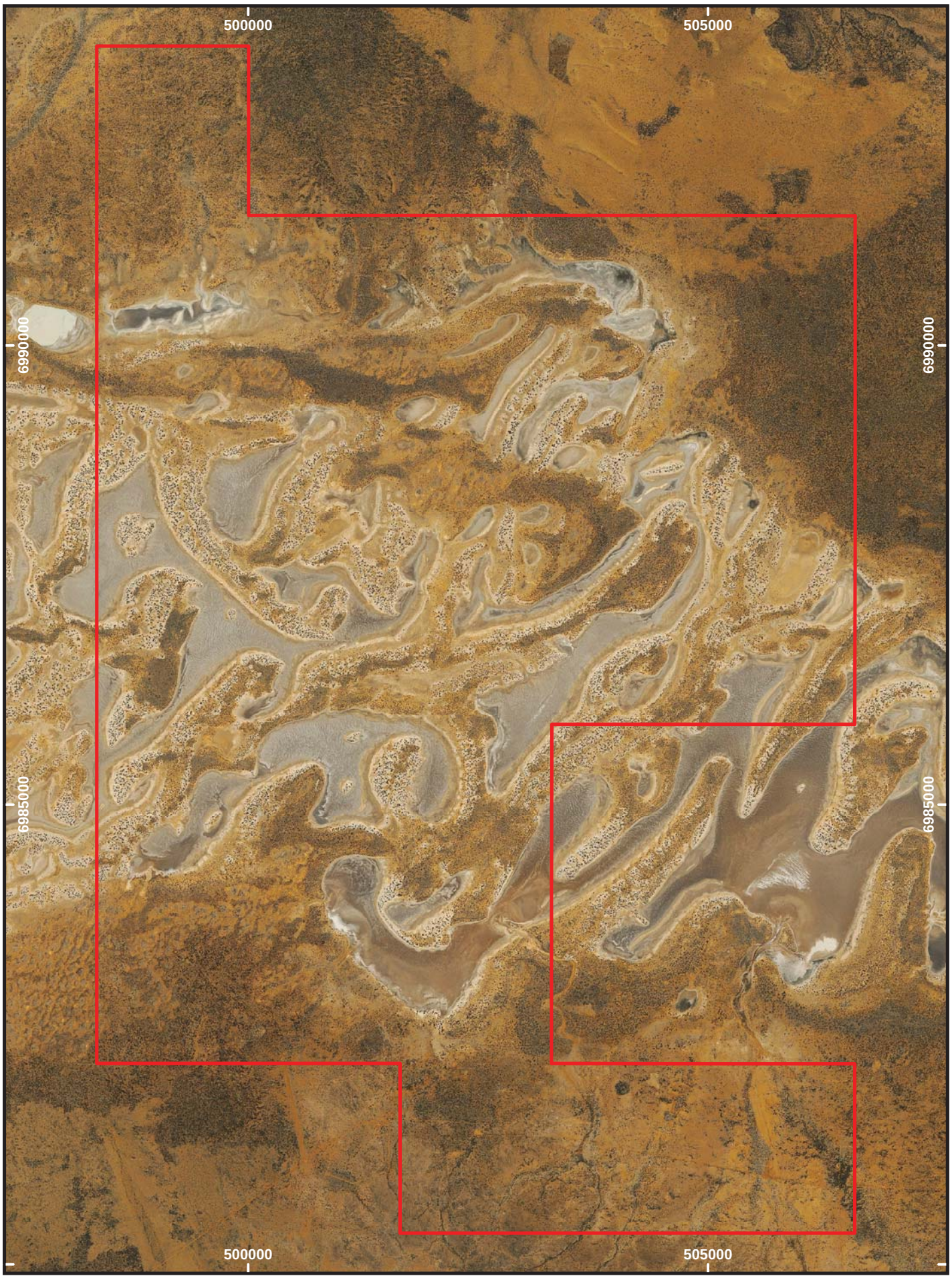
DATE : Feb 2016

SCALE: 1:1,100,000

Goldphyre Resources Limited
Lake Wells Potash Project

Project Area and Surrounds

Figure: 1



Legend

Project Area

0 0.5 1 1.5 2

Kilometres

Fauna Survey

Goldphyre Resources Limited
Lake Wells Potash Project

Project Area Air Photo

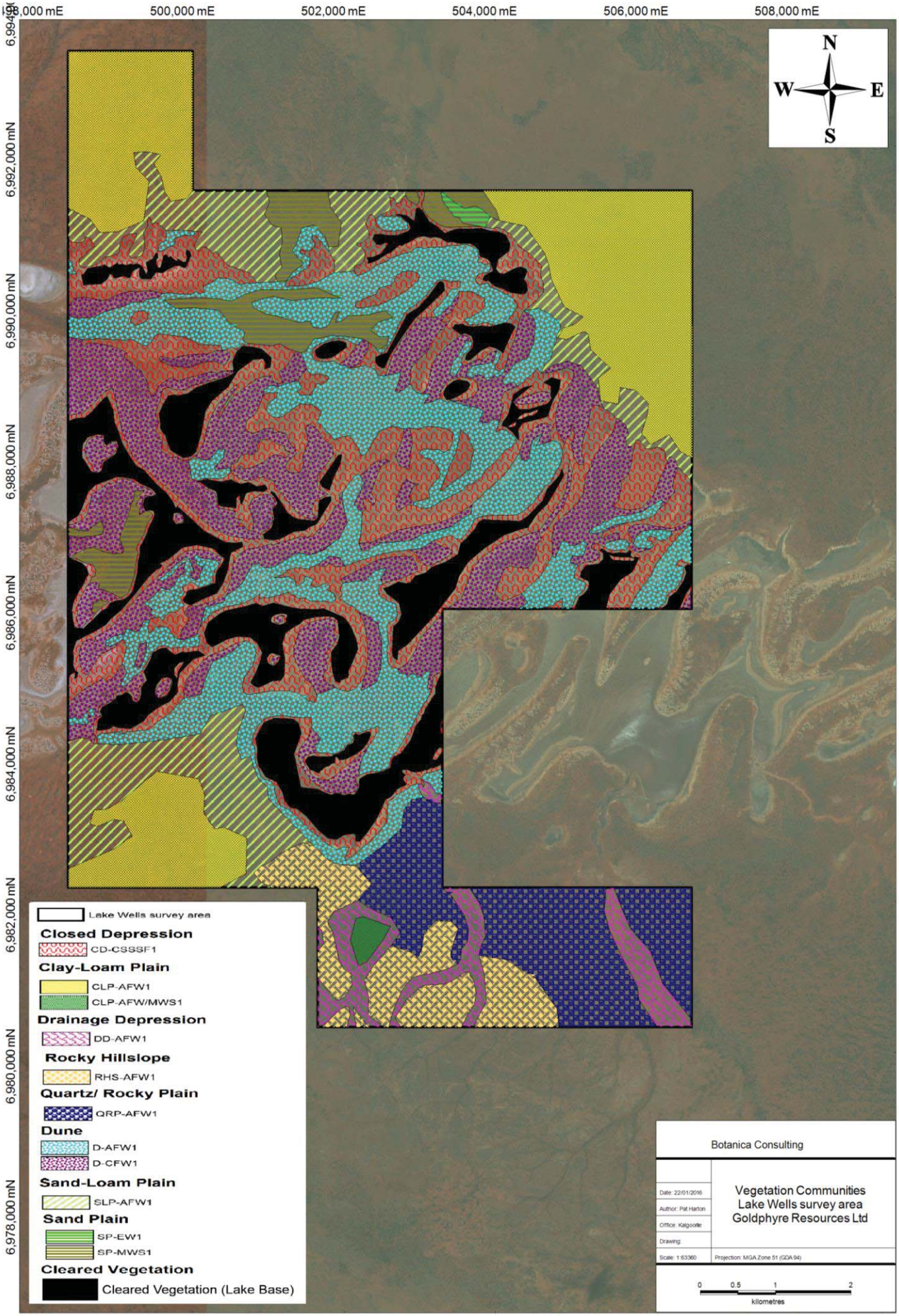
DRAWN:G Harewood

DATE : Feb 2016

SCALE: 1:55,000

Projection/Coordinate System: UTM/MGA Zone 51

Figure: 2


498,000 mE
500,000 mE
502,000 mE
504,000 mE
506,000 mE
508,000 mE
6,994,000 mN
6,992,000 mN
6,990,000 mN
6,988,000 mN
6,986,000 mN
6,984,000 mN
6,982,000 mN
6,980,000 mN
6,978,000 mN
N
W
E
S
Lake Wells survey area
Closed Depression
CD-CSSSF1
Clay-Loam Plain
CLP-AFW1
CLP-AFW/MWS1
Drainage Depression
DD-AFW1
Rocky Hillslope
RHS-AFW1
Quartz/ Rocky Plain
QRP-AFW1
Dune
D-AFW1
D-CFW1
Sand-Loam Plain
SLP-AFW1
Sand Plain
SP-EW1
SP-MWS1
Cleared Vegetation
Cleared Vegetation (Lake Base)
Botanica Consulting
Date: 22/01/2016
Author: Pat Harlon
Office: Kalgoorlie
Drawing:
Scale: 1:63360
Projection: MGA Zone 51 (GDA 94)
Vegetation Communities
Lake Wells survey area
Goldphyre Resources Ltd
0
0.5
1
2
kilometres

APPENDIX A

CONSERVATION CATEGORIES

***EPBC Act (1999)* Threatened Fauna Categories**

Threatened fauna may be listed under Section 178 of the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) in any one of the following categories:

Category	Code	Description
Extinct	E	There is no reasonable doubt that the last member of the species has died.
*Extinct in the wild	EW	A species (a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
*Critically Endangered	CE	A species is facing an extremely high risk of extinction in the wild in the immediate future.
*Endangered	EN	A species: (a) is not critically endangered; and (b) is facing a very high risk of extinction in the wild in the near future.
*Vulnerable	VU	A species (a) is not critically endangered or endangered; and (b) is facing a high risk of extinction in the wild in the medium-term future.
Conservation Dependent	CD	A species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered
*Migratory	Migratory	(a) all migratory species that are: (i) native species; and (ii) from time to time included in the appendices to the Bonn Convention; and (b) all migratory species from time to time included in annexes established under JAMBA, CAMBA and ROKAMBA; and (c) all native species from time to time identified in a list established under, or an instrument made under, an international agreement approved by the Minister.
Marine	Ma	Species in the list established under s248 of the *EPBC Act*

Note: Only species in those categories marked with an asterix are matters of national environmental significance (NES) under the *EPBC Act*.

Wildlife Conservation (Specially Protected Fauna) Notice 2015 Categories

Published as Specially Protected under the *Wildlife Conservation Act 1950*, and listed under Schedules 1 to 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

Category	Code	Description
Schedule 1 Critically Endangered species	CR	Threatened species considered to be facing an extremely high risk of extinction in the wild.
Schedule 2 Endangered species	EN	Threatened species considered to be facing a very high risk of extinction in the wild.
Schedule 3 Vulnerable species	VU	Threatened species considered to be facing a high risk of extinction in the wild.
Schedule 4 Presumed extinct species	EX	Species which have been adequately searched for and there is no reasonable doubt that the last individual has died.
Schedule 5 Migratory birds protected under an international agreement	IA	Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and the Bonn Convention, relating to the protection of migratory birds.
Schedule 6 Fauna that is of special conservation need as conservation dependent fauna	CD	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
Schedule 7 Other specially protected fauna.	OS	Fauna otherwise in need of special protection to ensure their conservation.

Western Australian DPaW Priority Fauna Categories

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

Category	Code	Description
Priority 1 Poorly Known Species.	P1	Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
Priority 2 Poorly Known Species.	P2	Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
Priority 3 Poorly Known Species.	P3	Species that are known from several locations and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
Priority 4 Rare, Near Threatened and other species in need of monitoring.	P4	(a) Rare: Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened: Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

*Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

***IUCN Red List* Threatened Species Categories**

The *IUCN Red List of Threatened Species*™ is a checklist of taxa that have undergone an extinction risk assessment using the *IUCN Red List Categories and Criteria*.

Categories are summarized below.

Category	Code	Description
Extinct	EX	Taxa for which there is no reasonable doubt that the last individual has died.
Extinct in the Wild	EW	Taxa which is known only to survive in cultivation, in captivity or and as a naturalised population well outside its past range and it has not been recorded in known or expected habitat despite exhaustive survey over a time frame appropriate to its life cycle and form.
Critically Endangered	CR	Taxa facing an extremely high risk of extinction in the wild.
Endangered	EN	Taxa facing a very high risk of extinction in the wild.
Vulnerable	VU	Taxa facing a high risk of extinction in the wild.
Near Threatened	NT	Taxa which has been evaluated but does not qualify for CR, EN or VU now but is close to qualifying or likely to qualify in the near future.
Least Concern	LC	Taxa which has been evaluated but does not qualify for CR, EN, VU, or NT but is likely to qualify for NT in the near future.
Data Deficient	DD	Taxa for which there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status.
Not Evaluated	NE	Taxa which has not been evaluated.

A full list of categories and their meanings are available at:

http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria

APPENDIX B

OBSERVED AND POTENTIAL VERTEBRATE FAUNA LIST

Fauna Recorded or Potentially in Region of Survey Area

Lake Wells Project - Goldphyre Resources Ltd.

Compiled by Greg Harewood - February 2016

Recorded (Captured/Sighted/Heard/Signs) = X

Rapallo Environmental (2015). Fauna Survey of the Gruyere Project Area. Unpublished report for Gold Road Resources Limited. May 2015.

KEC (2014). Sunrise Dam-Tropicana Infrastructure Corridor Fauna Survey. Unpublished report for AngloGold Ashanti. July 2014.

KLA (2012). Fauna Assessment (Level 2) Yamarna Project. Unpublished report for Gold Road Resources Ltd. October 2012.

Terrestrial Ecosystems (2011). Level 2 Fauna Risk Assessment for the Granny Deeps Project Area. Unpublished report. February 2011

ecologia (2009). Tropicana Gold Project. Operational Area Vertebrate Fauna Assessment. Unpublished report for Tropicana Joint Venture. February 2009.

Hall, N.J., McKenzie, N.L. and Keighery, G.J. (eds) (1994). The Biological Survey of the Eastern Goldfields of WA - Pt 10: Sandstone-Sir Samuel and Laverton-Leonora Study Areas. Records of the WAM, Supplement 47: 1 – 166.

DPaW (2015). NatureMap Database Search – Method = 'By Circle';122°58' 39" E, 27°17' 16" S (40km buffer). Accessed 21 December 2015.

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Amphibia									
Myobatrachidae Ground or Burrowing Frogs									
Neobatrachus aquilonius	Northern Burrowing Frog	LC							
Neobatrachus centralis	Desert Trilling Frog	LC							
Neobatrachus kunapalari	Kunapalari Frog	LC				X		X	
Neobatrachus sutor	Shoemaker Frog	LC		X	X	X			
Neobatrachus wilsmorei	Plonking Frog	LC							

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Platyplectrum spenceri	Centralian Burrowing Frog								
Pseudophryne occidentalis	Western Toadlet	LC							
Hylidae Tree or Water-Holding Frogs									
Cyclorana maini	Sheep Frog	LC				X		X	X
Cyclorana platycephala	Water-holding Frog	LC				X		X	X
Reptilia									
Carphodactylidae Knob-tailed Geckos									
Nephrurus laevissimus	Pale Knob-tailed Gecko		X	X			X		
Nephrurus levis	Smooth Knob-tailed Gecko			X			X		
Nephrurus vertebralis	Midline Knob-tailed Gecko								

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Diplodactylidae Geckoes									
Diplodactylus conspicillatus	Fat-tailed Gecko		X	X	X		X	X	
Diplodactylus granariensis	Western Stone Gecko					X	X		
Diplodactylus pulcher	Western Saddled Ground Gecko				X	X			
Lucasium damaeum	Beaded Gecko		X	X			X		
Lucasium squarrosus	Mottled Ground Gecko							X	
Lucasium stenodactylus	Sand-plain Gecko	LC							
Rhynchoedura ornata	Beaked Gecko		X	X		X	X	X	
Strophurus assimilis	Goldfields Spiny-tailed Gecko			X					
Strophurus ciliaris	Spiny-tailed Gecko								
Strophurus elderi	Jewelled Gecko		X	X			X	X	

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Strophurus intermedius	Southern Spiny-tailed Gecko				X				
Strophurus strophurus	Ring-tailed Gecko		X				X	X	
Strophurus wellingtonae	Western-shield Spiny-tailed Gecko	LC				X		X	
Gekkonidae Geckoes									
Gehyra purpurascens	Purple Arid Dtella		X	X			X	X	
Gehyra variegata	Variegated Dtella		X	X	X	X	X	X	X
Heteronotia binoei	Bynoe's Gecko		X	X	X	X	X	X	
Underwoodisaurus milii	Barking Gecko							X	

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Pygopodidae Legless Lizards									
Delma butleri	Unbanded Delma						X	X	
Delma nasuta	Long-nosed Delma		X	X			X	X	
Delma petersoni	Peterson's Delma			X			X		
Lialis burtonis	Burton's Legless Lizard		X				X	X	
Pygopus nigriceps	Hooded Scaly Foot		X	X	X		X		

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Agamidae Dragon Lizards									
Caimanops amphiboluroides	Mulga Dragon		X		X	X	X		
Ctenophorus caudicinctus	Ring-tailed Dragon				X				
Ctenophorus clayi	Collared Dragon						X		
Ctenophorus cristatus	Bicycle Dragon			X			X		
Ctenophorus fordi	Mallee Sand Dragon			X			X	X	
Ctenophorus isolepis	Military Dragon		X	X			X	X	
Ctenophorus nuchalis	Central Netted Dragon		X				X	X	
Ctenophorus pictus	Painted Dragon				X				
Ctenophorus reticulatus	Western Netted Dragon		X		X		X	X	
Ctenophorus salinarum	Salt Pan Dragon							X	

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Ctenophorus scutulatus	Lozenge-marked Bicycle Dragon		X	X	X			X	
Diporiphora paraconvergens	Grey-striped Western Desert Dragon		X						
Diporiphora reginae	Red-rumped Two-lined Dragon			X			X		
Gowidon longirostris	Long-nosed Dragon						X		
Moloch horridus	Thorny Devil		X	X			X	X	
Pogona minor	Western Bearded Dragon		X	X			X	X	
Tympanocryptis cephala	Pebble Dragon					X			

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Varanidae Monitor's or Goanna's									
Varanus brevicauda	Short-tailed Pygmy Monitor		X				X	X	
Varanus caudolineatus	Stripe-tailed Pygmy Monitor				X	X		X	
Varanus eremius	Pygmy Desert Monitor						X		
Varanus giganteus	Perentie		X	X			X		
Varanus gilleni	Pygmy Mulga Monitor						X		
Varanus gouldii	Sand Monitor		X	X	X		X	X	X
Varanus panoptes	Yellow-spotted Monitor		X	X		X			
Varanus tristis	Black-headed Monitor		X	X			X		

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Scincidae Skinks									
Cryptoblepharus buchananii	Fence Skink							X	
Cryptoblepharus carnabyi	Spiny-palmed Fence Skink						X	X	
Ctenotus ariadnae	Ariadna's Ctenotus						X		
Ctenotus brooksi	Central Wedge-snout Ctenotus		X	X			X		
Ctenotus calurus	Blue-tailed Skink		X	X			X		
Ctenotus dux	Narrow-lined Skink		X	X			X		X
Ctenotus grandis	Giant Desert Ctenotus						X		X
Ctenotus greeri	Spotted-necked Ctenotus			X			X	X	X
Ctenotus hanloni	Nimble Ctenotus								
Ctenotus helenae	Dusky Ctenotus		X	X	X		X	X	

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Ctenotus leonhardii	Leonhardi's Skink		X	X	X	X	X		X
Ctenotus nasutus	Long-snouted Ctenotus		X						
Ctenotus pantherinus	Leopard Ctenotus		X	X	X		X	X	
Ctenotus piankai	Coarse Sands Ctenotus		X						X
Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus		X	X			X		X
Ctenotus schomburgkii	Barred Wedge-snout Ctenotus		X	X			X	X	
Ctenotus severus	Stern Rock Ctenotus								
Ctenotus uber	Spotted Ctenotus		X						
Cyclodomorphus melanops	Eastern Slender Blue-tongue			X			X		
Egernia depressa	Pygmy Spiny-tailed Skink			X		X			
Egernia formosa	Goldfields Crevise Skink								

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Eremiascincus pallidus	Pale Sand-swimmer		X	X	X	X	X		
Lerista bipes	Western Two-toed Slider		X	X			X		X
Lerista desertorum	Great Desert Slider		X	X	X	X	X	X	
Lerista kingi	Common Mulch Skink							X	
Lerista taeniata	Ribbon Slider						X		
Lerista timida	Timid Slider		X	X			X		
Liopholis inornata	Desert Skink			X	X		X		
Liopholis kintorei	Great Desert Skink	S2 VU VU A1c							
Liopholis striata	Night Skink		X				X		
Menetia greyii	Dwarf Skink			X		X	X	X	
Morethia butleri	Woodland Dark-flecked Morethia			X		X	X	X	

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Morethia ruficauda									X
Proablepharus reginae	Western Soil-Crevice Skink			X			X		
Tiliqua multifasciata	Central Blue-tongue				X	X	X	X	
Tiliqua occipitalis	Western Bluetongue			X			X	X	
Typhlopidae Blind Snakes									
Anilios bicolor	Dark-spined Blind Snake					X			
Anilios endoterus	Interior Blind Snake						X		
Anilios hamatus	Northern Hook-snouted Blind Snake							X	
Anilios margaretae	Buff-snouted Blind Snake	P2							
Anilios waitii	Common Beaked Blind Snake						X		

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Boidae Pythons, Boas									
Antaresia stimsoni	Stimson's Python								

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Elapidae Elapid Snakes									
Acanthophis pyrrhus	Desert Death Adder						X		
Brachyurophis approximans	North-western Shovel-nosed Snake		X						
Brachyurophis fasciolata	Narrow-banded Shovel-nosed Snake			X			X		
Brachyurophis semifasciata	Southern Shovel-nosed Snake			X			X		
Demansia psammophis	Yellow-faced Whipsnake			X			X		
Furina ornata	Moon Snake							X	
Neelaps bimaculatus	Black-naped Snake						X		
Parasuta monachus	Monk Snake			X		X	X		
Pseudechis australis	Mulga Snake		X				X	X	
Pseudechis butleri	Spotted Mulga Snake								

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Pseudonaja modesta	Ringed Brown Snake		X		X		X		
Pseudonaja nuchalis	Gwardar						X		
Simoselaps anomalus	Desert Banded Snake		X						
Simoselaps bertholdi	Jan's Banded Snake			X			X	X	
Suta fasciata	Rosen's Snake					X			

Aves

Casuariidae
Emus, Cassowarries

Dromaius novaehollandiae	Emu	LC	X	X	X	X	X	X	X

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Anatidae Geese, Swans, Ducks									
Anas gracilis	Grey Teal	LC				X		X	
Anas rhynchotis	Australasian Shoveler	LC							
Anas superciliosa	Pacific Black Duck	LC				X		X	
Aythya australis	Hardhead	LC				X			
Chenonetta jubata	Australian Wood Duck	LC				X		X	
Malacorhynchus membranaceus	Pink-eared Duck	LC				X		X	
Tadorna tadornoides	Australian Shelduck	LC						X	
Podicipedidae Grebes									
Poliocephalus poliocephalus	Hoary-headed Grebe	LC				X	X	X	
Tachybaptus novaehollandiae	Australasian Grebe	LC							

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Ardeidae Herons, Egrets, Bitterns									
Ardea novaehollandiae	White-faced Heron	LC				X		X	
Ardea pacifica	White-necked Heron	LC						X	

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Accipitridae Kites, Goshawks, Eagles, Harriers									
Accipiter cirrocephalus	Collared Sparrowhawk	LC					X		
Accipiter fasciatus	Brown Goshawk	LC	X						
Aquila audax	Wedge-tailed Eagle	LC	X	X	X	X	X	X	X
Aquila morphnoides	Little Eagle	LC		X			X	X	
Circus assimilis	Spotted Harrier	LC						X	
Elanus caeruleus	Black-shouldered Kite	LC			X				
Haliastur sphenurus	Whistling Kite	LC	X						
Hamirostra melanosternon	Black-breasted Buzzard	LC							

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Falconidae Falcons									
Falco berigora	Brown Falcon	LC	X	X	X	X	X	X	
Falco cenchroides	Australian Kestrel	LC	X	X	X	X	X	X	X
Falco longipennis	Australian Hobby	LC	X	X	X		X	X	
Falco peregrinus	Peregrine Falcon	S7 LC					X		
Rallidae Rails, Crakes, Swamphens, Coots									
Fulica atra	Eurasian Coot	LC				X	X	X	
Gallinula ventralis	Black-tailed Native-hen	LC						X	
Otididae Bustards									
Ardeotis australis	Australian Bustard	LC		X	X		X	X	X
Turnicidae Button-quails									
Turnix velox	Little Button-quail	LC			X		X		

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Scolopacidae Curlews, Sandpipers, Snipes, Godwits									
Calidris acuminata	Sharp-tailed Sandpiper	S5 Mig CA JA RK LC							
Calidris ruficollis	Red-necked Stint	S5 Mig CA JA RK LC							
Tringa hypoleucos	Common Sandpiper	S5 Mig CA JA RK LC						X	
Tringa nebularia	Common Greenshank	S5 Mig CA JA RK LC							
Tringa stagnatilis	Marsh Sandpiper	S5 Mig CA JA RK LC							
Recurvirostridae Stilts, Avocets									
Cladorhynchus leucocephalus	Banded Stilt	LC				X			
Himantopus himantopus	Black-winged Stilt	LC				X		X	
Recurvirostra novaehollandiae	Red-necked Avocet	LC							

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Charadriidae Lapwings, Plovers, Dotterels									
Charadrius melanops	Black-fronted Dotterel	LC				X		X	
Charadrius ruficapillus	Red-capped Plover	LC		X				X	
Erythrogonys cinctus	Red-kneed Dotterel	LC							
Peltohyas australis	Inland Dotterel								
Vanellus tricolor	Banded Lapwing	LC			X		X	X	
Laridae Gulls, Terns									
Sterna nilotica	Gull-billed Tern	LC							

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Columbidae Pigeons, Doves									
Geopelia cuneata	Diamond Dove	LC			X		X	X	
Ocyphaps lophotes	Crested Pigeon	LC	X	X	X	X	X	X	
Phaps chalcoptera	Common Bronzewing	LC	X	X	X	X	X	X	

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Psittacidae Parrots									
Cacatua roseicapilla	Galah	LC	X	X	X		X	X	
Melopsittacus undulatus	Budgerigar	LC		X	X		X	X	
Neophema bourkii	Bourke's Parrot	LC	X		X			X	
Nymphicus hollandicus	Cockatiel	LC	X	X	X		X	X	
Platycercus varius	Mulga Parrot	LC	X	X	X	X	X	X	
Platycercus zonarius	Australian Ringneck	LC	X	X	X	X	X	X	
Polytelis alexandrae	Princess Parrot	P4 VU NT							

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Cuculidae Parasitic Cuckoos									
Chrysococcyx basalis	Horsfield's Bronze Cuckoo	LC		X			X	X	
Chrysococcyx osculans	Black-eared Cuckoo	LC		X			X		
Cuculus pallidus	Pallid Cuckoo	LC		X		X	X	X	
Strigidae Hawk Owls									
Ninox novaeseelandiae	Boobook Owl	LC	X	X	X				
Tytonidae Barn Owls									
Tyto alba	Barn Owl	LC							
Podargidae Frogmouths									
Podargus strigoides	Tawny Frogmouth	LC		X	X		X	X	
Caprimulgidae Nightjars									
Eurostopodus argus	Spotted Nightjar	LC	X	X	X		X		

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Aegothelidae Owlet-nightjars									
Aegotheles cristatus	Australian Owlet-nightjar	LC	X	X	X		X	X	
Halcyonidae Tree Kingfishers									
Todiramphus pyrrhopygia	Red-backed Kingfisher	LC	X	X	X	X	X	X	
Meropidae Bee-eaters									
Merops ornatus	Rainbow Bee-eater	S5 Mig JA LC		X			X		
Climacteridae Treecreepers									
Climacteris affinis	White-browed Treecreeper	LC					X	X	

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Maluridae Fairy Wrens, GrassWrens									
Amytornis striatus striatus	Striated Grasswren	P4 LC		X					
Malurus lamberti	Variegated Fairy-wren	LC	X		X			X	
Malurus leucopterus	White-winged Fairy-wren	LC		X		X		X	X
Malurus splendens	Splendid Fairy-wren	LC	X	X		X	X		
Stipiturus ruficeps	Rufous-crowned Emu-wren	LC							

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Acanthizidae Thornbills, Geryones, Fieldwrens & Whitefaces									
Acanthiza apicalis	Broad-tailed Thornbill	LC	X	X	X	X	X	X	X
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	LC		X	X	X	X	X	
Acanthiza iredalei iredalei	Slender-billed Thornbill (western)								
Acanthiza robustirostris	Slaty-backed Thornbill	LC	X	X	X	X	X		
Acanthiza uropygialis	Chestnut-rumped Thornbill	LC		X	X		X	X	
Aphelocephala leucopsis	Southern Whiteface	LC		X	X	X	X	X	X
Gerygone fusca	Western Gerygone	LC							
Pyrrholaemus brunneus	Redthroat	LC	X	X	X		X		
Smicrornis brevirostris	Weebill	LC	X	X	X		X	X	X

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Pardalotidae Pardalotes									
Pardalotus rubricatus	Red-browed Pardalote	LC	X		X				
Pardalotus striatus	Striated Pardalote	LC		X		X	X	X	X

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Meliphagidae Honeyeaters, Chats									
Acanthagenys rufogularis	Spiny-cheeked Honeyeater	LC	X	X	X	X	X	X	X
Anthochaera carunculata	Red Wattlebird	LC		X			X		
Certhionyx niger	Black Honeyeater	LC						X	
Certhionyx variegatus	Pied Honeyeater	LC				X		X	
Epthianura aurifrons	Orange Chat	LC					X		
Epthianura tricolor	Crimson Chat	LC		X	X	X	X	X	X
Lichenostomus plumulus	Grey-fronted Honeyeater	LC	X	X			X	X	
Lichenostomus virescens	Singing Honeyeater	LC	X	X	X	X	X	X	
Lichmera indistincta	Brown Honeyeater	LC		X			X	X	
Manorina flavigula	Yellow-throated Miner	LC	X	X	X	X	X	X	X

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Phylidonyris albifrons	White-fronted Honeyeater	LC		X			X	X	
Petroicidae Australian Robins									
Microeca fascinans	Jacky Winter	LC	X	X			X	X	
Petroica cucullata	Hooded Robin	LC	X	X	X	X	X	X	
Petroica goodenovii	Red-capped Robin	LC	X	X	X	X	X	X	
Pomatostomidae Babblers									
Pomatostomus superciliosus	White-browed Babbler	LC	X	X	X	X	X	X	X
Cinclosomatidae Whipbirds, Wedgebills, Quail Thrushes									
Cinclosoma castaneothorax	Chestnut-breasted Quail-thrush	LC	X		X				
Cinclosoma castanotus	Chestnut Quail-thrush	LC		X					
Psophodes occidentalis	Chiming Wedgebill	LC							

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Neosittidae Sitellas									
Daphoenositta chrysoptera	Varied Sittella	LC	X	X			X		X
Pachycephalidae Crested Shrike-tit, Crested Bellbird, Shrike Thrushes, Whistlers									
Colluricincla harmonica	Grey Shrike-thrush	LC	X	X	X	X	X	X	X
Oreoica gutturalis	Crested Bellbird	LC	X	X	X	X	X	X	X
Pachycephala rufiventris	Rufous Whistler	LC	X	X	X	X	X	X	
Dicruridae Monarchs, Magpie Lark, Flycatchers, Fantails, Drongo									
Grallina cyanoleuca	Magpie-lark	LC	X	X	X	X	X	X	X
Rhipidura fuliginosa	Grey Fantail	LC							
Rhipidura leucophrys	Willie Wagtail	LC	X	X	X	X	X	X	

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Campephagidae Cuckoo-shrikes, Trillers									
Coracina maxima	Ground Cuckoo-shrike	LC	X		X	X	X	X	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	LC	X	X		X	X	X	
Lalage tricolor	White-winged Triller	LC		X	X	X		X	
Artamidae Woodswallows, Butcherbirds, Currawongs									
Artamus cinereus	Black-faced Woodswallow	LC	X	X		X	X	X	X
Artamus minor	Little Woodswallow	LC	X	X		X			
Artamus personatus	Masked Woodswallow	LC	X	X	X	X	X	X	

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Cracticidae Currawongs, Magpies & Butcherbirds									
Cracticus nigrogularis	Pied Butcherbird	LC	X	X	X	X	X	X	X
Cracticus tibicen	Australian Magpie	LC	X	X	X	X	X	X	X
Cracticus torquatus	Grey Butcherbird	LC		X	X	X	X	X	
Strepera versicolor	Grey Currawong	LC		X	X		X	X	
Corvidae Ravens, Crows									
Corvus bennetti	Little Crow	LC	X	X	X	X	X	X	X
Corvus orru	Torresian Crow	LC	X	X	X	X			
Ptilonorhynchidae Bowerbirds									
Ptilonorhynchus maculatus	Western Bowerbird	LC	X	X		X			
Motacillidae Old World Pipits, Wagtails									
Anthus australis	Australian Pipit	LC		X	X	X	X	X	

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Estrilidae Grass Finches & Mannikins									
Taeniopygia guttata	Zebra Finch	LC	X	X	X	X	X	X	
Dicaeidae Flowerpeckers									
Dicaeum hirundinaceum	Mistletoebird	LC		X		X	X	X	
Hirundinidae Swallows, Martins									
Cheramoeca leucosternus	White-backed Swallow	LC		X		X	X	X	
Hirundo ariel	Fairy Martin	LC	X	X					
Hirundo neoxena	Welcome Swallow	LC		X		X			
Hirundo nigricans	Tree Martin	LC	X	X		X	X	X	
Sylviidae Old World Warblers									
Cincloramphus cruralis	Brown Songlark	LC		X	X			X	
Cincloramphus mathewsi	Rufous Songlark	LC	X					X	

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Mammalia									
Tachyglossidae Echidnas									
Tachyglossus aculeatus	Echidna	LC	X	X			X	X	

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Dasyuridae Carnivorous Marsupials									
Antechinomys laniger	Kultarr	LC				X			
Dasycercus blythi	Brush-tailed Mulgara	P4 LC		X					X
Ningaui ridei	Wongai Ningaui	LC	X					X	
Ningaui yvonneae	Southern Ningaui	LC		X			X		
Pseudantechinus macdonnellensis	Fat-tailed Pseudantechinus	LC							
Sminthopsis crassicaudata	Fat-tailed Dunnart	LC					X	X	
Sminthopsis dolichura	Little long-tailed Dunnart	LC		X	X	X	X		
Sminthopsis hirtipes	Hairy-footed Dunnart	LC	X	X		X	X	X	
Sminthopsis macroura	Stripe-faced Dunnart	LC			X	X		X	X
Sminthopsis ooldea	Ooldea Dunnart	LC		X			X	X	

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Macropodidae Kangaroos, Wallabies									
Macropus robustus	Euro	LC	X	X		X	X	X	
Macropus rufus	Red Kangaroo	LC	X	X	X		X	X	
Emballonuridae Sheath-tailed Bats									
Taphozous hilli	Hill's Sheathtail-bat	LC					X		
Molossidae Freetail Bats									
Austronomus australis	White-striped Freetail-bat	LC		X	X		X	X	
Ozimops petersi	Inland Freetail-bat	LC		X	X	X	X	X	

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Vespertilionidae Ordinary Bats									
Chalinolobus gouldii	Gould's Wattled Bat	LC	X	X	X	X	X	X	
Nyctophilus geoffroyi	Lesser Long-eared Bat	LC	X	X			X	X	
Scotorepens balstoni	Inland Broad-nosed Bat	LC	X		X	X	X	X	X
Vespadelus baverstocki	Inland Forest Bat	LC							
Vespadelus finlaysoni	Finlayson's Cave Bat	LC	X		X	X	X		

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Muridae Rats, Mice									
Mus musculus	House Mouse	Introduced	X	X	X	X	X	X	
Notomys alexis	Spinifex Hopping-mouse	LC	X	X	X	X	X	X	
Pseudomys bolami	Bolam's Mouse	LC							
Pseudomys desertor	Desert Mouse	LC		X	X		X		X
Pseudomys hermannsburgensis	Sandy Inland Mouse	LC	X	X	X	X	X	X	X
Canidae Dogs, Foxes									
Canis lupus	Dingo/Dog	LC/Introduced	X	X			X		
Vulpes vulpes	Red Fox	Introduced		X			X	X	
Felidae Cats									
Felis catus	Cat	Introduced	X	X	X	X	X	X	

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	Rapallo 2015	KEC 2014	KLA 2012	TE 2011	ecologia 2009	WAM 1994	DPaW 2015
Camelidae Camels									
Camelus dromedarius	Camel	Introduced	X	X			X	X	
Leporidae Rabbits, Hares									
Oryctolagus cuniculus	Rabbit	Introduced	X	X	X	X	X	X	

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

APPENDIX C

DPAW NATUREMAP & EPBC ACT DATABASE SEARCH RESULTS

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Greg Harewood on 21/12/2015

Kingdom	Animalia
Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Circle'
Centre	122°58' 39" E,27°17' 16" S
Buffer	40km
Group By	Species Group

Species Group	Species	Records
Amphibian	2	6
Bird	25	34
Invertebrate	2	2
Mammal	5	11
Reptile	10	12
TOTAL	**44**	**65**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Amphibian					
1.	25375	*Cyclorana maini (Sheep Frog)*			
2.	25376	*Cyclorana platycephala (Water-holding Frog)*			
Bird					
3.	24559	*Acanthagenys rufogularis (Spiny-cheeked Honeyeater)*			
4.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
5.	24267	*Aphelocephala leucopsis subsp. leucopsis (Southern Whiteface)*			
6.	24285	*Aquila audax (Wedge-tailed Eagle)*			
7.	24610	*Ardeotis australis (Australian Bustard)*			
8.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
9.		*Barnardius zonarius*			
10.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
11.	24416	*Corvus bennetti (Little Crow)*			
12.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
13.	25595	*Cracticus tibicen (Australian Magpie)*			
14.	24606	*Daphoenositta chrysoptera subsp. pileata (Varied Sittella, Black-capped Sitella)*			
15.	24470	*Dromaius novaehollandiae (Emu)*			
16.		*Eolophus roseicapillus*			
17.	24570	*Epthianura tricolor (Crimson Chat)*			
18.	25622	*Falco cenchroides (Australian Kestrel)*			
19.	24443	*Grallina cyanoleuca (Magpie-lark)*			
20.	24549	*Malurus leucopterus subsp. leuconotus (White-winged Fairy-wren)*			
21.	24583	*Manorina flavigula (Yellow-throated Miner)*			
22.	24618	*Oreoica gutturalis (Crested Bellbird)*			
23.	24630	*Pardalotus striatus subsp. westraliensis (Striated Pardalote)*			
24.		*Pardalotus striatus subsp. westraliensis Xmurchisoni*			
25.	24683	*Pomatostomus superciliosus (White-browed Babbler)*			
26.	42344	*Purnella albifrons (White-fronted Honeyeater)*			
27.	30948	*Smicrornis brevirostris (Weebill)*			
Invertebrate					
28.		*Isopeda leishmanni*			
29.		*Urodacus yaschenkoi*			
Mammal					
30.	30903	*Dasycercus blythi (Brush-tailed Mulgara, Ampurta)*		P4	
31.	24235	*Pseudomys desertor (Desert Mouse)*			
32.	24237	*Pseudomys hermannsburgensis (Sandy Inland Mouse)*			
33.	24199	*Scotorepens balstoni (Inland Broad-nosed Bat)*			
34.	24116	*Sminthopsis macroura (Stripe-faced Dunnart)*			
Reptile					
35.	25037	*Ctenotus dux*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
36.	25041	*Ctenotus grandis subsp. grandis*			
37.	25042	*Ctenotus greeri*			
38.	25052	*Ctenotus leonhardii*			
39.	25062	*Ctenotus piankai*			
40.	25066	*Ctenotus quattuordecimlineatus*			
41.	24959	*Gehyra variegata*			
42.	25125	*Lerista bipes*			
43.	25194	*Morethia ruficauda subsp. ruficauda*			
44.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			

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

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

Australian Government
Department of the Environment

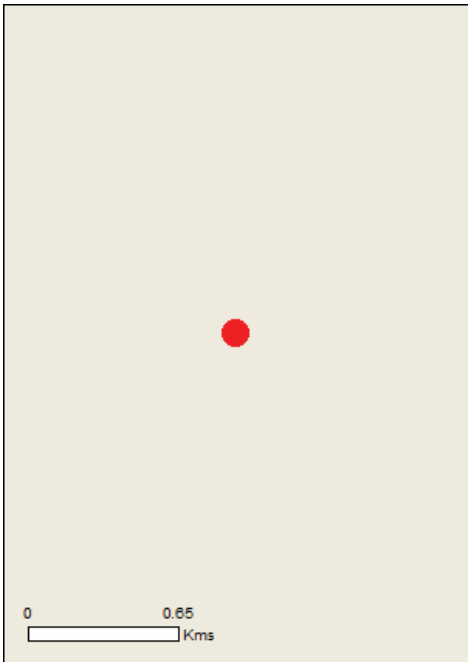
EPBC Act Protected Matters Report

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

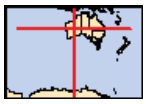
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

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

Report created: 21/12/15 19:54:17



Coordinates
Buffer: 0.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	5
Listed Migratory Species:	5

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	5
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	6
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat may occur within area
Mammals		
Sminthopsis psammophila Sandhill Dunnart [291]	Endangered	Species or species habitat may occur within area
Reptiles		
Liopholis kintorei Great Desert Skink, Tjakura, Warrarna, Mulyamiji [83160]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Terrestrial Species		
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Mammals		
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

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

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-27.28792 122.97744

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Parks and Wildlife Commission NT, Northern Territory Government
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

APPENDIX D

SIGNIFICANT SPECIES PROFILES

Buff-snouted Blind Snake *Anilios margaretae*

Status and Distribution: This species is listed as Priority 2 by DPaW. Limited number of records. Original specimen was collected at Lake Throssel in 1962 (~120 km east south-east of the Lake Wells Project area). Since this time it has been recorded at two other locations in WA, these being Neale Junction Nature Reserve (~200Km south east - 2008) and south of Neale Junction Nature Reserve (~ 200k south south east – 2011) (DPaW 2015b), and twice in South Australia over 700 km away (Maralinga – 2010 and Oak Valley School – 2012) (Atlas of Living Things 2016), indicating a wide distribution across the Great Victoria Desert. Not recorded during Level 2 fauna surveys at Yamarna Station (KLA 2012, Rapallo 2015 - ~120km south east of the Lake Wells Project area).

Habitat: Recorded in playa and sheoak (*Casuarina cristata*) habitat associated with Lake Throssell while to the south the blind snake was recorded in *Acacia* shrublands on the border of tree and shrub steppe between sandhills and sandplains (MBS 2014). Like other blind snakes this is a burrowing worm-like snake that feeds mostly on the larvae and pupae of ants and termites.

Likely presence in Project area: The status of this species in the Project area is difficult to determine. Given suitable habitat occurs (i.e. playa and sheoak, sand dunes and sand plains) its presence cannot be discounted despite not being recorded during previously fauna surveys in the wider area (ecologia 2009, KLA 2012, KEC 2014 and Rapallo 2015). While there are limited records for this species, it appears to have a wide distribution across the Great Victoria Desert. The lack of records could be attributed to the areas remoteness and the secretive habits of blind snakes and it may in fact be more common than records indicate.

Listed as a potential species based on available information.

Extent of potential habitat within the Project area: Gypsum dunes, Sand plains and sand dunes (3,276 ha - ~42.9% of total area).

Great Desert Skink *Liopholis kintorei*

Status and Distribution: This species is listed as Schedule 3 under the *WC Act* and as Vulnerable under the *EPBC Act*. The species appears to have occurred in widespread, but connected, populations in the past in the Great Sandy, Gibson, Great Victoria and Tanami Deserts in the eastern interior of WA and adjacent areas in south-western NT and northwestern SA.

The reported distribution consists of but is not limited to seven isolated populations. Three populations occur in WA at Patjarr (population estimated to be less than 2500 individuals), near the Kiwirrkura community, including the vicinity of Lake Mackay (<500 individuals), and in Rudal River NP (unknown population size). Populations

also occur in the NT in the Tanami Desert, including Rabbit Flat, Sangster's Bore, The Granites and near Kintore, (< 2250 individuals); in Uluru - Kata Tjuta NP including part of the Yulara borefields (< 500 individuals); and in the Yulara lease lands including part of the Yulara borefields (< 350 individuals). Only one population is known to persist in SA, near Watarru on the Anangu-Pitjantjatjara Lands (< 50 individuals) (McAlpin 2001).

Habitat: Arid sand flats and clay based loamy soils vegetated with spinifex (Wilson and Swan 2013). The species generally occurs on red sandplains and sand ridges (Cogger *et al*. 1993). Populations in the Gibson Desert occur on sandplains with a surface cover of fine gravel (Pearson *et al*. 2001). Vegetation usually consists of hummock grassland (*Triodia basedowii, T. pungens* and *T. schinzii*), with some scattered shrubs and occasional trees (e.g. *Acacia spp., Eucalyptus* spp*., Hakea* spp*., Grevillea* spp*. and Allocasuarina decaisneana*) (Cogger *et al.* 1993, McAlpin 2001).

Likely presence in Project area: The likely status of this species in the Project area is difficult to determine as there are no nearby recent records. Habitat in some sections of the Project area does however appear superficially suitable (clay loam plains, sand loam plains, sand plains and sand dunes vegetated with spinifex) and the site falls within the historical range of the species.

Closest DPaW records are from ~100 west of Laverton in 1967 and just south of Warburton in 1963. The closest, more recent records are from the Gibson Desert Nature Reserve (300 km north east of the Lake Wells Project area) in 1997 (DPaW 2015b).

Listed as a potential species based on available information.

Extent of potential habitat within the Project area: Clay loam plains, sand loam plains, sand plains and sand dunes vegetated with spinifex (3,285 ha - ~43.0% of total area).

Malleefowl *Leipoa ocellata*

Status and Distribution: This species is listed as Schedule 3 under the *WC Act* and as Vulnerable under the *EPBC Act*. Originally common, but now generally rare to uncommon and patchily distributed.

Current distribution mainly southern arid and semi-arid zones, north to Shark Bay, Jingemarra, Colga Downs and Yeelirrie, east to Earnest Giles Range, Yeo Lake, lower Ponton Creek and to Eucla and west and south to Cockleshell Gully, the Wongan Hills, Stirling Range, Beaufort Inlet, Hatters Hill, Mt Ragged and Point Malcolm (Johnstone and Storr 1998).

Habitat: Mainly scrubs and thickets of mallee *Eucalyptus* spp., boree *Melaleuca lanceolata* and bowgada *Acacia linophylla*, dense litter forming shrublands and dense mulga woodland.

Likely presence in Project area: No evidence of this species (individuals, foot prints, feathers or recent/old nest mounds) was observed during the botanical survey (Botanica Consulting pers. comms.). There are very few records of this species this far north east of its main documented range (DpaW 2015b). Habitat within the Project area appears unsuitable primarily due to the generally sparse nature of the vegetation and/or a lack of leaf litter. Transient individuals may occur very rarely.

Not listed as a potential species as under normal circumstance this species would not be present, though transient individuals may occur very rarely.

Extent of potential habitat within the Project area: No habitat suitable for this species to utilise appears to be present.

Eastern Great Egret *Ardea alba*

Status and Distribution: This species of egret is listed as Schedule 5 under the *WC Act and as* Migratory under the *EPBC Act* including international agreements to which Australia is a signatory. The eastern great egret is common and very widespread in any suitable permanent or temporary habitat (Morcombe 2004).

Habitat: Wetlands, flooded pasture, dams, estuarine mudflats, mangroves and reefs (Morcombe 2004).

Likely presence in Project area: Very rarely recorded in this general area. Suitable habitat limited to depressions when inundated.

Not listed as a potential species as under normal circumstance this species would not be present, though individuals may occur very occasionally after significant rain events.

Extent of potential habitat within the Project area: Foraging habitat - Salt lake, drainage depressions and closed depressions when inundated (2,389 ha - ~31.3% of total area). Most habitat does however appear marginal in quality at best. Breeding habitat – absent.

Peregrine Falcon *Falco peregrinus*

Status and Distribution: This species is listed as Schedule 7 under the *WC Act*. Individuals of this species are uncommon/rare but wide ranging across Australia. Moderately common at higher levels of the Stirling Range, uncommon in hilly, north

west Kimberley, Hamersley and Darling Ranges; rare or scarce elsewhere (Johnstone and Storr 1998).

Habitat: Diverse from rainforest to arid shrublands, from coastal heath to alpine (Morcombe 2004). Mainly about cliffs along coasts, rivers and ranges and about wooded watercourses and lakes (Johnstone and Storr 1998). The species utilises the ledges, cliff faces and large hollows/broken spouts of trees for nesting. It will also occasionally use the abandoned nests of other birds of prey. Also known to utilise decommissioned open cut pit walls for nesting.

Likely presence in Project area: The species potentially utilises some sections of the Project area as part of a much larger home range for foraging purposes only. Would only be represented by a very small number of individuals for limited periods. Previously recorded at Tropicana (ecologia 2009).

Listed as a potential species based on available information, though frequency of occurrence and probability of breeding would be low.

Extent of potential habitat within the Project area: Foraging habitat – Air space over the entire Project area (7,634 ha – 100% of total area). Breeding habitat - Large trees with open spouts suitable for nesting or abandoned bird of prey nests – total number, if any, unknown.

Grey Falcon *Falco hypoleucos*

Status and Distribution: Listed as Schedule 3 under the *WC Act*. Within WA found in the northern half, south to about 26°S (Gascoyne, Lake Carnegie and Warburton), casual further south (Johnstone and Storr 1998).

Habitat: Lightly treed plains, gibber deserts, sand ridges, pastoral lands, timbered water courses but seldom in driest deserts (Pizzey & Knight 2012). It has a distribution centred around ephemeral or permanent drainage lines, utilising old nests of other bird species situated in the tallest trees along the river systems (Garnett and Crowley 2000).

Likely presence in Project area: This paucity of recent records nearby and the lack of tree-lined watercourses within the Project area itself would suggest that grey falcons would only occur as nonbreeding, irregular visitors.

Not listed as a potential species as under normal circumstance this species would not be present, though individuals may occur very occasionally.

Extent of potential habitat within the Project area: Foraging habitat – Air space over the entire Project area (7,634 ha – 100% of total area). Breeding habitat – none identified.

Migratory Shorebirds

A small number of migratory shorebird species have previously been recorded in the wider area. Not all specific species are discussed in detail. The most likely species to be found on central, inland lakes (after significant rainfall events only) are listed in Appendix B.

Status and Distribution: Migratory shorebirds are listed under the *EPBC Act,* the *WC Act* (Schedule 5) and under international agreements to which Australia is a signatory. All species are either widespread summer migrants to Australia or residents. State and Federal conservation status varies between species.

Habitat: Varies between species but includes beaches and permanent/temporary wetlands varying from billabongs, swamps, lakes, floodplains, sewerage farms, saltwork ponds, estuaries, lagoons, mudflats sandbars, pastures, airfields, sports fields and lawns.

Likely presence in study area: Salt lakes and claypans represent potential habitat for migratory shorebirds when inundated though this specific area is not recognised as significant to migratory shorebirds and the level of utilisation is likely to be very low (i.e. species diversity and numbers of individuals).

As with other birds which rely on wetlands the presence of suitable habitat (and therefore the birds themselves) in freshwater claypans or on the salt lake itself is totally dependent on unpredictable, episodic rain events of a magnitude sufficient to supply the required amount of water. It should be noted that migratory waders only breed in the northern hemisphere, but migrate to the southern hemisphere during spring and then leave late summer/early autumn.

Several migratory waders are listed as potential species based on available information, though frequency of occurrence would be very low and opportunistic.

Extent of potential habitat within the Project area: Salt lake, drainage depressions and closed depressions when inundated (2,389 ha - ~31.3% of total area). Most habitat does however appear marginal in quality at best.

Oriental Plover *Charadis veredus*

Status and Distribution: The oriental plover is listed as Schedule 5 under the *WC Act* and as Migratory under the *EPBC Act* including international agreements to which Australia is a signatory. Breeds in Mongolia and Manchuria – regular summer migrant to Australia (September to March) (Pizzey & Knight 2012). Kimberley, north western interior (Lake Gregory) and north west coastal plains (south to tropic); casual or vagrant elsewhere (south to 32°15'S) (Johnstone and Storr 1998).

Habitat: Mainly sparsely vegetated plains including samphire and short grasses flats. Also beaches, tidal flats, salt works and sewage ponds (Johnstone and Storr 1998).

Likely presence in Project area: This species would only occur in the general area as a casual/vagrant on very rare occasions at best.

Not listed as a potential species as under normal circumstance this species would not be present, though individuals/small groups may occur on very rare occasions.

Extent of potential habitat within the Project area: Closed depressions (1,333 ha - ~17.5 % of total area). Habitat does however appear marginal in quality at best.

Princess Parrot *Polytelis alexandrae*

Status and Distribution: This species is listed as Priority 4 by the DPaW and as Vulnerable under the *EPBC Act*. Rare, highly nomadic (Pizzey & Knight 2012). Found in the eastern deserts north to the Edgar Ranges, west to the Gregory Range, Well 18, Mt Bates, Lake Throssell and Mt Luck and south to Queen Victoria Spring and Carlisle Lakes, casual further north (Fossil Downs, Bohemia Downs) and west (head of Gascoyne, head of the Murchison, Wiluna, Wanjarri, Sandstone, Laverton, Kookynie, Menzies, Kanowna). Also deserts of eastern Australia (Johnstone and Storr 1998).

Habitat: Arid shrubland, particularly mulga, desert oak and spinifex country including trees along watercourses (Simpson and Day 2010). The princess parrot inhabits sand dunes and sand flats supporting open woodlands and shrublands that usually consist of scattered stands of *Eucalyptus* (including *E. gongylocarpa* and mallee species), *Casuarina* or *Allocasuarina* trees and an understorey of shrubs such as *Acacia* (especially *A. aneura*), *Senna, Eremophila, Grevillea, Hakea* and a ground cover dominated by *Triodia* species (DotE 2013).

Likely presence in Project area: The species may frequent the Project area at times, but given it is highly nomadic, its frequency of occurrence would be very low and generally temporary. Areas containing *Euclayptus gongylocarpa* woodland are of most significance as they have the potential to contain larger trees with hollows that may represent potential breeding habitat.

Listed as a potential species based on available information, though frequency of occurrence and probability of breeding would be low.

Extent of potential habitat within the Project area: Foraging habitat – Vegetated sand plains, sand dunes, clay loam plains, sand loam plains, drainage depressions, rocky hillslopes and quartz rocky plains (5,445 ha – 71.3% of total area). Breeding

habitat - Large trees within *Eucalyptus* woodlands with hollows suitable for nesting – total number, if any, unknown.

Night Parrot *Pezoporus occidentalis*

Status and Distribution: This species is listed as Schedule 1 under the *WC Act* and as Endangered under the *EPBC Act*. Historical evidence indicates that night parrots were distributed over much of semi-arid and arid Australia (Garnett and Crowley 2000). Extremely secretive and hard to flush, in WA there are only three accepted records of night parrots since 1935, all from the Pilbara region (1979, 1980 and 2005; DotE 2015). The most recent record is from Minga Well (35 km north east of Marillana) during a fauna survey at Fortescue Metals Group's Cloudbreak lease (Bamford 2005).

Habitat: Preferred habitat is thought to be spinifex grasslands or samphire and chenopod shrublands on claypans, floodplains or the margins of salt lakes, creeks or other water bodies (Johnstone and Storr 1998; Higgins 1999; DotE 2015).

Likely presence in Project area: There are no recent records of this species in the area and it is generally accepted as being locally and possibly regionally extinct despite the presence of apparently suitable habitat.

Not listed as a potential species based on currently available information.

Extent of potential habitat within the Project area: *Triodea* dominated sand plains, clay loam plains and closed depressions (with chenopods) (926 ha – 23.1 % of total area).

Rainbow Bee-eater *Merops ornatus*

Status and Distribution: This species is listed as Schedule 5 under the *WC Act* and as Migratory under the *EPBC Act* including international agreements to which Australia is a signatory. The rainbow bee-eater is a common summer migrant to southern Australia but in the north they are resident (Morcombe 2004).

Habitat: Open country, of woodlands, open forest, semi arid scrub, grasslands, clearings in heavier forest, farmlands (Morcombe 2004). Breeds underground in areas of suitable soft soil firm enough to support tunnel building. Nest is a burrow usually dug at a slight angle in flat ground, sometimes into sandy banks or cuttings and often on margins of roads and tracks (Johnstone and Storr 1998).

Likely presence in Project area: The rainbow bee-eater is a very common and widespread seasonal visitor to the southern half of WA and would not be specifically attracted to the site. Nests within burrows made into soil and therefore some potential for the species to breed in parts of the Project area where ground

conditions are suitable. Population levels would however not be significant as it usually breeds in pairs and rarely in small colonies (Johnstone and Storr, 1998).

Listed as a potential species based on available information.

Extent of potential habitat within the Project area: Foraging habitat - Air space over the entire Project area (7,634 ha – 100% of total area). Breeding habitat - sand plains, sand dunes and sand loam plains (2,163 ha - ~28.3% of total area).

Striated Grasswren (sandplain) *Amytornis striatus striatus*

Status and Distribution: This sub-species is listed as Priority 4 by DPaW. Found in the eastern deserts between lats.20° and 28°39'S (north to Sahara Track and Well 48 and including much of Great Sandy, Gibson and Great Victoria Deserts), west to Erliston and south to 39 km ENE of Laverton, 27 km S of Neale Junction and the Serpentine Lakes, with an apparently isolated population between Meekatharra and Wiluna and another near Queen Victoria Spring (Johnstone and Storr 1998).

Habitat: Mainly spinifex, with or without low shrubs (especially *Thryptomene maisonneuvei*) and herbage, on sandy or loamy plains; also bushy acacias (especially *A. ligulata* and *A. aneura*) on sandridges and interdunes, usually with spinifex (Johnstone and Storr 1998).

Likely presence in Project area: While records in the general area are sparse (DpaW 2015b) the striated grasswren can be considered a potential species given the presence of suitable habitat.

Listed as a potential species based on available information.

Extent of potential habitat within the Project area: Sand plains, sand dunes, clay loam plains and sand loam plains (3,285 ha – 43.0% of total area).

Grey Wagtail *Motacilla cinerea*

Status and Distribution: The grey wagtail is listed as Schedule 5 under the *WC Act* and as Migratory under the *EPBC Act* including international agreements to which Australia is a signatory. A rarely recorded, accidental vagrant that has on a few occasions been recorded on widely separated parts of the Australian coastline (Pizzey & Knight 2012).

Habitat: In Australia, near running water in disused quarries, sandy, rocky streams in escarpments and rainforest, sewerage ponds, ploughed fields and airfields (Pizzey & Knight 2012).

Likely presence in Project area: This species preferred habitat is absent from the Project area and under normal circumstances it would not occur.

Not listed as a potential species based on currently available information.

Extent of potential habitat within the Project area: No habitat suitable for this species to utilise appears to be present.

Yellow Wagtail *Motacilla flava*

Status and Distribution: The yellow wagtail is listed as Schedule 5 under the *WC Act* and as Migratory under the *EPBC Act* including international agreements to which Australia is a signatory. A regular summer migrant to mostly coastal northern Australia, vagrant in southern Australia (Pizzey & Knight 2012).

Habitat: Habitat requirements for the yellow wagtail are highly variable, but typically include open grassy flats near water. Habitats include open areas with low vegetation such as grasslands, airstrips, pastures, sports fields; damp open areas such as muddy or grassy edges of wetlands, rivers, irrigated farmland, dams, waterholes; sewage farms, sometimes utilise tidal mudflats and edges of mangroves (Pizzey & Knight 2012).

Likely presence in Project area: This species preferred habitat is absent from the Project area and under normal circumstances it would not occur.

Not listed as a potential species based on currently available information.

Extent of potential habitat within the Project area: No habitat suitable for this species to utilise appears to be present.

Brush-tailed Mulgara *Dasycercus blythi*

Status and Distribution: Listed as Priority 4 by the DPaW. Because most previous records did not distinguish among the two species of mulgara now recognised (i.e. brush-tailed and crest-tailed), there is some ambiguity about the distribution of both species. Widespread but patchy in sandy regions of arid central Australia and WA. Has declined in the south and east of range (Menkhorst & Knight 2011).

Habitat: The brush-tailed mulgara occur in a range of vegetation types including hummock grass plains, sand ridges, mulga shrubland on loamy sand, however, the principal habitat is mature hummock grasslands of spinifex, especially *Triodia basedowii* and *T. pungens* where it lives in burrows that it digs on the flats between low sand dunes (Van Dyck & Strahan 2008). The location of brush-tailed mulgara colonies may be influenced by the presence of better watered areas such as paleo-drainage systems or drainage lines in sand plain or sand dune habitats (Masters *et al.* 2003).

Likely presence in Project area: Current status in the Project area is difficult to determine and there is a paucity of records of this species in the wider area, the closest (35 km south west), most recent being from 1994 (De La Poer Range NR – DPaW 2015b). Habitat in some sections of the Project area does however appear suitable (e.g. sand plains, sand ridges, *Acacia* shrubland on loamy sand) and therefore it must be considered a potential species.

Listed as a potential species based on available information.

Extent of potential habitat within the Project area: Sand plains, sand dunes, clay loam plains and sand loam plains (3,285 ha – 43.0% of total area).

Southern Marsupial Mole *Notoryctes typhlops*

Status and Distribution: Listed as Priority 4 by the DPaW. The southern marsupial mole is widely distributed throughout the arid areas of central Australia, mainly in the central deserts of the Northern Territory, Western Australia and South Australia (Burbidge *et al*. 1988). These regions include the Great Sandy, Little Sandy, Gibson, Tanami, Great Victoria and western Simpson Deserts. Recent survey work suggests they are more widespread and common than previously thought (Van Dyck & Strahan 2008, Woinarski *et al.* 2014).

Habitat: Deep loose sand appears to be a requirement for the southern marsupial mole and the species is most often recorded in sandy dunes with various *Acacias* and other shrubs (Corbett 1975, Johnson & Walton 1989). Such habitat is widespread and typical of the sandy deserts. The southern marsupial mole may also occur in some sandy plains, and might also occupy sandy river flats, especially in areas where aeolian dunes also occur (Benshemesh 2004).

Likely presence in Project area: The status of this species within the Project area is difficult to determine. While the Project area does contain some areas of sand dunes which superficially represent suitable habitat for this species, the dune field is relatively small and isolated from other dune areas by considerable distances. This suggests that the probability of this species occurring is low.

Not listed as a potential species based on currently available information.

Extent of potential habitat within the Project area: Sand dunes and sand plains (1,517 ha – ~19.9% of total area).

Sandhill Dunnart *Sminthopsis psammophila*

Status and Distribution: The sandhill dunnart is listed as Schedule 2 under the *WC Act* and as Endangered under the *EPBC Act*. The species is known from a limited number of locations including southern Northern Territory, South West Great Victoria

Desert (Including Queen Victoria Springs Nature Reserve), Yellabinna sand dunes in Central South Australia and the Eyre Peninsula in South Australia (Menkhorst and Knight 2011). In Western Australia the species appears to be restricted to the south western fringe of the Great Victoria Desert inhabiting yellow sand dune systems with long unburnt mature hummock grasslands (*Triodia* sp.) and often in association with Mallee or Marble Gum, *Callitris* and an associated complex shrub understorey (GHD 2010, Churchill 2009, DPaW 2015b).

Sandhill dunnarts in Western Australia have been captured in Queen Victoria Springs, (Pearson and Robinson, 1990) and near Mulga Rock in the Great Victoria Desert (Hart and Kitchener 1986) and in the Plumridge Nature Reserve (ecologia 2009). The sandhill dunnart has also recently been recorded at several locations along the Tropicana to Sunrise Dam pipeline route (KEC 2014).

Habitat: A variety of sandy habitats usually with sand dunes and an understorey of *Triodea* spp. hummock grass. Overstorey vegetation can vary but in Great Victoria region most often associated with low open *Eucalyptus* and *Callitris* woodlands (Van Dyck & Strahan 2008). Low parallel sand dunes carrying open woodland with diverse low shrub layer and hummock grass (Menkhorst and Knight 2011). Long unburnt spinifex sandplain between yellow sand dunes (KEC 2014).

Likely presence in Project area: This species optimum habitat in the Great Victoria Desert area is yellow sand dune systems with long unburnt mature hummock grasslands (*Triodia* sp.). This habitat is appears to be absent from the Project area and a lack of any records within 200 kms (DpaW 2015b) suggests it is unlikely to be present.

Not listed as a potential species based on currently available information.

Extent of potential habitat within the Project area: No suitable habitat (yellow sand dune systems with long unburnt mature hummock grasslands (*Triodia* sp.)) for this species appears to be present.

Bilby *Macrotis lagotis*

Status and Distribution: The bilby is listed as Schedule 3 under the *WC Ac*t and as Vulnerable under the *EPBC Act*. Current known distribution in suitable habitat extends from Tanami Desert west to near Broome and south to Warburton. Former distribution extended south to Margaret River, though apparently absent from coastal plain (Burbidge 2004).

Habitat: Current habitat includes *Acacia* shrublands, spinifex and hummock grassland (Menkhorst and Knight 2011). Mitchell grass and stony downs country with cracking clay, also desert sand plains and dune fields sometimes with spinifex hummock grassland and acacia shrubland (Van Dyck *et al.* 2013).

Likely presence in Project area: Current status in the Project area is difficult to determine and there is a paucity of records of this species in the wider area (DpaW 2015b), the closest, most recent ones being from Lorna Glen Station where the animals have been re-introduced. Habitat in some sections of the Project area does however appear suitable (e.g. sand plains, sand dunes, *Acacia* shrubland) and therefore it must be considered a potential species.

Listed as a potential species based on available information.

Extent of potential habitat within the Project area: Sand plains, sand dunes, quartz rocky plains, clay loam plains, sand loam plains and drainage depressions (4,024 ha - ~52.7% of total area).

DISCLAIMER

This fauna assessment report ("the report") has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Greg Harewood ("the Author"). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints. In accordance with the scope of services, the Author has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

The conclusions are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of preparing the report. Also it should be recognised that site conditions, can change with time.

Within the limitations imposed by the scope of services, the field assessment and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

In preparing the report, the Author has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise stated in the report, the Author has not verified the accuracy of completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. The Author will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to the Author.

The report has been prepared for the benefit of the Client and no other party. The Author assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of the Author or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

The Author will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.