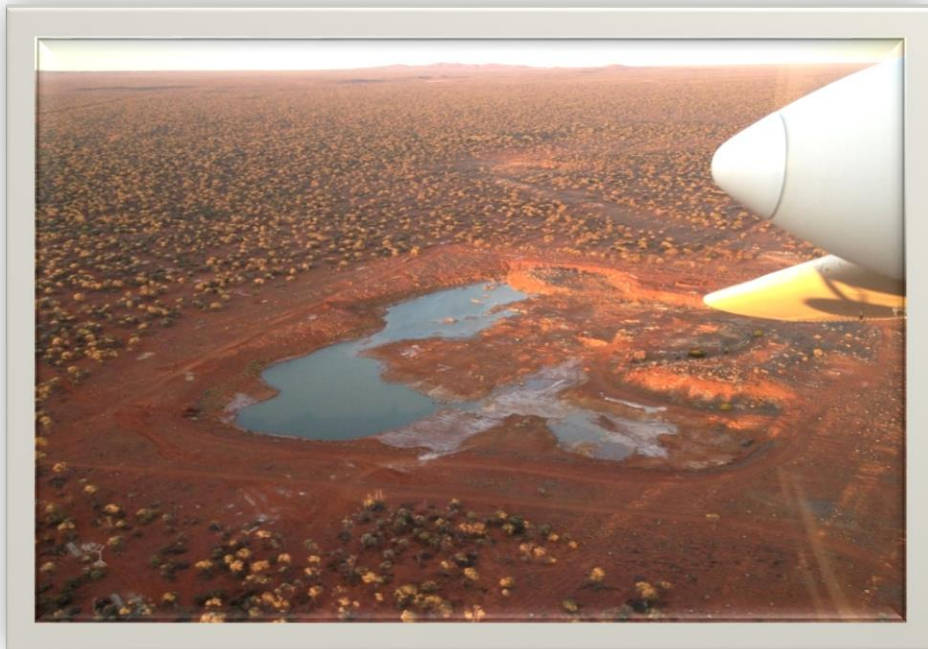


# **MBContracting**

Environmental and Media Consulting Services

## **Level 1 Fauna Assessment And Level 2 Targeted Malleefowl Survey Dalgara**

**Prepared for Gascoyne Resources Ltd**



**June 2016**

# MBCContracting

Environmental and Media Consulting Services

**Report to:**

Gascoyne Resources Ltd

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**Date of Production of final report:** June 2016

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**Front Cover Plate** – Old mine pit near Dalgaringa- part of the proposed new mining operation.

## Summary

Gascoyne Resources Ltd, proposes to conduct a mining operation which involves expanding a pre-existing mine near Dalgara. This area is located approximately 60 km north-west of Mount Magnet and 73 km south-west of Cue in the Murchison Region of Western Australia (Figure 1.). The proposed mine and associated infrastructure is located within Mining Leases M59/749 as well as Miscellaneous Licenses L59/141, L59/151, L59/142, L59/152 & L59/153 (Figure 2).

The minimum level of fauna assessment required for a natural area in the Murchison Region, where more than 50 ha of native vegetation is being disturbed and assuming it has no unusual, distinct or rare features or functions and no known fauna of conservation significance and has vast areas of similar vegetation nearby, is a Level 1 Fauna Survey. This may need to be followed up with additional Level 2 Targeted Fauna Surveys or a Level 2 Comprehensive Fauna Assessment depending on the results of the Level 1 Fauna Assessment (EPA 2004, 2010).

The study area had no known unusual, distinct or rare features or ecological functions and no known fauna of conservation significance currently on record. It is also surrounded by vast areas of similar vegetation nearby. The minimum Level 1 Fauna Assessment was therefore initially prescribed, with time allowed to conduct Level 2 Targeted Surveys for conservation significant species if required, as indicated by the results of the Level 1 Fauna Assessment.

In 2014 Australasian Ecological Services was commissioned by Gascoyne Resources Ltd to conduct a Level 1 Fauna Survey of the Golden Wings pit area and access roads, which was done on the 16<sup>th</sup> October 2013 (AES 2014) (Figure 2). MBContracting was subsequently commissioned to survey the remaining areas of native vegetation that are proposed to be cleared, or disturbed for the Dalgara Gold Project, as illustrated in Figure 2. This work was done recently between the 31<sup>st</sup> May and 1<sup>st</sup> June 2016. Both fauna surveys were done in conjunction with Level 1 Flora Assessments conducted at the same time by Native Vegetation Solutions (Native Vegetation Solutions 2014) and (Native Vegetation Solutions 2016) currently being prepared.

### **The aims of a Level 1 Fauna Assessment are to –**

1. Conduct a Desktop Survey to ascertain what fauna assemblages and conservation significant fauna are likely to be in the region, based on available information.
2. Verify which of these species are likely to be within the study area by conducting a brief on-site Level 1 Fauna Survey. This will take into account the condition of the habitats found and opportunistic sightings of species, directly (e.g. birds and some of the larger mammals and reptiles) or indirectly via the presence of calls, tracks, scats, feeding signs, nests and burrows. Sometimes, if appropriate, spotlighting is conducted and/or camera traps are deployed. This on-site survey may also add species to the original desktop list.

3. Identify potential impacts on this fauna, based on available information and make recommendations for management and further survey work, if necessary.

**The aims of a Level 2 Targeted Fauna Survey are to –**

1. Conduct targeted survey work for specific conservation significant species, in any areas identified as suitable habitat and likely to be supporting that species

The desktop study, combined with the on-site Level 1 Fauna Survey, identified eight fauna habitats. It also identified 123 fauna species as potentially occurring in the general area, including 2 amphibians, 22 reptiles, 78 birds, 11 mammals and 1 invertebrate. Appendix 1 lists these species. Ten of these species had conservation significance. These species are listed in Table 2 together with information on their conservation status, reason for that conservation status, their biology, probability of their presence within the study area, the impacts that will affect them if they are present and in which areas they would be most affected. This table is ordered to reflect the relative conservation and management priority for these species as a guideline only, based on these factors and the biology of each species.

Species requiring conservation and management consideration, if they occur, in the study area include the Rainbow Bee-eater, Peregrine Falcon and Malleefowl. However, this Level 1 Fauna Assessment indicates there are no species where the habitat in the study area could be said to be critical to these species survival.

Eleven ha of fauna habitat was surveyed for Malleefowl and their mounds, but no evidence of Malleefowl was found in this area, or the study area generally. However, there was an extinct mound found just outside the study area (approximately 1.1 km SSW of Gilbey's pit in the SW of tenement M59/749).

Potential impacts on the fauna currently residing within the study area will be habitat loss and increased mortality with a slight increase in the risk of fire (also involving increased mortality and temporary habitat loss), increased weed infestation and increased predation and competition from exotic species.

However, this fauna assessment indicates the mine would impose only a very minor, impact on local fauna species, including those conservation significant species mentioned, if they were actually present in the study area.

A list of recommended generic management and monitoring measures, that will help decrease the potential impacts described is provided (see Recommendations).

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## 1. Introduction

Gascoyne Resources Ltd, proposes to conduct a mining operation which involves expanding a pre-existing mine near Dalgara. This area is located approximately 60 km north-west of Mount Magnet and 73 km south-west of Cue in the Murchison Region of Western Australia (Figure 1.). The proposed mine and associated infrastructure is located within Mining Leases M59/749 as well as Miscellaneous Licenses L59/141, L59/151, L59/142, L59/152 & L59/153 (Figure 2).

The minimum level of fauna assessment required for a natural area in the Murchison Region, where more than 50 ha of native vegetation is being disturbed and assuming it has no unusual, distinct or rare features or functions and no known fauna of conservation significance and if it has vast areas of similar vegetation nearby, is a Level 1 Fauna Survey. This may need to be followed up with additional Level 2 Targeted Fauna Surveys or a Level 2 Comprehensive Fauna Assessment depending on the results of the Level 1 Fauna Assessment (EPA 2004, 2010).

The study area had no known unusual, distinct or rare features or ecological functions and no known fauna of conservation significance currently on record. It is also surrounded by vast areas of similar vegetation nearby. The minimum Level 1 Fauna Assessment was therefore initially prescribed, with time allowed to conduct Level 2 Targeted Surveys for conservation significant species if required, as indicated by the results of the Level 1 Fauna Assessment.

In 2014 Australasian Ecological Services was commissioned by Gascoyne Resources Ltd to conduct a Level 1 Fauna Survey of the Golden Wings pit area and access roads, which was done on the 16<sup>th</sup> October 2013 (AES 2014) (Figure 2). MBContracting was subsequently commissioned to survey the remaining areas of native vegetation that were proposed to be cleared, or disturbed for the Dalgara Gold Project, as illustrated in Figure 2. This work was done recently between the 31<sup>st</sup> May and 1<sup>st</sup> June 2016. Both fauna surveys were done in conjunction with Level 1 Flora Assessments conducted at the same time by Native Vegetation Solutions (Native Vegetation Solutions 2014) and (Native Vegetation Solutions 2016) currently being prepared. The flora and fauna assessments were done in conjunction with Clark Lindbeck and Associates (CLA), commissioned as the lead Environmental Consultant for this project.

The survey area lies in the Murchison (MUR) bioregion within the Western Murchison (MUR2) subregion with a variety of vegetation types. This subregion has an arid climate with bimodal rainfall that usually falls in winter. Mean annual minimum temperature at nearby Mount Magnet Aero is 15.1°C and mean annual maximum temperature is 28.5°C. The coldest month is July (mean minimum temperature 7.0°C) and the hottest is January (mean maximum temperature 37.9°C) (Native Vegetation Solutions 2014). A complete description of the location, tenure, climate, geology and vegetation for the golden wings pit can be found in the Golden Wings Level 1 Flora Assessment Report (Native Vegetation Solutions 2014) and the Dalgara Level 1 Flora Assessment Report (Native Vegetation Solutions 2016) currently being prepared.

## **1.1 Objectives of a Level 1 Fauna Assessment**

**The aims of a Level 1 Fauna Assessment are to –**

1. Conduct a Desktop Survey to ascertain what fauna assemblages and conservation significant fauna are likely to be in the region, based on available information.

Verify which of these species are likely to be within the study area by conducting a brief on-site Level 1 Fauna Survey. This will take into account the condition of the habitats found and opportunistic sightings of species, directly (e.g. birds and some of the larger mammals and reptiles) or indirectly via the presence of calls, tracks, scats, feeding signs, nests and burrows. Sometimes, if appropriate, spotlighting is conducted and/or camera traps are deployed. This on-site survey may also add species to the original desktop list.

2. Identify potential impacts on this fauna, based on available information and make recommendations for management and further survey work, if necessary.

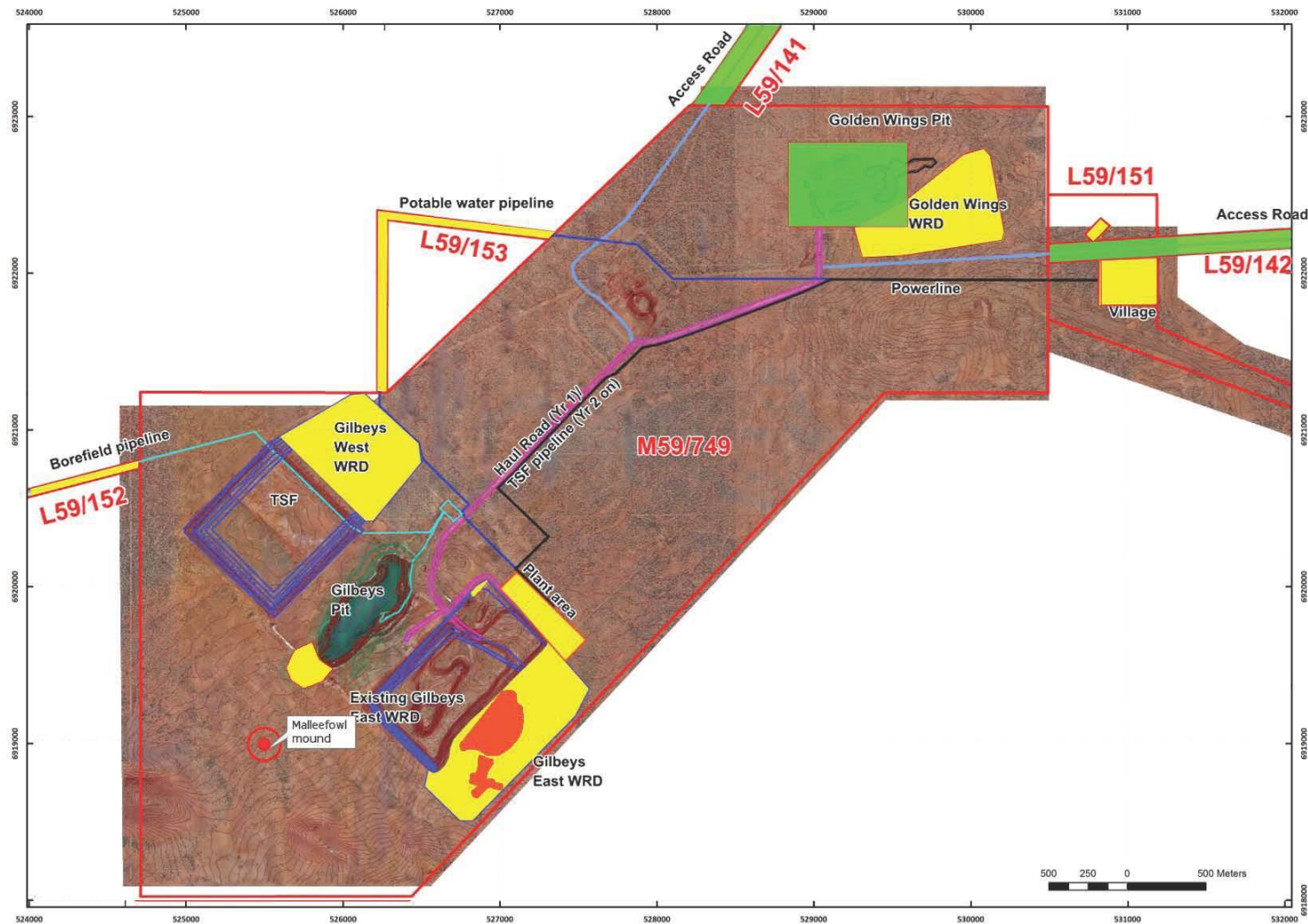
**The aims of a Level 2 Targeted Fauna Survey are to –**

1. Conduct targeted survey work for specific conservation significant species, in any areas identified as suitable habitat and likely to be supporting that species.





**Figure 1.** Location of proposed mine near Dalgaranga, Gascoyne Resources Ltd.



**Figure 2.** Study area. This includes the areas covered by the first Level 1 Fauna Survey (AES 2014), including revegetation along the northern and eastern entrance roads and the surrounds of the golden wings pit (light green), the present survey consisting of the remaining areas proposed for clearing (yellow) and the Level 2 Targeted Malleefowl Survey (11 ha)(orange). The location of the extinct Malleefowl mound outside the study area is indicated with a red point.

## **2. Methods**

### **2.1 Desktop Study**

This information is supplemented with information on the habitat requirements and general distributions of fauna species from field guides and other standard references including frogs (Tyler *et al.* 1994; Tyler and Doughty 2009), reptiles (Storr *et al.* 1983; 1990; 1999; 2002; Wilson and Swan 2008), birds (Morcombe 2004; Garnett *et al.* 2010 and specific volumes of the Handbook of Australian and New Zealand and Antarctic Birds as stated), mammals (Churchill 2008; Menkhorst *et al.* 2011; van Dyke and Strahan 2008), Short Range Endemic invertebrates (Harvey 2002 and some other specific references stated) and tracks (Triggs 1996 and Moseby *et al.* 2011). It also took into account previous work in the area (Davies *et al.* 1995) and (AES 2014).

In assessing the likely impact of clearing in the local area, the area within a 15 km radius of the impact site is generally adopted as a guide according to the EPA guidelines (EPA 2004).

### **2.2 On-Site Level 1 Fauna Survey**

The first Level 1 Fauna Survey was conducted as a spring survey on the 16<sup>th</sup> October 2013 (AES 2014), with the present Level 1 Fauna Survey in late autumn/early winter, between the 31<sup>st</sup> May and 1<sup>st</sup> June 2016. The study site for the present Level 1 Fauna Survey was restricted mostly to areas of native vegetation or regenerating native vegetation within the clearing footprint (Figure 2). The survey involved walking over the study area and looking for species directly (e.g. birds and some of the larger mammals and reptiles), as well as indirectly by listening for bird calls and finding scats, tracks, diggings, burrows and nests (including Malleefowl mounds). Effort was focused on significant conservation species and searching for habitat characteristics that are important to these species.

### **2.3 Level 2 Targeted Malleefowl Survey**

A Level 2 Targeted Malleefowl survey was conducted by two observers walking in a grid pattern over the areas of suitable nesting habitat (11 ha) within the study area (Figure 2). Spacing between grid transects was varied slightly, according to the vegetation density, and varied from 15 to 25 m. Effort was focused on finding and classifying any malleefowl mounds, as prescribed by the National Malleefowl Monitoring Team (2016).

### **2.4 Personnel**

Level 1 survey work and reporting was carried out by Michael Burbidge (General Consultant), and Specialist Consultant Julie Raines (Australasian Ecological Services), a zoologist and ecologist with over 30 years of experience in vertebrate ecology.

## 2.5 Nomenclature and Taxonomy

The taxonomy and nomenclature used in this report follows the recommendations presented in EPA Guidance Statement Number 56 (EPA 2004) and the more recent Technical Guide – terrestrial vertebrate fauna surveys for environmental impact assessment (2010). The nomenclature for vertebrates generally follows the ‘Checklist of Vertebrates of Western Australia’ (Western Australian Museum website Nov 2011). However, where data were extracted from the DPaW NatureMap database, the alphabetical order of species within broad taxonomic groups is maintained.

## 3. Results of the Level 1 Fauna Survey

### 3.1 Fauna Habitat

Eight different fauna habitats were identified during the 2014 and 2016 Level 1 Fauna Surveys. These are described below with photographs. The three habitats found in the Golden Wings Pit and access roads study area (AES 2014) are marked with an asterisk.

#### Mulga Fauna Habitats

Mulga woodland occurs in the study area in varying densities and with varying composition and density of its understorey. The top story comprises Mulga in tree-form, mainly *A. caesaneura* with some *A. aneura*, *A. mulganeura* and *A. pteroneura* and smaller numbers of other species, sometimes with some *Grevillea berryana* and/or *A. grasbyi*. This is over a shrubland of shrub-form Mulga including *A. aneura*, *A. mulganeura* and *A. pteroneura* and other shrubs including *A. crasspedocarpa*, *A. tetragonophilla*, *A. ramulosa ramulosa*, *A. ramulosa linophylla*, *Eremophila granitica*, *E. gluetonotis*, *E. forrestii*, *E. fraseri* and *Ptilotus obovatus*. Sometimes with a ground cover of grasses including *Aristida contorta*, *Eriachne helmsii* and *Cymbopogon ambiguous*. (Plant identifications provided by Eren Reid, Native Vegetation Solutions).

Surface soils generally vary from orange to dark orange clay to clay – loam sometimes with associated stony surface.

Five different Mulga fauna habitats were identified as illustrated below and were usually in good to very good condition -



**Plate 1.** Mulga with understorey of variable species.

1. **\*Mulga over low to medium density understorey of variable species (as described above).** This was the most common fauna habitat in the study area and the main habitat which was found in the Golden Wings Level 1 Fauna Survey (AES 2014).



**Plate 2.** Mulga with only very sparse understorey.

2. **Mulga with only very sparse understorey.** Only small amounts of this fauna habitat was found within the study area.



**Plate 3.** Mixed low Mulga shrubland over rocky ground.

- 3. Mixed low Mulga shrubland over rocky ground.** Only a very small amount of this fauna habitat is in the study area.



**Plate 4.** Mulga with stands of *Eremophila forrestii*.

- 4. Mulga with stands of *Eremophila forrestii*.** This is mulga over medium – dense shrubland comprising a variable shrubland containing relatively dense stands of *E. forrestii*. A small amount of this fauna habitat was found in the study area.



**Plate 5.** Thicker vegetation comprising very mature tree-form *A. crasspedocarpa* with some *A. tetragonophylla*,

- 5. Thicker vegetation comprising very mature tree-form *A. crasspedocarpa* with some *A. tetragonophylla*,** with sparse Mulga, over *E. forrestii* and softer green plants including *Solanum ferocissimum* and *Abutilon oxycarpum* and green moss. Very small amount of this fauna habitat is found in study area.



**Plate 6.** Disturbed fauna habitat.

- 6. Disturbed Fauna Habitat.** Highly disturbed areas comprising little vegetation probably all regenerating from previous mine disturbance. Surface soils varied from orange to dark orange clay to clay – loam. Only small amounts in the study area, as the study area focuses on native vegetation proposed for clearing.



**Plate 7.** Roadside rehabilitation illustrating regenerating habitat on right side of photograph.

7. **\*Regenerating Fauna Habitat.** Habitat which has previously been cleared or disturbed by mining or related activity which is being rehabilitated. The plants comprise a mixture of grasses and small regenerating shrubs from the Mulga woodland. Soils varied from orange to dark orange clay to clay – loam. This habitat was described on the road verges in AES (2014) with small amounts found elsewhere in the study area.



**Plate 8.** The Golden Wings Mining Pit with water in it, first described in AES (2014).

8. **\*Mining Pit With Water Fauna Habitat.** Note only the Golden Wings Pit was included in the study area. It was part of the 2014 survey. The Golden Wings Pit comprised hard clay/loam surface soils with some regenerating habitat still in



degraded condition. It contained water which was being utilised by a small number of waterbirds.

A detailed botanical description of the vegetation types in the study area is being provided through the Level 1 Flora Survey of all the tenements (not just the fauna study area) (Native Vegetation Solutions 2016) being prepared, which was conducted concurrently with this fauna survey. A flora report produced in 2014 for the Golden Wings pit area also contains detailed botanical descriptions for that specific area (Native Vegetation Solutions 2014).

### **3.2 Fauna recorded during Desktop and On-Site Fauna Survey**

The desktop study identified 123 species as potentially occurring in the general region. Appendix 1 lists these species. During the on-site survey a number of species were recorded and these are marked with an asterisk in Appendix 1. Introduced species are marked with a cross and species of conservation significance are indicated according to the key provided at the front of the Appendix.

Conservation significant species are those species listed as either Threatened under the Commonwealth Environmental Protection and Biodiversity Act (1999) and/or the Western Australian Wildlife Conservation Act (1950), or are listed as Priority species by the Department of Parks and Wildlife. These species need specific consideration in any impact assessment process.

#### **3.2.1 Amphibians and Reptiles**

The combined Desktop Survey and on-site Level 1 Fauna Survey identified two amphibians and 22 reptiles as potentially occurring in the general area. Three conservation significant reptiles were identified in the Desktop Survey. More detail about these species, their scientific names and conservation status can be found in Table 1.

#### **3.2.2 Birds**

The combined Desktop Survey and on-site Level 1 Fauna Survey identified 78 birds potentially occurring in the general area. Forty-one bird species were seen or heard (confirmed) during the on-site Level 1 Fauna Survey and these are indicated with an asterisk in Appendix 1. Six of these bird species were conservation significant (Appendix 1), including the Malleefowl (listed under the EPBC Act, 1999). More detail about these species, their scientific names and conservation status can be found in Table 1.

#### **Malleefowl**

The fauna habitat in the Golden Wings pits area was very sparse and unsuitable for Malleefowl breeding (AES 2014). Most of the fauna habitat in the remaining study area was also similarly unsuitable. The small amount of denser fauna habitat found (11 ha) was

searched during the Level 2 Targeted Malleefowl Survey. The location of this denser vegetation is illustrated in Figure 2. No Malleefowl, mounds or other sign of Malleefowl were found during this targeted survey. More of this denser fauna habitat may be found outside the study area but nearby.

Whilst no direct evidence that Malleefowl are using the study area was found, during the Level 1 Fauna Survey or the Targeted Level 2 Malleefowl survey, an extinct Malleefowl mound was incidentally found by botanist, Eren Reid (Native Vegetation Solutions), just outside the fauna study area nearby. It's location is illustrated in Figure 2. Several areas of dense medium height shrubland (not found on the tenements) were also incidentally seen from the main road east of the tenements, which could be potential Malleefowl nesting habitat. This suggests that the open Mulga fauna habitat, which is predominant in the region, may generally contain some smaller areas of this denser fauna habitat, suitable for Malleefowl nesting. Notably, this dense shrubland habitat was not found on the tenements in the Level 1 Flora Survey (Native Vegetation Solutions 2016).

The extinct mound, found just outside the fauna study area, was less than 10 cm high (Plate 9). It would therefore have been many decades old. It was outside the proposed clearing areas (fauna study area). It was located approximately 1.1 km SSW of Gilbey's pit in the SW of tenement M59/749 and is approximately 1 km from the nearest proposed clearing area. Malleefowl normally nest in relatively dense vegetation. This extinct mound was in very open vegetation which suggests that when it was constructed the fauna habitat was denser. It was most likely to have been an area like Fauna Habitat 4 (Mulga with stands of *Eremophila forrestii*) (Plate 4) or Fauna Habitat 5 (Thick vegetation comprising very mature tree-form *A. crasspedocarpa* with some *A. tetragonophylla*, with sparse Mulga, over *E. forrestii*) (Plate 5), in which the present Level 2 Fauna Survey efforts were conducted. This change may have been due of natural variation, or some fauna habitats in the region may have tended to become less dense over time due to the combined pressures of many years of fire and grazing by both sheep, goats and camels.



**Plate 9.** Extinct mound found nearby just outside the study area.

### **3.2.3 Mammals**

The combined Desktop Survey and on-site Level 1 Fauna Survey identified 11 mammals as potentially occurring in the general area. Six mammal species were recorded (confirmed) during the on-site Level 1 Fauna Survey and these are indicated with an asterisk in Appendix 1. The presence of Rabbit, Camel and Cat were identified by the presence of scats and tracks and Euro, Sheep and Goat were seen. Although not detected during the survey, exotic predators, dingo/dogs and foxes are likely to be present too, as they are usually widespread through this type of habitat. The Desktop Survey identified one mammal species of conservation significant and this was the Black-flanked Rock Wallaby (*Petrogale lateralis* ssp *lateralis*) which is listed as Vulnerable under the EPBC Act 1999 and is considered rare or likely to become extinct under the Wildlife Conservation Act (1950) (Schedule 3) (Appendix 1). More detail about this species, its scientific name and conservation status can be found in Table 1.

### **3.2.4 Invertebrates**

The combined Desktop Survey and on-site Level 1 Fauna Survey identified one invertebrate species as potentially occurring in the general region. However, it should be noted that the taxonomy for many of these invertebrates has not been finalised. This species is the Shield-backed Trapdoor Spider which is listed as Vulnerable under the Wildlife Conservation Act (1950) (Schedule 3). More detail about this species, its scientific name and conservation status can be found in Table 1.

Short Range Endemic (SRE) invertebrate species are not very mobile and can only move over a short range. They therefore cannot re-distribute themselves when impact occurs in their area. This lack of mobility also causes species to become isolated and they may inbreed to the point of becoming taxonomically distinct and therefore unique over the generations. No potential SRE habitat was identified during the Level 1 Fauna Survey. The habitat on the study site, was not characteristic of that which normally supports Short Range Endemic Invertebrates. It was very uniform, wide ranging Mulga woodland with no isolated protected areas such as rock areas or access to the subterranean environment, streamlines or other low lying protected areas.

## **3.3 Limitations of this Level 1 Fauna Assessment**

Any survey can be limited in its effectiveness by variables ranging from the weather to the competency and experience of the personnel conducting the survey. EPA Guidance Statement 56 (EPA 2004) provides guidelines to assess the limitations and effectiveness of both Level 1 and 2 fauna surveys. The assessment of the present Level 1 Fauna Assessment and the Level 2 Targeted Malleefowl Survey are summarised in Appendix 2. These surveys had no limitations and can therefore be deemed an effective for their intended purpose.

## 4. Assessment of Conservation Significant Species

The desk top study combined with the on-site Level 1 Fauna Survey produced a list of 10 conservation significant species, which need to be considered in assessing the impact of developing the proposed mine.

The conservation significant species identified are listed in Table 1 together with information on their conservation status, reason for that conservation status, their biology, probability of their presence within the study area (rated as Confirmed or otherwise as High, Medium, Low or Negligible probability), the impacts that will affect them if they are present and in which areas they would be most affected. This table is ordered to reflect the relative conservation and management priority for each of these species as a guideline only, based on these factors and the biology of each species.

Species requiring specific conservation and management consideration are those conservation significant species that have a 'Low – Medium' or higher ranking probability of occurring in the study area and will potentially be affected by the proposed project (if the species was actually present) based on its conservation significance and biology. The conservation and management requirements of these species therefore need to be considered in developing the proposed project and may, or may not, require the proponent to alter their proposed project and/or implement special management procedures.

Species requiring conservation and management consideration in the study area include the Rainbow Bee-eater, Peregrine Falcon and Malleefowl. The details about these species including their scientific names and conservation status are provided in Table 1.

This Level 1 Fauna Assessment indicates there are no species where the habitat in the study area could be said to be critical to these species survival. The Rainbow Bee-eater and Peregrine Falcon notably have 'Medium' and 'Medium – Low' probability, respectively, of occurring within the study area (see Table 1). A very small proportion of their potential foraging and breeding habitat would be affected by clearing in the study area, if the species was actually present. They would be most affected in spring and early summer when these species are breeding.

Malleefowl choose relatively denser fauna habitat to breed in. There was only a very small amount of relatively dense fauna habitat within the study area (11 ha). These denser habitats were searched during the Level 2 Target Malleefowl Survey and no Malleefowl mounds were found. The study area is therefore not being used for breeding by this species at present.

The extinct mound found outside the study area, but nearby, was in very open vegetation. This suggested that when it was constructed decades ago the fauna habitat was denser. It was most likely to have been an area like Fauna Habitat 4 (Mulga with stands of *Eremophila forrestii*) (Plate 4) or Fauna Habitat 5 (Thick vegetation comprising very mature tree-form *A.*

*crasspedocarpa* with some *A. tetragonophylla*, with sparse Mulga, over *E. forrestii*) (Plate 5), in which the present Level 2 Fauna Survey efforts were conducted.

There is a Low probability that Malleefowl are using the study area for foraging, given that densely vegetated habitats suitable for breeding occur nearby in the region (Table 1). Notably, Malleefowl will wander several kilometres or more during the breeding season, in search of food and up to 15 km in the non-breeding season. This species will therefore potentially be affected, to a very small extent, by clearing in the study area, if this species were actually present.

For various reasons, it is unlikely that the remaining conservation significant species listed in Table 1 will be impacted if the study area is disturbed. In all cases there is a low probability of these species being present because either the habitat is marginal for the species, or is suitable but there is more suitable habitat nearby, or because there are no records within 30 - 40 km or more of the proposed disturbance. Also the study area may only be a small part of a large and similar landscape containing a similar range of vegetation as described in the study area. This applies to the Shield-backed Trapdoor Spider, Western Spiny-tailed Skink, Good-legged Lerista, Gilled Slender Blue-tongue and Short Range Endemic Invertebrates (see Table 1 for scientific names and details on these lower risk conservation species).

Some species are of even less concern, because either, the habitat on the study area is clearly unsuitable and/or there are no records within many 10s of kilometres and /or they will remain independent of the study area. This applies to the Slender-billed Thornbill, Black-flanked Rock Wallaby, Fork-tailed Swift and Night Parrot (see Table 1 for scientific names and details on these lower risk conservation species)

**Table 1. Summary of Conservation Significant Species and Ecological Considerations**

Species are ordered to reflect relative conservation and management priority as a guideline only, taking into account the conservation significance of the species, its biology, probability of it being present and in which particular areas this impact would occur.

\* = **Recorded in Level 1 Fauna Survey.**

**Probability of presence is expressed as Confirmed or otherwise ranging through High, Medium -High, Medium, Medium – Low, Low, Low - Negligible or Negligible.**

The references listed in the desktop study method are used to produce this table, except where otherwise stated. Please note that the Crested Bellbird and the Australian Bustard, which were mentioned in AES (2004) as DPaW Priority species, are no longer listed as conservation significant species. NatureMap and the Protected Matters Search Tool was accessed June 2016.

Species	Conservation Significance	Reason species is Conservation Significant	Probability of presence in the study area and ecological considerations	Potential impacts that would occur if species present in the study area
<p><b>Rainbow Bee-eater</b> <i>(Merops ornatus)</i></p>	<p>International Migratory Bird Agreement (Commonwealth) and Schedule 5 Wildlife Conservation Act, 1950 obliging Australia to conserve habitat for these species.</p>	<p>This species is subject to International Migratory Bird Agreement (s). It winters in Indonesia and northern Australia and migrates south to breed. It digs a burrow in the ground to nest in and favours softer soils but will use heavier soils and sometimes uses banks of soil. Its population has been decreasing.</p>	<p><b>Medium</b> – re- presence of potential foraging habitat in area. Widespread species and suitable habitat for foraging, though no records nearby.</p> <p><b>Medium - Low</b> – re- presence of nesting habitat (soils heavier than ideal, but could burrow into banks of soil that comprise waste from the previous mine, but not ideal as this soil is very rocky).</p> <p>Two Nature Map records 22km WNW (1978), one record 42km NE, 11 records between 50km and 100km.</p> <p>Vast area of suitable habitat nearby and species very mobile.</p>	<p>Clearing/mining of study area would remove and degrade a small proportion of habitat, but may also create additional banks of soil that could be used as nesting habitat, however not ideal for this purpose.</p>

Species	Conservation Significance	Reason species is Conservation Significant	Probability of presence in the study area and ecological considerations	Potential impacts that would occur if species present in the study area
<p><b>Peregrine Falcon</b> <i>(Falco peregrinus)</i></p>	<p>Other specially protected fauna (Schedule 7) Wildlife Conservation Act, 1950.</p>	<p>This is a wide ranging bird of prey preferring forest or woodland to rest, roost and breed in, near open areas where it can hunt. It has decreased due to habitat loss, including freshwater wetlands and possibly poaching. Historical pesticide use has also been implicated causing egg shell thinning.</p>	<p><b>Medium - Low</b></p> <p>Habitat suitable but not ideal. May use Mulga trees and hunt waterbirds in the Golden Wings pit. However, this food source is only recent and ‘man-made’ since the pit was dug.</p> <p>Widely spread species. NatureMap has nearest record approximately 14km WSW (= local area) (1 record in 1999), four records within 50km and eleven within 100km (NatureMap accessed Oct 2013).</p> <p>Species very mobile, but likes trees to nest, roost and hunt from. Plenty of this fauna habitat also available outside the study area. May also use the walls of the pits.</p>	<p>Removal of water in Golden Wings pit and clearing of trees in the study area would potentially cause a minor loss of foraging habitat. However, the pit is only recently man-made.</p>
<p><b>*Malleefowl</b> <i>(Leipoa ocellata)</i></p>	<p>Vulnerable EPBC Act 1999, Vulnerable (Schedule 3) Wildlife Conservation Act, 1950.</p>	<p>Now uncommon and patchily distributed within its range due to clearing, fragmentation and degradation of habitat, fire and changed fire regimes and predation by introduced species, including foxes. More recently cats have been identified as taking both chicks and adults (J. Raines unpubl. data and other sources).</p>	<p><b>Low for Breeding-</b> habitat unsuitable for breeding in the Golden Wings study area. This area was well traversed and no Malleefowl mounds or other sign were found (AES 2014). Most habitat in the remaining proposed clearing areas (present study area) was unsuitable for breeding. Areas possibly suitable (11 ha) were surveyed for Malleefowl mounds and none found.</p> <p><b>Low for Foraging-</b> habitat in the Golden Wings study area and most of the remaining proposed clearing areas (present study) is fairly marginal for foraging, but may be used by some Malleefowl out of the breeding season, or in the breeding season in</p>	<p>Clearing the study area will have a very low impact on foraging and a negligible impact on nesting.</p>



Species	Conservation Significance	Reason species is Conservation Significant	Probability of presence in the study area and ecological considerations	Potential impacts that would occur if species present in the study area
			<p>areas that have adjacent dense vegetation, potentially suitable for breeding, nearby.</p> <p>NatureMap has nearest record approx. 38km ESE (1 record in 1999) and a few other records &gt;80 km away, but area is relatively remote and clearly not well studied.</p> <p>A vast area of similar open fauna habitat is available nearby, outside the study area, as well as fauna habitats that are better for nesting, including medium to dense shrublands in the region.</p>	
<p><b>Shield-backed Trapdoor Spider</b> <i>(Idiosoma nigrum)</i></p>	<p>Vulnerable EPBC Act 1999, Vulnerable (Schedule 3) Wildlife Conservation Act, 1950.</p>	<p>Small number of populations known and threats not well understood.</p> <p>Burrows in heavy clay soil in areas of either open <i>Eucalyptus loxophleba</i> (York Gum), <i>E. salmonophloia</i> (Salmon Gum) or <i>E. capillosa</i> (Wandoo) under which there is a sparse understorey of <i>Acacia acuminata</i> (Jam). Feeds in the ground litter surrounding the burrow.</p>	<p><b>Low - Negligible</b></p> <p>Habitat appears unsuitable, though not well researched and understood.</p> <p>NatureMap has nearest record 14km away W (=local area) (1 record in 2010) and then further away: 27km NE (1*2010) and 61 km NW (1*2010). There are also records from the Weld range from surveys in 2012, but this is approx. 92km NE.</p>	<p>Habitat not fully researched and understood so clearing and mining could potentially have a small effect. However, plenty of these habitats available in the region.</p>

Species	Conservation Significance	Reason species is Conservation Significant	Probability of presence in the study area and ecological considerations	Potential impacts that would occur if species present in the study area
<p><b>Western Spiny-tailed Skink or Gidgee Skink</b></p> <p><i>(Egernia stokesii spp. badia)</i></p>	Vulnerable EPBC Act 1999, Vulnerable (Schedule 3) Wildlife Conservation Act, 1950.	Few populations known are disjunct through the wheatbelt and mid-west regions. Shelter amongst rocks and logs.	<p><b>Low – Negligible</b></p> <p>Habitat largely unsuitable. Rocky habitat that might be suitable is generally outside the proposed disturbance area.</p> <p>NatureMap has 1 record close by approximately 10 km NE (=local area). A number of other records around 50km NNE and one 80km SW.</p>	Would remove a very small – negligible amount of habitat.
<p><b>Good-legged Lerista</b></p> <p><i>(Lerista eupoda)</i></p>	DPaW Priority 1 species.	This species is poorly understood with few known locations on threatened lands. It has a limited distribution between Meekatharra and Cue on open mulga areas on loamy soils.	<p><b>Low – Negligible</b></p> <p>Habitat suitable but nearest records a long way from study area, however species not well understood.</p> <p>NatureMap has 2 records 70km NNE (1984), 6 records approx. 90km NE (1990-1998) and 1 record 93km NE (2014).</p>	Would remove a small amount of habitat if species present.
<p><b>Gilled Slender Blue-tongue</b></p> <p><i>(Cyclodomorphus branchialis)</i></p>	Vulnerable EPBC Act 1999, Vulnerable (Schedule 3) Wildlife Conservation Act, 1950.	Species facing high risk of extinction in the wild. A number of subspecies widely spread, but poorly known.	<p><b>Negligible</b></p> <p>Dalgaranga is N of this species known range, though it is not well known. NatureMap records are approx. 60km ESE (1*2005) and 1 record approx. 100km SSW (1965).</p> <p>In the mid-west and goldfields it appears to be associated with spinifex (<i>Triodia</i>) habitat. No <i>Triodia</i> in study area.</p>	Not applicable.

Species	Conservation Significance	Reason species is Conservation Significant	Probability of presence in the study area and ecological considerations	Potential impacts that would occur if species present in the study area
<p><b>Other Short Range Endemic Invertebrates</b></p> <p>(Species that cannot disperse far)</p>	<p>Various conservation levels depending on species found.</p>	<p>Species cannot re-distribute when impact occurs. Also isolation causes species to inbreed and become taxonomically distinct over the generations.</p>	<p><b>Negligible</b></p> <p>The study area does not contain isolated rocky areas, access to the subterranean environment, streamlines or low lying areas that are likely to support isolated SRE invertebrates.</p>	<p>Not applicable</p>
<p><b>Slender-billed Thornbill</b></p> <p>(<i>Acanthiza iredalei</i>)</p>	<p>Vulnerable EPBC Act 1999.</p>	<p>Lives in saltbush and samphire flats habitat or occasionally in dense heath, feeding on the ground.</p>	<p><b>Negligible</b></p> <p>Habitat unsuitable and no records close by. Nearest records are very old 70km NE (12 records from 1903) and 87km NE (1*2002).</p>	<p>Not applicable</p>
<p><b>Black-flanked Rock Wallaby</b></p> <p>(<i>Petrogale lateralis lateralis</i>)</p>	<p>Vulnerable EPBC Act 1999, Vulnerable (Schedule 3) Wildlife Conservation Act, 1950.</p>	<p>Declined over much of its range. Threatened by predation from foxes and cats and degradation of habitat by grazing particularly by sheep, goats and rabbits.</p> <p>Inhabits granite outcrops, sandstone cliffs and scree slopes in ranges with hummock grassland and occasional fig trees and low shrubs, caves, and coastal limestone cliffs.</p>	<p><b>Negligible</b></p> <p>Habitat not suitable. Rocks not extensive enough within study area or nearby. Vegetation mostly not suitable.</p> <p>NatureMaps nearest record 18km NE (1 record 1854) and a small number of records &gt;50km N, E and S.</p>	<p>Not applicable</p>

Species	Conservation Significance	Reason species is Conservation Significant	Probability of presence in the study area and ecological considerations	Potential impacts that would occur if species present in the study area
<b>Fork-tailed Swift</b> <i>(Apus pacificus)</i>	International Migratory Bird Agreement (Commonwealth) and Schedule 5 Wildlife Conservation Act, 1950, obliging Australia to conserve habitat for these species.	This species is subject to International Migratory Bird Agreements. It breeds in the northern hemisphere and over winters in the south-west from October.	<b>Negligible</b> Will remain independent of the study area if it is in the general area, as it is an aerial forager. Nearest records approx. 54km NNE (1 record in 2001) and 80km SW (1*2008).	Not applicable
<b>Night Parrot</b> <i>(Pezoporus occidentalis)</i>	Critically Endangered EPBC Act 1999, Endangered (Schedule 1) Wildlife Conservation Act, 1950.	Species of the arid and semi-arid habitats. Most records before 1880, but a few records since then in the Pilbara, Qld and S.A. In 2013 live birds were found and are currently being studied in Qld.  Pilbara sightings occurred in 1980 and 2005 (Garnett <i>et al.</i> 2010). Previously found in <i>Triodia</i> grassland and chenopod shrublands and possibly mallee shrubland and open <i>Eucalyptus</i> woodland with an understorey of grasses.	<b>Negligible</b> Has not been known from the general region since 1800s. NatureMap has 1 record approx. 30km ENE in 1854 as the type locality for the Night Parrot and one verified record more than 150 km SSW recorded in 1961.	Not applicable

## 5. Impact Assessment

The desk top study combined with the on-site Level 1 Fauna Survey produced a list of 10 conservation significant species, which need to be considered in assessing the impact of developing the proposed mine, however there are no species where the habitat in the study area could be said to be critical to these species survival.

The Rainbow Bee-eater and Peregrine Falcon have ‘Medium’ and ‘Medium – Low’ probability, respectively, of occurring within the study area. A very small proportion of potential foraging and breeding habitat would potentially be affected by clearing, if the species were actually present. They would be most affected in spring and early summer when these species are breeding. However, notably there are also vast areas of these fauna habitats nearby and in the general area, so the overall impact on these species would be minor.

The Level 1 Fauna Survey combined with the Level 2 Targeted Malleefowl survey indicated the study area is not used for Malleefowl breeding. While this area is not used for breeding, there is a low probability that Malleefowl may be using the study area for foraging, outside the breeding season or while breeding in denser habitat nearby in the region. Some areas of dense shrubland fauna habitat were also incidentally seen from the main road east of the tenements and may occur more widely in the region and potentially may be used for breeding. However, notably, there are also vast areas of the open mulga fauna habitats nearby and in the general area, so the overall impact of clearing the study area (which is mainly open Mulga) on Malleefowl foraging, would be very minor, if they did occur there.

The following general impacts also need to be considered –

### 5.1 Loss of Habitat and Fragmentation of Habitat

**The general case.** Any large-scale clearing or severe disturbance of an area will result in some loss of habitat for the majority of fauna species currently residing there. The establishment of closely placed exploration lines can also potentially have this effect. In dense habitat tracks and exploration lines will also penetrate and allow easier access by exotic predators, competitors, weeds and dieback and may contribute to the degrading and fragmenting of habitat.

**Dalgaranga study area.** The clearing of native vegetation in the study area for the mining operation will cause habitat loss for the majority of fauna species currently residing there. Notably, previous mining activity has already fragmented the general area between the Golden Wings Mine Pit and the Gilbey’s Mine Pit.

There are also vast areas of similar fauna habitats nearby, so if the study area is cleared, only a very small proportion of these fauna habitat types will be removed from the region.

## 5.2 Increased Mortality

**The general case.** Any large-scale clearing or severe disturbance of an area will result in some direct, or indirect mortality, of the majority of species currently residing there. The establishment of closely placed exploration lines can also potentially have this effect. Indirect mortality may occur because the great majority of residents have either nowhere to go, or the adjacent habitat is already occupied to full carrying capacity by others of that same species – leading to mortality. Direct mortality could potentially also occur due to vehicle and earth moving equipment being used.

**Dalgaranga study area.** The clearing of native vegetation in the study area for the mining operation will cause some direct, or indirect mortality, for the majority of fauna species currently residing there. There are also vast areas of similar fauna habitats nearby, so only a very small proportion of these fauna habitat types will be removed.

## 5.3 Increased Risk of Wild Fire

**The general case.** Fire can temporarily damage or remove habitat and cause direct and indirect mortality to fauna via habitat loss. Frequent fire may also cause more permanent damage to the habitat by altering the structure, density and floristic composition of the area, especially by causing the establishment of more weeds. Any increase in human activity in the study area could potentially increase the risk of wild fire occurring. The impact of fire to the local fauna communities will depend on the frequency, extent and intensity of the fire in question.

**Dalgaranga study area.** The clearing of the study area and the development of the mine will involve an increase in human activity and operating machinery at the study site causing a potential increase in the risk of wild fire occurring in the area.

## 5.4 Increased Weed Infestation

**The general case.** Weeds can substantially alter the structure, density and composition of the native vegetation, thereby affecting the fauna living within it. Increase in human usage of an area will increase the risk of introducing, or increasing exotic weeds, particularly if areas of dense vegetation are penetrated and therefore ‘opened up’ by tracks or exploration lines.

**Dalgaranga study area.** In the study area this impact will apply to some extent. The clearing of the study area and development of the mine will increase human usage of the area, including accommodating people on site which has the potential to introduce weeds to the area. However, the study area already contains open vegetation and it is already grazed by

rabbits, sheep, goats and camels. Two non-invasive weed species were described in the flora survey (Native Vegetation Solutions 2016), however these are not declared pests and no specific control measures have been recommended for them.

## **5.5 Increased Predation and Competition**

**The general case.** Disturbance to bushland will often make the resident fauna more vulnerable to both predation and competition from introduced exotic animals and the development of an area often coincides with an increase in these species.

**Dalgaranga study area.** In the study area, this impact will apply to a very small extent. It already contains open vegetation which is disturbed by sheep, goats and camels and cats and would almost certainly have dingo/dogs and foxes living there too, as they are usually widespread through this type of habitat.

## **6. Recommendations**

### **6.1 Management and Monitoring Recommendations**

In the study area, potential impact upon fauna, due to the area being cleared, will relate mainly to small amounts of habitat loss and direct and indirect mortality as a result of clearing, but also to a potential increase in fire risk and an increase in weeds and feral predators and competitors due to the increased human activity.

In addition to the specific recommendations above, the following generic management actions may potentially help to mitigate these impacts –

#### **6.1.2 Management Recommendation 1.**

Limit clearing and fragmentation of native vegetation as much as possible. Use cleared or disturbed areas in preference to clearing native vegetation.

#### **6.1.3 Management Recommendation 2.**

Ensure fire risk is managed to prevent habitat loss by fire.

#### **6.1.4 Management Recommendation 3.**

Ensure a weed monitoring and management program is developed and applied to the study area to stop any influx and/or spread of weeds as the mine is developed. Implement adequate vehicle and equipment hygiene if appropriate.

#### **6.1.5 Management Recommendation 4.**

Consider implementing exotic predator (dog, fox and cat) eradication programs to the study area and surrounding tenements, as appropriate to the region and to conform to community efforts, in conjunction with pastoralists.

#### **6.1.6 Management Recommendation 5.**

Manage waste so as not to encourage the growth or influx of feral predator or feral rodent populations.



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## Appendix 1.

### Results of Desktop Study and on-site Level 1 Fauna Survey

#### DATA SOURCES

Combined data from DPaW NatureMap, which includes data from Birds Australia Databases and the Western Australian Museum supplemented by data from the EPBC Protected Matters Search Tool and information collected on the on-site Level 1 fauna survey

\* - Species recorded during on-site Level 1 Fauna Survey.

+ - Introduced species.

#### **KEY – Environmental Protection Biodiversity Conservation Act (EPBC Act) (1999) (Commonwealth) categories based on the International Union for Conservation of Nature (IUCN).**

T = Threatened (Extinct, Extinct in the wild, Critically Endangered, Endangered or Vulnerable).

X = Extinct. Taxa not recorded in the wild for the past 50 years.

XW = Extinct in the wild. Taxa survives only in captivity.

C = Critically Endangered. Taxa facing extremely high risk of extinction in the wild in the immediate future.

E = Endangered. Taxa facing extinction in the wild in the near future.

V = Vulnerable. Taxa facing high risk of extinction in the wild in the medium-term future.

NT = Near Threatened. Taxa at risk of becoming Vulnerable in the wild.

CD = Conservation Dependent. Taxa dependent on conservation measures to prevent them becoming Vulnerable.

DD = Data Deficient. Taxa insufficiently known but suspected of being in one of the above categories.

LC = Least Concern. Taxa are not threatened.

IA = Taxa subject to International Migratory Species Agreements.

#### **KEY - Wildlife Conservation Act (1950) (Western Australia)**

S1 = Rare or likely to become extinct (Schedule 1)

S2 = Fauna presumed to be extinct (Schedule 2)

S3 = Birds protected under an international agreement (Schedule 3)

S4 = Other specially protected fauna (Schedule 4)

#### **KEY - Department of Environment and Conservation Priority Species List**

P1 = Taxa with few poorly known locations on threatened lands.

P2 = Taxa with few poorly known populations on conservation lands/several poorly known populations not on conservation lands.

P3 = Taxa with several poorly known populations, some on conservation lands.

P4 = Taxa in need of monitoring. Taxa sufficiently known and not currently in need of protection, but require monitoring in case circumstances change.

P5 = Taxa in need of monitoring. Reliant on specific conservation program or would become threatened within five years (IUCN Conservation Dependent).

Appendix 1 continued...

	<b>Species</b>	<b>EPBC Act 1999</b>	<b>Wildlife Conservation Act 1950</b>	<b>DPaW Priority Species</b>
	<b>Amphibia</b>			
	<i>Neobatrachus kunapalari</i> (Kunapalari Frog)			
	<i>Neobatrachus sutor</i> (Shoemaker Frog)			
	<b>Aves (Birds)</b>			
*	<i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
*	<i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
	<i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
	<b><i>Acanthiza iredalei</i> (Slender-billed Thornbill)</b>	<b>V</b>		
*	<i>Acanthiza robustirostris</i> (Slaty-backed Thornbill)			
*	<i>Acanthiza uropygialis</i> (Chestnut-rumped Thornbill)			
	<i>Accipiter cirrocephalus</i> (Collard Sparrowhawk)			
*	<u><i>Accipiter fasciatus</i></u> (Brown Goshawk)			
	<i>Aegotheles cristatus</i> (Australian Owlet-nightjar)			
*	<i>Anas gracillis</i> (Grey Teal)			
*	<i>Anas superciliosa</i> (Pacific Black Duck)			
*	<i>Anthus australis</i> (Australian Pipit)			
*	<i>Aphelocephala leucopsis</i> (Southern Whiteface)			
	<b><i>Apus pacificus</i> (Fork-tailed Swift)</b>	<b>M</b>		
*	<i>Aquila audax</i> (Wedge-tailed Eagle)			
	<b><i>Ardeotis australis</i> (Australian Bustard)</b>			<b>P4</b>
*	<i>Artamus cinereus</i> (Black-faced Woodswallow)			
	<i>Artamus minor</i> (Little Woodswallow)			
	<i>Artamus personatus</i> (Masked Woodswallow)			
*	<i>Aythya australis</i> (Hardhead)			
	<i>Certhionyx variegatus</i> (Pied Honeyeater)			
	<i>Cincloramphus mathewsi</i> (Rufous Songlark)			
	<i>Cinclosoma castaneothorax</i> (Chestnut-breasted Quail-thrush)			
*	<i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
	<i>Coracina maxima</i> (Ground Cuckoo-shrike)			
	<i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
	<i>Corvus bennetti</i> (Little Crow)			
	<i>Corvus orru</i> (Torresian Crow)			
	<i>Cracticus nigrogularis</i> (Pied Butcherbird)			
*	<u><i>Cracticus torquatus</i></u> (Grey Butcherbird)			
*	<i>Cracticus tibicen</i> (Australian Magpie)			
*	<u><i>Cygnus atratus</i></u> (Black Swan)			
	<i>Dromaius novaehollandiae</i> (Emu)			

		<i>Epthianura tricolor</i> (Crimson Chat)			
*		<i>Elseynornis melanops</i> (Black-fronted Dotterel)			
*		<i>Erythronyctes alba</i> (Red-kneed Dotterel)			
		<i>Falco berigora</i> (Brown Falcon)			
		<i>Falco cenchroides</i> (Australian Kestrel)			
		<i>Falco longipennis</i> (Australian Hobby)			
		<b><i>Falco peregrinus</i> (Peregrine Falcon)</b>		<b>S4</b>	
*		<i>Fulica atra</i> (Coot)			
*		<i>Gavicalis virescens</i> (Singing Honeyeater)			
		<i>Geopelia cuneata</i> (Diamond Dove)			
		<i>Grallina cyanoleuca</i> (Magpie-lark)			
		<i>Haliastur sphenurus</i> (Whistling Kite)			
*		<i>Hirundo neoxena</i> (Welcome Swallow)			
		<b><i>Leipoa ocellata</i> (Malleefowl)</b>	<b>V</b>	<b>S1</b>	
*		<i>Malacorhynchus membranaceus</i> (Pink-eared Duck)			
		<i>Malurus lamberti</i> (Variegated Fairy-wren)			
*		<i>Malurus leucopterus</i> (White-winged Fairy-wren)			
*		<i>Malurus splendens</i> (Splendid Fairy-wren)			
*		<i>Manorina flavigula</i> (Yellow-throated Miner)			
*		<i>Melanodryas cucullata</i> (Hooded Robin)			
		<i>Melopsittacus undulatus</i> (Budgerigar)			
		<b><i>Merops ornatus</i> (Rainbow Bee-eater)</b>	<b>M</b>		
		<i>Neopsephotus bourkii</i> (Bourke's Parrot)			
		<i>Ninox novaeseelandiae</i> (Southern Boobook)			
		<i>Nymphicus hollandicus</i> (Cockatiel)			
*		<i>Ocyphaps lophotes</i> (Crested Pigeon)			
*		<b><i>Oreoica gutturalis</i> (Crested Bellbird)</b>			<b>P4</b>
*		<i>Oxyura australis</i> (Blue-billed Duck)			
*		<i>Pachycephala rufiventris</i> (Rufous Whistler)			
*		<i>Pardalotus rubricatus</i> (Red-browed Pardalote)			
*		<i>Petroica goodenovii</i> (Red-capped Robin)			
		<i>Pezoporus occidentalis</i> (Night Parrot)	<b>E</b>	<b>S1</b>	
		<i>Phaps chalcoptera</i> (Common Bronzewing)			
*		<i>Pomatostomus superciliosus</i> (White-browed Babbler)(ssp <i>superciliosus</i> )			
*		<i>Pomatostomus temporalis</i> (Grey-crowned Babbler)			
*		<i>Pyrrholaemus brunneus</i> (Redthroat)			
*		<i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			
*		<i>Rhipidura leucophrys</i> (Willie Wagtail)			
		<i>Smicronis brevirostris</i> (Weebill)			
*		<i>Tachybaptus ruficollis</i> (Little Grebe)			
*		<i>Tadorna tadomoides</i> (Australian Shelduck)			
*		<i>Taeniopygia guttata</i> (Zebra Finch)			
		<i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
		<i>Todiramphus pyrrophygus</i> (Red-backed Kingfisher)			
		<i>Vanellus tricolour</i> (Banded Lapwing)			
		<b>Mammalia</b>			

*	+	<i>Camelus dromedarius</i> (Camel)			
*	+	<i>Canis lupus</i> Dingo/dog or hybrid			
*	+	<i>Capra hircus</i> (Goat)			
	+	<i>Felis catus</i> (Cat)			
*		<i>Osphranter robustus</i> subsp. <i>erubescens</i> (Euro, Biggada)			
*	+	<i>Oryctolagus cuniculus</i> (Rabbit)			
*	+	<i>Ovis aries</i>			
		<b><i>Petrogale lateralis</i> subsp <i>lateralis</i> (Black-flanked Rock Wallaby)</b>	V	S3	
		<i>Sminthopsis crassicaudata</i> (Fat-tailed Dunnart)			
		<i>Tadarida australis</i> (White-striped Freetail Bat)			
	+	<i>Vulpes vulpes</i> (Red Fox)			
		<b>Reptilia</b>			
		<i>Ctenophorus caudicinctus</i> (Ring-tailed Dragon)			
		<i>Ctenophorus reticulatus</i> (Western Nettled Dragon)			
*		<i>Ctenophorus scutulatus</i> (Lozenge-marked Dragon)			
		<i>Ctenotus leonhardii</i>			
		<i>Ctenotus severus</i>			
		<b><i>Cyclodomorphus branchialis</i> (Gilled Slender Blue-tongue)</b>	V	S3	
		<i>Egernia depressa</i> (Southern Pygmy Spiny-tailed Skink)			
		<b><i>Egernia stokesii</i> spp <i>badia</i> (Western Spiny-tailed Skink)</b>	V	S3	
		<i>Gehyra punctata</i>			
		<i>Gehyra variegata</i>			
		<i>Lerista nichollsi</i>			
		<i>Lerista timida</i>			
		<b><i>Lerista eupoda</i> (Good-legged Lerista)</b>			PI
		<i>Liopholis striata</i> (Night Skink)			
		<i>Menetia greyii</i>			
		<i>Neelaps bimaculatus</i> (Black-naped Snake)			
		<i>Oedura marmorata</i> (Marbled Velvet Gecko)			
		<i>Pseudechis butleri</i> (Spotted Mulga Snake)			
		<i>Rhynchoedura ornata</i> (Western Beaked Gecko)			
		<i>Simoselaps bertholdi</i> (Jan's Banded Snake)			
		<i>Strophurus strophurus</i>			
		<i>Varanus caudolineatus</i>			
		<b>Invertebrates</b>			
		<b><i>Idiosoma nigrum</i> (Shield-backed Spider)</b>	V	S1	

## Appendix 2

**Assessment of the present Level 1 Fauna Survey and Level 2 Targeted Malleefowl Survey for compliance to EPA Guidance Statement 56 (EPA 2004). These guidelines help define the limitations and effectiveness of fauna assessments.**

<b>Possible Limitation</b>	<b>Comment</b>
Level of survey.	Level 1 appropriate under circumstances. See Introduction section. Level 2 targeted Malleefowl survey applied appropriately.
Competency/experience of the consultant(s) in carrying out the survey.	Survey overseen by senior zoologist with over 30 years experience in vertebrate ecology.
What faunal groups were sampled and were some sampling methods not able to be employed because of constraints?	Sampling quite adequate for Level 1 reconnaissance survey, which focuses on identifying fauna habitat, and its condition, with opportunistic observations on fauna and their sign. Malleefowl survey appropriate.
Proportion of fauna identified, recorded and/or collected.	All fauna seen and sign of fauna were identified to species.
Sources of information.	Sources include a range of previous records from the area, species distribution information and new observations.
The proportion of the task achieved and further work that might be needed.	Site inspection completed and all fauna habitat types sampled. Targeted Malleefowl survey completed.
Timing/weather/season/cycle.	This is more than adequate for a level 1 reconnaissance survey which focuses on habitat and identifying signs of the presence of fauna species particularly significant species. Fine for Malleefowl survey.
Disturbances (e.g. fire, flood, accidental human intervention etc.) which affected results of survey.	No disturbances affected the surveys.
Intensity. In retrospect, was the intensity adequate?	Survey intensity was more than adequate for a Level 1 Fauna Survey in this type of habitat and Malleefowl survey.
Completeness (e.g. was relevant area fully surveyed).	Desktop study covered project area and adjacent habitats. Site inspection covered fauna habitat from within the study site.
Resources (e.g. degree of expertise available in animal identification to taxon level).	All vertebrate fauna species identified to taxon level.