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Environmental and Media Consulting Services

**Level 1 Fauna Assessment and
Targeted Malleefowl Survey
Extension of Dalgaranga Gold Project - Part Two**

Prepared for Gascoyne Resources Ltd



June 2017

MBCContracting

Environmental and Media Consulting Services

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Gascoyne Resources Ltd

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Date of Production of final report: June 2017

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Front Cover Plate – Old Gilbey's mine pit near Dalgaranga- part of the proposed Dalgaranga Gold Project.

Summary

Gascoyne Resources Ltd (Gascoyne Resources), proposes to expand their mining operation near Dalgaringa. 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).

Two on-site Level 1 Reconnaissance Fauna Surveys were previously commissioned by Gascoyne Resources: one covering the Golden Wings pit area and access roads (65 ha) (AES 2014) and the second covering an additional 221 ha of native vegetation that was proposed to be cleared/disturbed for the Dalgaringa Gold Project, which also included a small Targeted Malleefowl Survey (11ha) (MBC 2016) (Figure 2).

In the present study, Gascoyne Resources has commissioned MBC to conduct a further on-site Level 1 Reconnaissance Fauna Survey over additional areas (622 ha) within tenement M59/749 (Figure 2). Gascoyne Resources may require additional Targeted Fauna Surveys or a Level 2 Detailed Fauna Survey depending on how much native vegetation they wish to clear and on what important environmental factors are determined from the present Survey (EPA 2016b and c). All the fauna assessments were done in conjunction with Clark Lindbeck and Associates (CLA), commissioned as the lead Environmental Consultant for this project and in conjunction with Level 1 Flora Surveys (Native Vegetation Solutions 2014) and (Native Vegetation Solutions 2016).

Briefly, the aims of a Level 1 Reconnaissance Fauna Assessment and Targeted Species Survey include –

- Conducting an up to date Fauna Desktop Study to ascertain what fauna assemblages and conservation significant fauna are likely to be in the region, based available information.
- Verifying the accuracy of the Fauna Desktop Study, adding new species found and determining what species assemblages that are actually, likely to be within the study area, by conducting an on-site Level 1 Reconnaissance Fauna Survey. This takes into account the fauna habitats found, including their soils, soil character, habitat structure and linkage and condition 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, burrows and Malleefowl mounds. Sometimes, if appropriate, spotlighting is conducted and/or camera traps are deployed.
- Conduct targeted Malleefowl survey in any areas identified as suitable habitat that are likely to be supporting this species.
- Identify potential impacts on this fauna, based on available information and make recommendations for management and/or further survey, monitoring or research work, if necessary, taking into account guidance from EPA (2016a, b and c).

Nine different fauna habitats were identified during the present Reconnaissance Fauna Survey. The Fauna Desktop Study, including previous work at Dalgaringa, identified 131

species as potentially occurring in the general region, including 2 amphibians, 23 reptiles, 85 birds, 12 mammals and 1 specific invertebrate (spider) species. Appendix 1 lists these species, including their scientific names. During the on-site Level 1 Reconnaissance Fauna Survey, a number of species were recorded and these are marked with an asterisk in Appendix 1. In addition, the rocky outcrops (Fauna Habitat 9) in the south-east corner of the present study area constitute potential SRE habitat, based on their location and habitat characteristics and records in the region. These could feasibly support SRE groups such as garypids (pseudoscorpions) and selenopids (wall crab spiders) (V. Framenau, Phoenix Environmental Sciences pers. comm.).

The Fauna Desktop Study combined with the on-site Level 1 Reconnaissance Fauna Survey produced a list of 10 conservation significant species including, 3 reptiles, 5 birds, 1 mammal and 1 specific invertebrate (spider) species. In addition, as mentioned above, some SRE invertebrate groups, need to be considered in assessing the impact of developing the proposed mine.

These conservation significant species identified are listed in Table 1, together with their scientific names, information on their conservation status, reasons for that conservation status, their biology, probability of their presence within the study area (rated as Confirmed or otherwise rated ranging from Very High, High, High-Medium, Medium, Medium-Low, Low, Low-Negligible and Negligible probability of presence), 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 in the study area include the Gilled Slender Blue-tongue, Western Spiny-tailed Skink, Peregrine Falcon, Malleefowl, Good-legged Lerista and certain Short Range Indemic (SRE) invertebrate groups including garypids (pseudoscorpions) and selenopids (wall crab spiders). The details about these species including their scientific names and conservation status are provided in Table 1.

The conservation and management requirements of these species therefore need to be considered in developing the proposed Dalgarranga Gold Project and may, or may not, require the proponent to alter their proposed project and/or implement special management procedures.

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, except potentially one or more SRE invertebrate species. Since SRE species are extremely restricted in their movement, potential critical habitat, if any of these species were present, would be localised to the Rocky Outcrop Fauna Habitat (Fauna Habitat 9) and possibly its immediate surrounding area of rocky substrate.

However, although not critical habitat, the rocky out crops (Fauna Habitat 9) and nearby area of rocky substrate would also potentially be very important to the Gilled Slender Blue-tongue and Western Spiny-tailed Skink, if they are present.

The Peregrine Falcon was recorded using the mulga trees within the study area and Gilbey's Pit. It is likely to roost and nest in trees (utilising the nests of other raptors or corvids), or more likely use the pit walls, and hunt waterbirds in the pit. It may also hunt waterbirds near the Golden Wings pit and use trees nearby in the NE of the study area to nest. The species nests from September in the greater Gascoyne Region (including the Murchison Bioregion) (Storr 1985). The nest and the area immediately surrounding the nest is important to this species during spring and cannot be disturbed or removed during this time. During the breeding season Peregrine Falcons can hunt anywhere, but are likely to choose a nest site which is close to a rich source of food, if it is available, for energetic reasons. As such, an active Peregrine nest may be found within 1 km or so of either the Golden Wings Pit or the Gilbey's pit or they may nest in the Gilbey's Pit.

Malleefowl are known to have once been in the area, as is evidenced by an extinct Malleefowl mound found during a previous survey, in the study area. However, they are no longer likely to be breeding in the present study area because the vegetation is more open, as indicated by the results of the Targeted Malleefowl Survey. However, Malleefowl will wander several kilometres or more during the breeding season, in search of food, and forage up to 15 km in the non-breeding season. There is a Medium-Low probability that Malleefowl are using the present study area for foraging, given that denser vegetated habitats, potentially suitable for breeding, occur nearby on both the Dalgarranga Gold Project area and nearby in the local area as described in more detail in section 3.3 and (Table 1).

In the Murchinson Bio-region, the degree of general fauna habitat degradation and clearing already accumulated in the bioregion, and therefore the sensitivity of the receiving environment, is considered moderate (EPA 2016b). The scale and nature of the impacts to fauna biodiversity in this bio-region is based on the assessment of 10 independent parameters. These parameters are also used to help assess what level of fauna survey is required to support a clearing proposal. These parameters, and the assessment of the present study area against them, are presented in Table 2.

In terms of describing the scale and nature of impact, the present study area has two distinct areas, Fauna Habitat 9 (rocky outcrop) and the remaining eight fauna habitats. The impact of disturbing and clearing the rock outcrops (Fauna Habitat 9) in the study area, is more significant than the other fauna habitats present. It is important under six parameters and the impact of clearing it is potentially High-Moderate (Table 2). In particular, it will possibly be rated as High if SRE invertebrate species are present. It may potentially support the following conservation significant species, the Gilled Slender Blue-tongue, Western Spiny-tailed Skink and certain Short Range Endemic (SRE) invertebrate groups including garypids (pseudoscorpions) and selenopids (wall crab spiders) (Table 1).

The remaining eight fauna habitats combined are important for two parameters, related to the amount of native vegetation proposed to be cleared and the presence of three conservation significant species. The impact of clearing the other eight fauna habitats is potentially Moderate-Low (Table 2), but is potentially Low if appropriate management is applied with respect to the Malleefowl and Peregrine Falcon (see Section 6). These fauna habitats support the conservation significant Peregrine Falcon (confirmed) and may also potentially support Malleefowl (for foraging) and possibly the Good-legged Lerista.

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

Specific recommendations include-

1. Avoid clearing Fauna Habitat 9 (the rocky outcrop) and its surrounding rocky substrate.
2. If this cannot be avoided then conduct a survey of this habitat to determine what conservation significant species may be present, if any.
3. If disturbance is to occur in the Gilbey's Pit in spring, or clearing of large tree-form Mulga is to take place near the Gilbey's Pit or the Golden Wings Pit, in spring and within 1 km of these pits, then conduct a Targeted Peregrine Falcon nest survey of the largest trees in the areas proposed to be cleared and the wall of the Gilbey's Pit. If a Peregrine Falcon nest is found and is being used, do not disturb the area within 100 m of the nest until the young have fledged.
4. If Gascoyne Resources wishes to disturb or clear the extinct Malleefowl mound in the study area it must be approved by the Species and Communities Branch of DBCA.
5. The possible presence of Malleefowl foraging in the study area, while nesting in nearby dense vegetation, should be a management consideration when running the Dalgarranga Gold Mine.
6. The scale and nature of the impacts to fauna biodiversity in this bio-region is based on the assessment of 10 independent parameters (EPA 2016b). These parameters are also used to help assess what level of fauna survey is required to support a clearing proposal. The assessment in Table 2 suggests the level of fauna survey should be reviewed in relation to these impacts, though notably many of the potentially higher impacts pertain more to the rocky outcrops. Consider reviewing this with the DMIRS.

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

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1. Introduction

Gascoyne Resources Ltd (Gascoyne Resources), 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.

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 Aerodrome 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 (including Threatened and Priority Ecological Communities) 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).

In 2013 Australasian Ecological Services (AES) was commissioned by Gascoyne Resources to conduct an on-site Level 1 Reconnaissance Fauna Survey of the Golden Wings pit area and access roads (65 ha), which was done on the 16th October 2013 (AES 2014) (Figure 2). MBContractingAUS (MBC) was subsequently commissioned to survey an additional 221 ha of native vegetation that was proposed to be cleared/disturbed for the Dalgara Gold Project (MBC 2016) (Figure 2). This work was done between the 31st May and 1st June 2016 and also included a small Targeted Malleefowl Survey of two small areas of dense vegetation (11ha) (Figure 2). Both these fauna surveys were done in conjunction with on-site Level 1 Reconnaissance Flora Assessments conducted at the same time by Native Vegetation Solutions (Native Vegetation Solutions 2014) and (Native Vegetation Solutions 2016).

In the present study MBC has been commissioned by Gascoyne Resources to conduct a further on-site Level 1 Reconnaissance Fauna Survey over additional areas (622 ha) within tenement M59/749 (Figure 2). Gascoyne Resources may require additional Targeted Fauna Surveys or a Level 2 Detailed Fauna Survey depending on how much native vegetation they wish to clear and on what important environmental factors are determined from the present Level 1 Reconnaissance Fauna Survey (EPA 2016b and c).

All the fauna assessments were done in conjunction with Clark Lindbeck and Associates (CLA), commissioned as the lead Environmental Consultant for this project.

Survey designs took in to account the following guidelines: Environmental Factor Guideline-Terrestrial Fauna (EPA 2016a), Technical Guidance-Terrestrial Fauna Surveys (EPA 2016b),

Technical Guidance – Sampling Methods for Terrestrial Vertebrate Fauna (EPA 2016c) and
Technical guidance – Sampling of Short Range Endemic vertebrate fauna (EPA 2016d).

1.1 Objectives

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

1. Conduct an up to date Fauna Desktop Study to ascertain what fauna assemblages and conservation significant fauna are likely to be in the region, based available information.
2. Verify the accuracy of the Fauna Desktop Study, add new species found, and determine what species assemblages that are actually, likely to be within the study area by conducting an on-site Level 1 Reconnaissance Fauna Survey. This will take into account the condition of the fauna habitats found, including their soils, soil character, habitat structure and linkage and condition 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, burrows and Malleefowl mounds. Sometimes, if appropriate, spotlighting is conducted and/or camera traps are deployed. This on-site survey may also add species to the original Fauna Desktop Study list.
3. Identify potential impacts on this fauna, based on available information and make recommendations for management and/or further survey, monitoring or research work, if necessary, taking into account guidance from EPA (2016a, b and c).
4. Where possible, within the time constraints of the Reconnaissance Fauna Survey (Level 1), collect the necessary data to assist in the design of additional Targeted, Detailed or Comprehensive Fauna Surveys.
5. Provide a Level 1 Fauna Survey Assessment report that is appropriately researched and written to the standards required by the Environmental Protection Authority's Environmental Impact Assessment process (EPA 2016b).

The aims of a Targeted Fauna Survey are to –

1. Conduct targeted survey work for specific conservation significant species, in any areas identified as suitable habitat that are likely to be supporting that species.
2. If appropriate, identify potential impacts on this species, based on available information and make recommendations for management and/or further survey, monitoring or research work (taking into account guidance from EPA 2016b and 2016c).

3. Provide a Targeted Fauna Survey report that is appropriately researched and written to the standards required by the Environmental Protection Authority's Environmental Impact Assessment process (EPA 2016b).



Figure 1. Location of the Gascoyne Resources Dalgara Gold Project.

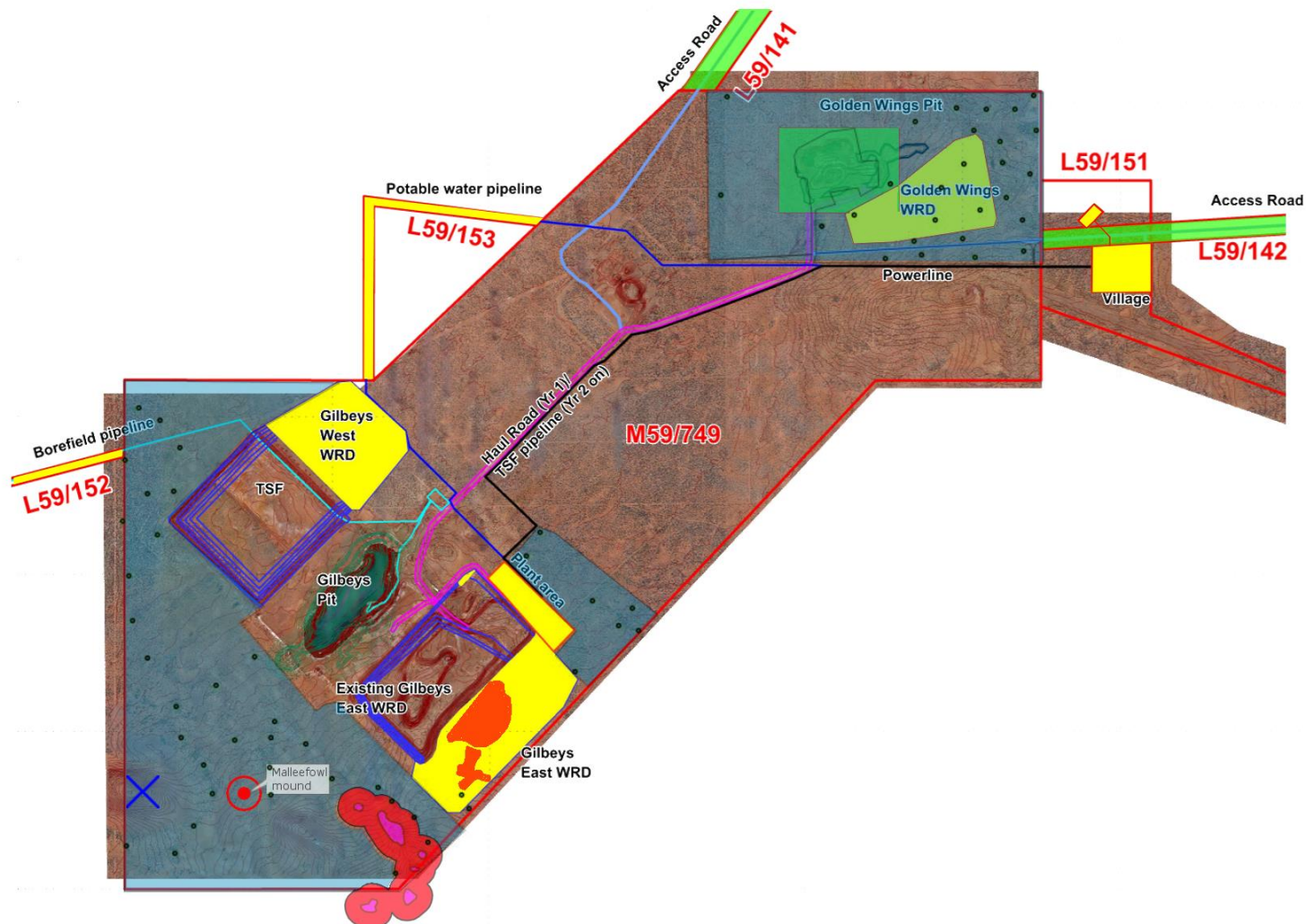


Figure 2. Study area for the present Level 1 Reconnaissance Fauna Survey (aqua blue), including rock out crops (Fauna Habitat 9) (pink) and their nearby habitat (45m) plus a 50m EPBC Act (1999) threatened species buffer zone (red). Also rocky ridge (Fauna Habitat 8) (blue cross) and general areas surveyed for Malleefowl (dark green dots). Previous Level 1 Reconnaissance Fauna Surveys included AES (2014) (light green) and MBC (2016) (yellow), the later which included a small (11 ha) Targeted Malleefowl Survey (orange). The location of the extinct Malleefowl mound found (MBC 2016) is indicated with a red point and labelled.

2. Methods

2.1 Fauna Desktop Study

The Fauna Desktop Study drew information from a number of different sources. These included the Commonwealth Environment Protection Biodiversity Conservation Act (EPBC) Protected Matters Search Tool (Department Environment and Energy 2017) and the Department of Biodiversity, Conservation and Attractions (DBCA) NatureMap database (DBCA 2017) (both accessed May 2017, using a 40 km radius from the centre point 31 50 53S, 119 52 54E). NatureMap includes data from the DBCA Threatened Fauna Database (DBCA 2017), BirdLife Australia Databases (Birddata 2017) and the Western Australian Museum. It also took into account the results of various fauna reports including Davies *et al.* (1995) and AES (2014) and MBC (2016).

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).

Web searches necessarily draw records from either a circle of chosen radius, from the location of interest, or a drawn polygon around that location. Therefore, they usually include records that clearly are from very different habitats within the search radius or search polygon. As the final desktop analysis was conducted, species that were recognised as clearly belonging to these extraneous habitats were excluded.

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 2016b).

2.2 On-site Level 1 Reconnaissance Fauna Survey

The study site for the present on-site Level 1 Reconnaissance Fauna Survey (622 ha) comprised areas of native vegetation, not previously surveyed for fauna, within the Dalgaringa Gold Project (see aqua blue areas in Figure 2). The information collected in this study is also supplemented by information previously collected in 2013 and 2016. These previous fauna surveys included a brief Level 1 Reconnaissance Fauna Survey of the Golden Wings pit area and access roads (65 ha), which was done on the 16th October 2013 (AES 2014) (see green areas in Figure 2), followed by a Level 1 Reconnaissance Fauna Survey of a number of other sites including areas around the Gilbey's Pit (221 ha) (see yellow areas in Figure 2), conducted between the 31st May and 1st June 2016 (MBC 2016). This later effort,

also incorporated a small Targeted Malleefowl Survey (11 ha) of two small areas of dense vegetation (see orange areas in Figure 2).

The present Level 1 Reconnaissance Fauna Survey was conducted during the 10th – 14th May 2017. It involved determining the fauna habitat types, including their soils, soil character, habitat structure and linkage and condition. It 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). Camera traps were also used to help record and identify animals. Effort was focused on significant conservation species and searching for habitat characteristics that are important to these species.

2.3 Targeted Malleefowl Survey

In 2016 an extinct Malleefowl mound was found incidentally by Native Vegetation Solutions during a Level 1 Reconnaissance Flora Survey of the tenements pertaining to the Dalgara Gold Project. It was found in a very open area, indicating that the vegetation in the vicinity was once much thicker and had become sparse over many decades (MBC 2016). It was found outside the study area for the 2016 fauna survey (MBC 2016), but was checked and classified by fauna personnel who were onsite at the time and reported in MBC (2016). This mound is located within the present Reconnaissance Fauna Survey study area and its position is illustrated in Figure 2.

As most of the present study area comprises vegetation that is too sparse to support Malleefowl nesting, a modified Targeted Malleefowl Survey was conducted, to cover a large area efficiently. This survey identified areas of vegetation that might be dense enough to support Malleefowl nesting, using aerial imagery and additional areas identified while actually on site. Each area was then visited on foot. If the area was sufficiently dense to potentially support a recently active Malleefowl mound, the area was searched by one or two observers on foot.

The exact method used for the search depended on the size, shape and density of each patch of vegetation, but was sufficient to find any large mounds. Any Malleefowl mounds found were classified according to the classification method prescribed by the National Malleefowl Monitoring Scheme (2016). Whilst it is possible that other extinct mounds would be missed using this modified method, it is in the knowledge that we already know Malleefowl once nested in the study area, so the finding of any additional extinct mounds in this very open vegetation would not add to this knowledge, or change the conclusions of this survey.

2.4 Personnel

Survey work and reporting was carried out by Michael Burbidge (General Terrestrial Vertebrate Fauna Consultant) with over 7 years of experience and Specialist Consultant, Julie Raines (Australasian Ecological Services), a terrestrial vertebrate 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 'Checklist of Vertebrates of Western Australia' (Western Australian Museum website Nov 2016). This nomenclature is sourced from Hutchins (2001) for fish, Aplin and Smith (2001) for amphibians and reptiles, Johnstone (2001) for birds and How *et. al.* (2001) for mammals. However, where data were extracted from the DBCA NatureMap database, the alphabetical order of species within broad taxonomic groups is maintained.

3. Results of on-site Level 1 Reconnaissance Fauna Survey

3.1 Fauna Habitat

Nine different fauna habitats were identified during the present Reconnaissance Fauna Survey. These are described below and illustrated with photographs. Five of these fauna habitats were also found in previous Reconnaissance Fauna Surveys (AES 2014 and MBC 2016) and are marked with a cross (+).

Mulga Fauna Habitats (1 – 5)

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. gluertonotis*, *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 (Fauna Habitats 1 – 5) were identified as illustrated below and were usually in 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 fauna habitat was common, and found mainly in the northern part of the present study area and was the main fauna habitat type found in previous Reconnaissance Fauna Surveys (AES 2014 and MBC 2016).



Plate 2. + Mulga with only very sparse understorey.

- 2. + Mulga with only very sparse understorey.** Often associated with poorly drained areas. This fauna habitat was found within the study area, mainly west and immediately north of Gilbey's Pit. This was the second most common habitat found in the present study area and was also found in the previous MBC 2016 survey north of Gilbey's Pit.



Plate 3. + Mulga over mixed shrubland over rocky ground.

- 3.** + **Sparse Mulga (tree form) over mixed Mulga shrubland, or Mixed Mulga shrubland, both over rocky ground.** This was the most common fauna habitat in the present study area, mainly in the south – west of the study area. A very small amount was found in MBC 2016 near Gilbey's Pit.



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

- 4.** + **Mulga with stands of *Eremophila forrestii*.** This is Mulga over medium – dense mixed shrubland including relatively dense stands of *E. forrestii*. Very small pockets of this fauna habitat were found in the present study area. A small amount of this fauna habitat was also found in MBC 2016.



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

5. + Thicker Mulga 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. In the present study found only in minute pockets, associated with Habitat 4. Only small amounts found in MBC 2016.



Plate 6. Open flat, rocky fauna habitat.

6. Open, flat rocky areas comprising very sparse Mulga tree, or shrub form, over very sparse low shrubland sometimes including chenopods, over flat, open rocky ground comprising very small rocks with few crevices. Found in several small areas in the SW of the present study area.



Plate 7. Open flat fauna habitat.

7. Open, flat areas (not rocky) comprising very sparse Mulga tree, or shrub form, over very sparse low shrubland. A few large areas found in the NE of the present study area.



Plate 8. Rocky ridge with Mulga over mixed shrubland.

8. Rocky ridge comprising Mulga over mixed shrubland. This rocky slope was located in the southern part of the present study area on the ridge on its west boundary (See Figure 2).



Plate 9. Rocky outcrops.

9. Rocky out crops providing small or large crevices, protruding from Mulga over mixed shrubland. Rocks are mostly dolerite and gabbro and are part of an Archean aged intrusive mafic sequence in the SE corner of the study area that trends WNW (Julian Goldsworthy, Head Geologist, Gascoyne Resources pers.com.). The out crops may also contain some basalt. See Figure 2.

A detailed botanical description of the vegetation types in the study area has been provided through the Level 1 Reconnaissance Flora Survey of all the tenements (not just the present fauna study area) (Native Vegetation Solutions 2016). 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 Fauna Desktop Study and On-Site Level 1 Reconnaissance Fauna Survey

The Fauna Desktop Study identified 131 species as potentially occurring in the general region. Appendix 1 lists these species. During the on-site Level 1 Reconnaissance Fauna 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 the Biodiversity Conservation Act (2016), or are listed as Priority species by the Department of Biodiversity, Conservation and Attractions (DBCA) (previously the Department of Parks and Wildlife). These species need specific consideration in any impact assessment process.

3.2.1 Amphibians and Reptiles

The combined Fauna Desktop Study and on-site Level 1 Reconnaissance Fauna Survey identified two amphibians and 23 reptiles as potentially occurring in the general area. Three conservation significant reptiles were identified in the Fauna Desktop Study, two listed as threatened species and one as a priority species. More detail about these species, their scientific names and conservation status can be found in Table 1.

3.2.2 Birds

The combined Fauna Desktop Study and on-site Level 1 Reconnaissance Fauna Survey identified 85 birds potentially occurring in the general area. Forty-eight bird species were seen or heard (confirmed) during the present on-site Level 1 Fauna Survey and/or the previous surveys (AES 2014 and MBC 2016) and these are indicated with an asterisk in Appendix 1. Five of these bird species were conservation significant (Appendix 1), including the Peregrine Falcon (listed as a Specially Protected Species under the Biodiversity and Conservation Act, 2016) and the Malleefowl which is listed as Vulnerable under the EPBC Act (1999) and is considered rare or likely to become extinct under the Biodiversity and Conservation Act (2016) (Schedule 3) (Appendix 1). A Targeted Fauna Survey was conducted for this species. More detail about all these species, their scientific names and conservation status can be found in Table 1.

As described in the methods (Section 2), a number of small areas were identified from aerial imagery as possibly being sufficiently dense to support Malleefowl nesting. These areas were surveyed using the modified Targeted Malleefowl Survey technique described.

Some of these patches proved too sparse for Malleefowl to nest in. Others were generally too sparse but had small pockets of denser vegetation within them. These small pockets comprised Fauna Habitat 4 (Mulga with stands of *Eremophila forrestii*) (Plate 4) and Fauna Habitat 5 (Thick vegetation comprising very mature tree-form *A. crasspedocarpa* with some *A. tetragonophylla*, with sparse Mulga, over *E. forrestii*) (Plate 5). These pockets were targeted and surveyed more systematically, on foot, for large Malleefowl mounds. In the process of conducting this targeted survey, other areas of dense vegetation were incidentally found that had not been identified from the aerial imagery. Overall, the aerial imagery was found to be very helpful, but not entirely reliable in identifying fauna habitat suitable for Malleefowl to nest in. However, the area was adequately surveyed, by conducting more time ground truthing on-site. Figure 2 illustrates the general areas that were surveyed, but they are not illustrated accurately, because the edges of the actual vegetation searched were not sufficiently discernible on the aerial images to map them.

No Malleefowl mounds were found in the present study area. However, it is possible that some flat extinct mounds may have been missed using this modified survey technique. However as described in the methods (Section 2), the finding of an extinct Malleefowl

mound in 2016 has already established that at least some of the study area was once suitable fauna habitat for Malleefowl nesting. However, this particular area is clearly no longer suitable for this purpose. It appears probable that, over time, the vegetation around the mound had become more sparse and therefore unsuitable for Malleefowl nesting (MBC 2016). The finding of any additional extinct mounds, in this very open vegetation, would therefore not add to this knowledge, or change the conclusions for this targeted survey.

Although dense vegetation suitable for Malleefowl nesting has been found on the Dalgaranga Gold Project tenements, during both the present survey and a previous survey (MBC 2016), it appears that Malleefowl are not breeding in the present study area at this time.

However, Malleefowl could be using the area for foraging. Malleefowl will roam over large distances from their nest sites to forage, up to 4 km in the breeding season and up to 15 km in the non-breeding season. They may be foraging on the tenements of the Dalgaranga Gold Project in the breeding season as there is thick vegetation, suitable for nesting, within 4 km, including a small area of dense vegetation 200 – 300 metres east of the present study area and in various places within the Dalgaranga Gold Project, beyond the present study area. In addition, they may also be foraging on these tenements in the non-breeding season because there is thick vegetation, suitable for nesting, within 15 km of the project, including dense vegetation, potentially suitable for nesting east of the project.

The DBCA leases the pastoral stations immediately west and north of Gascoyne Resources M59/749 tenement. They have been running an exotic predator control program (Jamie Conway-Physick, DBCA Geraldton pers. comm, information provided by CLA). As dog/dingo, foxes and cats are a major threat to Malleefowl, the instigation of this program may potentially help the Malleefowl in the area to increase in numbers over time. As such they may use the tenements of the Dalgaranga Gold Project more in the future.

3.2.3 Mammals

The combined Fauna Desktop Study and on-site Level 1 Reconnaissance Fauna Survey identified 12 mammals as potentially occurring in the general area. Nine mammal species were recorded (confirmed) during the on-site Level 1 Reconnaissance Fauna Survey and these are indicated with an asterisk in Appendix 1. The presence of Rabbit, Camel, Cat and Fox were identified by the presence of scats and tracks and Euro, Red Kangaroo, Sheep and Goat were seen. Although not detected during the survey, dingo/dogs are likely to be present too, as they are usually widespread through this type of habitat.

The Desktop Study identified one mammal species of conservation significance and this was the Black-flanked Rock Wallaby which is listed as Vulnerable under the EPBC Act (1999) and is considered rare or likely to become extinct under the Biodiversity and Conservation Act (2016) (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

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. This is important in terms of preserving biodiversity. It should be noted that the taxonomy for many of these invertebrates has not been finalised.

The combined Fauna Desktop Study and on-site Level 1 Reconnaissance Fauna Survey identified one invertebrate species and some species groups as potentially occurring in the general region. The Shield-backed Trapdoor Spider has been identified as possibly being in the study area. It is listed as Vulnerable under the EPBC Act (1999) and is considered rare or likely to become extinct under the Biodiversity and Conservation Act (2016) (Schedule 3) (Appendix 1). More detail about this species, its scientific name and conservation status can be found in Table 1. Notably, this conservation status may change in the near future due to recent taxonomic work, but this is not yet published.

The rocky outcrops (Fauna Habitat 9) in the south-east corner of the present study area constitute potential SRE habitat, based on their location and habitat characteristics and records in the region. These could feasibly support SRE groups such as garypids (pseudoscorpions) and selenopids (wall crab spiders) (V. Framenau, Phoenix Environmental Sciences pers. comm.).

3.3 Targeted Malleefowl Survey

As described in the methods (Section 2), a number of small areas were identified from aerial imagery as possibly being sufficiently dense to support Malleefowl nesting. These areas were surveyed using the modified Targeted Malleefowl Survey technique described.

Some of these patches proved too sparse for Malleefowl to nest in. Others were generally too sparse but had small pockets of denser vegetation within them. These small pockets comprised Fauna Habitat 4 (Mulga with stands of *Eremophila forrestii*) (Plate 4) and Fauna Habitat 5 (Thick vegetation comprising very mature tree-form *A. crasspedocarpa* with some *A. tetragonophylla*, with sparse Mulga, over *E. forrestii*) (Plate 5). These pockets were targeted and surveyed more systematically, on foot, for large Malleefowl mounds. In the process of conducting this targeted survey, other areas of dense vegetation were incidentally found that had not been identified from the aerial imagery. Overall, the aerial imagery was found to be very helpful, but not entirely reliable in identifying fauna habitat suitable for Malleefowl to nest in. However, the area was adequately surveyed, by conducting more time ground truthing on-site. Figure 2 illustrates the general areas that were surveyed, but they are not illustrated accurately, because the edges of the actual vegetation searched were not sufficiently discernible on the aerial images to map them.

No new Malleefowl mounds were found in the present study area. However, it is possible that some flat extinct mounds may have been missed using this modified survey technique. However as described in the methods (Section 2), the finding of an extinct Malleefowl mound in 2016 has already established that at least some of the study area was once suitable fauna habitat for Malleefowl nesting. However, this particular area is clearly no longer suitable for this purpose. It appears probable that, over time, the vegetation around the mound had become more sparse and therefore unsuitable for Malleefowl nesting (MBC 2016). The finding of any additional extinct mounds, in this very open vegetation, would therefore not add to this knowledge, or change the conclusions for this targeted survey.

Although dense vegetation suitable for Malleefowl nesting has been found on the Dalgaranga Gold Project tenements, during both the present survey and a previous survey (MBC 2016), it appears that Malleefowl are not breeding in the present study area at this time.

However, Malleefowl could be using the area for foraging. Malleefowl will roam over large distances from their nest sites to forage, up to 4 km in the breeding season and up to 15 km in the non-breeding season. They may be foraging on the tenements of the Dalgaranga Gold Project in the breeding season because there is thick vegetation, suitable for nesting, within 4 km of it, including a small area of dense vegetation 200 – 300 metres east of the present study area and in various places within the Dalgaranga Gold Project, beyond the present study area. In addition, they may also be foraging on these tenements in the non-breeding season because there is thick vegetation, suitable for nesting, within 15 km of the project, including dense vegetation, possibly suitable for nesting east of the project.

The DBCA leases the pastoral stations immediately west and north of Gascoyne Resources M59/749 tenement. They have been running an exotic predator control program (Jamie Conway-Physick, DBCA Geraldton pers. comm, information provided by CLA). As dog/dingo, foxes and cats are a major threat to Malleefowl, the instigation of this program may potentially help the Malleefowl in the area to increase in numbers over time. As such they may use the tenements of the Dalgaranga Gold Project more in the future.

3.4 Limitations of this 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 (2016b) 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 Targeted Malleefowl Survey are summarised in Appendix 2. The Level 1 Reconnaissance Fauna Survey had no limitations. The Targeted Malleefowl Survey was deliberately limited to denser habitat and searching only for large (non-extinct) mounds for the reasons provided in the Methods section. Both surveys can be deemed as effective for their intended purpose.

4. Assessment of Conservation Significant Species

The Fauna Desktop Study combined with the on-site Level 1 Reconnaissance Fauna Survey produced a list of 10 conservation significant species as well as some SRE invertebrate groups, 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 rated ranging from Very High, High, High-Medium, Medium, Medium-Low, Low, Low-Negligible and Negligible probability of presence), 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.

The conservation and management requirements of these species therefore need to be considered in developing the proposed Dalgaranga Gold Project and may, or may not, require the proponent to alter their proposed project and/or implement special management procedures.

Species requiring specific conservation and management consideration in the study area include the Gilled Slender Blue-tongue, Western Spiny-tailed Skink, Peregrine Falcon, Malleefowl, Good-legged Lerista and certain Short Range Indemic (SRE) invertebrate groups including garypids (pseudoscorpions) and selenopids (wall crab spiders). 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, except potentially one or more SRE invertebrate species. Since SRE species are extremely restricted in their movement, potential critical habitat, if any of these species were present, would be localised to the Rocky Outcrop Fauna Habitat (Fauna Habitat 9) and possibly its immediate surrounding area of rocky substrate.

However, although not critical habitat, the rocky out crops (Fauna Habitat 9) and nearby area of rocky substrate would potentially be very important to the Gilled Slender Blue-tongue and Western Spiny-tailed Skink, if they are present.

The Peregrine Falcon was recorded using the mulga trees within the study area and Gilbey's Pit. It is likely to roost and nest in trees (utilising the nests of other raptors or corvids), or more likely use the pit walls, and hunt waterbirds in the pit. It may also hunt waterbirds near the Golden Wings pit and use trees nearby in the NE of the study area to nest. The species nests from September in the greater Gascoyne Region (including the Murchison Bioregion)

(Storr 1985). The nest and the area immediately surrounding the nest is important to this species during spring and cannot be disturbed or removed during this time. During the breeding season Peregrine Falcons can hunt anywhere, but are likely to choose a nest site which is close to a rich source of food, if it is available, for energetic reasons. As such, an active Peregrine nest may be found within 1 km or so of either the Golden Wings Pit or the Gilbey's pit or they may nest in the Gilbey's Pit.

Malleefowl are no longer likely to be breeding in the present study area because the vegetation is more open, as indicated by the Targeted Malleefowl Survey. However, Malleefowl will wander several kilometres or more during the breeding season, in search of food, and forage up to 15 km in the non-breeding season. There is a Medium-Low probability that Malleefowl are using the present study area for foraging, given that denser vegetated habitats, potentially suitable for breeding, occur nearby on both the Dalgara Gold Project area and nearby in the local area as described in more detail in section 3.3 and (Table 1).

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 habitats in the study area may only be a small part of a large and similar landscape such that the fauna habitats being studied are not limited to the study area. 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, 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 Reconnaissance Fauna Survey.** Probability of presence is expressed as **Confirmed or otherwise ranging through Very High, High, High-Medium, Medium, Medium-Low, Low, Low-Negligible to Negligible.**

The references listed in the Fauna Desktop Study method are used to produce this table, except where otherwise stated. Please note that the Crested Bellbird and Australian Bustard, which were mentioned in AES (2014) as DBCA Priority species, and the Rainbow Bee-eater, which was mentioned in MBC (2016) as an International Migratory Agreement species, are no longer listed as conservation significant species.

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 is present in the study area
<p>Gilled Slender Blue-tongue <i>(Cyclodomorphus branchialis)</i></p>	<p>Vulnerable EPBC Act 1999, Vulnerable (Schedule 3) Biodiversity Conservation Act, 2016.</p>	<p>Species facing high risk of extinction in the wild. A number of subspecies widely spread, but poorly known.</p> <p>Found on rocky outcrops in Mulga (B. Maryan, R. Browne-Cooper and M Bamford pers. comm.), on rocky outcrops including banded ironstone (Thompson and Thompson 2010) and in semi-arid shrublands on heavy red soils (Wilson and Swan 2008).</p>	<p>Medium</p> <p>Habitat suitable in the rocky outcrops and nearby rocky substrates (Habitat 9, Plate 9) (Figure 2) and possibly also on the rocky ridge (Habitat 8, Plate 8) (Figure 2). These are respectively in the SE and SW of the present study area.</p> <p>Dalgaranga appears at the northern edge of this species known range, though it is not well known, with very few records, so may not be an accurate boundary.</p> <p>Nearest NatureMap records are approx. 60km ESE (2*2005 Mt Magnet) and 1 record approx. 100km SSW (1965).</p> <p>Limited habitat available in the area.</p>	<p>May remove important habitat if rocky outcrops, or nearby rocky substrate, or possibly the rocky ridge in the present study area, are removed or disturbed.</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 is present in the study area
<p>Western Spiny-tailed Skink or Gidgee Skink</p> <p><i>(Egernia stokesii</i> <i>spp. badia)</i></p> <p>Includes both black and brown forms of this sub-species.</p>	<p>Vulnerable EPBC Act 1999, Vulnerable (Schedule 3) Biodiversity Conservation Act, 2016.</p>	<p>The few populations known are disjunct through the wheatbelt and mid-west and Gascoyne regions. Shelter amongst rocks and logs.</p> <p>Not well researched.</p>	<p>Medium-Low</p> <p>Habitat possibly suitable in the rocky area and nearby rocky substrate in the SE of the present study (Habitat 9, Plate 9) (Figure 2) for the black form of this species.</p> <p>Scat latrines of a similar species, the Pygmy Spiny-tailed Skink, were found in this area during the present Level 1 Reconnaissance Fauna Survey. This related species occupies similar habitat to this species, indicating higher likelihood of habitat being suitable for the black form of the Western Spiny-tailed Skink as well.</p> <p>NatureMap has 1 record close by approximately 10 km NE (=local area). A number of other records 50-100km from site. Limited habitat available in the area.</p>	<p>May remove important habitat if rocky outcrops, or nearby rocky substrate, in the SW of the present study area is removed or disturbed.</p>
<p>Short Range Endemic Invertebrates</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>Medium-Low</p> <p>The rocky outcrops (Habitat 9, Plate 9) in the SE corner of the present study area are potential SRE habitat based on their location, habitat characteristic and records in the region. They could potentially support SRE groups such as garypids (pseudoscorpions) and selenopids (wall crab spiders) (V. Framenau, Phoenix Environmental Sciences pers. comm.).</p>	<p>May remove very important habitat, possibly critical habitat, if rocky outcrops in the SW of the present study area are removed or disturbed.</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 is present in the study area
<p>*Peregrine Falcon <i>(Falco peregrinus)</i></p>	<p>Other specially protected fauna (Schedule 7) Biodiversity Conservation Act, 2016.</p>	<p>In Western Australia, this bird of prey species prefers forest or woodland to rest, roost and breed in, near open areas where it can hunt, or near wetlands. It also uses ledges on cliff faces to nest. It tends to be sedentary within its nesting territory. Its population has decreased due to habitat loss (including loss of freshwater wetlands) and possibly poaching. Historical pesticide use has also been implicated causing egg shell thinning.</p>	<p>Confirmed</p> <p>Found in study area using Mulga trees as well as Gilbey's Pit. It is likely to roost and nest in trees (using old raptor or corvid nests) or, more likely on the pit walls, and hunt waterbirds in the pit. Can hunt anywhere, but are likely to choose a nest site which is close to a rich source of food, if it is available, for energetic reasons. Therefore nest may be found within 1 km or so of either the Golden Wings Pit or the Gilbey's pit or they may nest in the Gilbey's Pit. Nests starting in September in the greater Gascoyne Region (including the Murchison) (Storr 1985).</p> <p>Draining of pits may affect species, however, this food source is only relatively 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.</p>	<p>Disturbance and removal of water from either the Gilbey's or Golden Wings pits and clearing of tall Mulga trees in the study area would cause a loss of foraging and breeding habitat. However, the pits are only man-made</p>
<p>*Malleefowl <i>(Leipoa ocellata)</i></p>	<p>Vulnerable EPBC Act 1999, Vulnerable (Schedule 3) Biodiversity Conservation Act, 2016.</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.</p>	<p>Medium-Low for Foraging</p> <p>Habitat in the present study area is patchy ranging from good to fair for foraging. Malleefowl will roam over large distances from their nest sites to forage, up to 4 km in the breeding season and up to 15 km in the non-breeding season. Malleefowl may be foraging on the tenements of</p>	<p>The degree to which clearing the present study area will impact the Malleefowl for foraging will</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 is present in the study area
		<p>More recently cats have been identified as taking both chicks and adults (J. Raines unpubl. data and other sources).</p>	<p>the Dalgaranga Gold Project, in the breeding season, because there is thick vegetation suitable for nesting nearby within 4 km, including on the Dalgaranga Project itself. In addition, they may also be foraging on the tenements in the non-breeding season, because there is thick vegetation within 15kms of the project.</p> <p>Low–Negligible for Breeding- habitat largely unsuitable for breeding in the present study area.</p> <p>It was well traversed and the pockets of thicker vegetation surveyed. No Malleefowl mounds, or other signs, were found. However, an extinct mound was incidentally found in the study area (Figure 2) during a flora survey (NVS 2012, reported in MBC 2016), indicating the area had once had more dense vegetation.</p> <p>NatureMap has nearest records approx. 38km ESE (1 record in 1999) and 49km E (2016). There are also six other records within 100km. NatureMap data suggest the area is relatively remote and not well studied.</p> <p>A vast area of similar fauna habitats to those found in the present study area are available nearby.</p>	<p>depend on the amount of area that is cleared, but is likely to be fairly low. It is likely to be negligible for nesting.</p>
<p>Good-legged Lerista <i>(Lerista eupoda)</i></p>	<p>DBCA Priority 1 species.</p>	<p>This species is poorly understood with few known locations on threatened lands. It appears to have a limited distribution between Meekatharra and Cue on open mulga areas on loamy soils.</p>	<p>Medium-Low</p> <p>Habitat suitable but nearest records a long way from study area, however species not well understood.</p>	<p>Would remove a small amount of habitat if species present.</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 is present in the study area
			NatureMap has 2 records 70km NNE (1984), 6 records approx. 90km NE (1990-1998) and 1 record 93km NE (2014). A vast amount of similar habitat nearby.	
<p>Shield-backed Trapdoor Spider</p> <p><i>(Idiosoma nigrum)</i></p> <p>Current taxonomic revision work may split this species into a large number of species and many will likely be conservation significant. This work is not yet published and it will be some time before it is reviewed by State and Federal Threatened Species Scientific Committees.</p>	<p>Vulnerable EPBC Act 1999, Vulnerable (Schedule 3) Biodiversity Conservation Act, 2016.</p>	<p>Small number of populations known and threats not well understood.</p> <p>Burrows in heavy clay soil in Mulga on south facing slopes associated with creeks and hill tops, rarely on plains or flats. In all these 3 settings, always either directly under mulga trees or very close as they need the leaves to make their burrow fringe. Rarely on plains and flats (J Clark, Phoenix Environmental Sciences pers. comm.). Feeds in the ground litter surrounding the burrow. Can also be found in 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).</p>	<p>Low</p> <p>Habitat appears largely unsuitable, except possibly on the slopes of a small area of ridge (Fauna Habitat 8) in the present study area. Notably, this species is not well researched and understood and, in particular, the taxonomy has just changed (see column 1). No evidence found during the present on-site Level 1 Reconnaissance Fauna Survey at Habitat 8, but this was not a targeted survey for the species.</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 an effect, depending on how much Mulga on ridge habitat is 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 is present in the study area
<p>Black-flanked Rock Wallaby <i>(Petrogale lateralis lateralis)</i></p>	<p>Vulnerable EPBC Act 1999, Vulnerable (Schedule 3) Biodiversity Conservation Act, 2016.</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. Feeds on grasses and other herbs, browse and seeds and fruit.</p>	<p>Low (Note this depends on the presence of other nearby rock outcrops in the adjacent tenements)</p> <p>Habitat may be suitable if rock outcrops in the SE of the present study extend well beyond the study area onto adjacent tenements (Figure 2) and if immediately surrounding vegetation is suitable to support foraging. The Level 1 Reconnaissance Fauna Survey found larger rock outcrops just SE of the present study area, but it was outside the scope of this study to investigate further beyond the study area.</p> <p>NatureMaps nearest record 18km NE (1 record 1854) and a small number of records >50km N, E and S.</p>	<p>Would remove a very small amount of habitat if species present.</p>
<p>Slender-billed Thornbill <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>Negligible</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>

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 is present in the study area
Fork-tailed Swift <i>(Apus pacificus)</i>	International Migratory Bird Agreement (Commonwealth) and Schedule 5 Biodiversity Conservation Act, 2016, 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.	Negligible 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
Night Parrot <i>(Pezoporus occidentalis)</i>	Critically Endangered EPBC Act 1999, Endangered (Schedule 1) Biodiversity Conservation Act, 2016.	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. In WA only a few likely records existed until in 2017 this species was finally photographed in mature Triodia habitat in interior WA. Species poorly understood so might be found in other habitat in the future.	Negligible Habitat not suitable in the present study area. Has not been recorded from this general region since the 1800s, though with new acoustic search techniques this species may be re-discovered in the region in the future. NatureMap has 1 record approx. 20km 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

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 is present in the study area
		<p>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.</p>		

5. Impact Assessment

The Fauna Desktop Study combined with the on-site Level 1 Reconnaissance Fauna Survey produced a list of 10 conservation significant species as well as some SRE invertebrate groups, which need to be considered in assessing the impact of the proposed mine re-development.

There are no species where the habitat in the study area could be said to be critical to these species survival except potentially one or more SRE invertebrate species. Since SRE species are extremely restricted in their movement, potential critical habitat, if any of these species were present, would be localised to the Rocky Outcrop Fauna Habitat (Fauna Habitat 9), and possibly its immediate surrounding area of rocky substrate, located in the SE of the present study area (Figure 2).

5.1 Scale and Nature of Impacts to Fauna Biodiversity

In the Murchison Bio-region, the degree of general fauna habitat degradation and clearing already accumulated in the bioregion, and therefore the sensitivity of the receiving environment, is considered moderate (EPA 2016b). The scale and nature of the impacts to fauna biodiversity in this bio-region is based on the assessment of 10 independent parameters. The parameters are also used to help assess what level of fauna survey is required to support a clearing proposal. These parameters, and the assessment of the present study area against them, are presented in Table 2.

In terms of describing the scale and nature of impact, the present study area has two distinct areas, Fauna Habitat 9 (rocky outcrop) and the remaining fauna habitats. The impact of disturbing and clearing the rock outcrops (Fauna Habitat 9) in the study area, is more significant than the other fauna habitats present.

Criteria for Impact Assessment	Fauna Habitat 9 (Rocky Outcrops)	Remaining 8 Fauna Habitats
1. Degree of general fauna habitat degradation and clearing already accumulated in the region before site specific impact occurs.	Extent of this fauna habitat in the region is not known, but probably uncommon therefore likely to be at least Moderate	Low
2. Size and scale of proposed disturbance/clearing.	High	If 10 – 50 ha cleared then Moderate , If >50 ha cleared then High

3. Rarity of vegetation and landforms to fauna.	Fauna Habitat 9 potentially Moderate.	Low
4. Presence of significant fauna habitats for specific ecological reasons, important to conservation significant species.	Rock out crops potentially High to Moderate depending on whether it is important to SRE.	Potentially Low
5. Presence of refugia.	Rock out crops potentially High to Moderate depending on whether it is important to SRE.	Low
6. Presence of significant fauna/fauna assemblages with ecological or seasonal significance.	Low	Low
7. Presence of significant remnant habitat.	Low	Low
8. Importance of fauna habitat providing an ecological linkage.	Low	Low
9. Presence of complex fauna habitats offering a wide range of structures and resources.	Low	Low
10. Presence of habitat supporting conservation significant species.	Rocky area potentially High with Specially Protected/Threatened species and multiple Priority species potentially occurring.	Present study area potentially Moderate-Low with one Specially Protected species known to be present and one Threatened species and one Priority species potentially occurring.

Table 2. Assessment of study area, defining scale and nature of impacts on fauna biodiversity (EPA 2016b) as a guidance to Level of Fauna Survey required.

Habitat 9 (Rocky outcrops) in the present study area. This fauna habitat is important for six parameters. The impact of clearing the rock outcrops (Fauna Habitat 9) is potentially High-Moderate (Table 2). In particular, it will possibly be rated as High if SRE invertebrate species are present.

Various conservation significant species could potentially be using the rocky outcrops (Fauna Habitat 9) and their immediate surrounding area. They may potentially support the following conservation species, the Gilled Slender Blue-tongue, Western Spiny-tailed Skink and certain Short Range Endemic (SRE) invertebrate groups including garypids (pseudoscorpions) and selenopids (wall crab spiders) (Table 1). Disturbance or clearing of this fauna habitat would potentially be high to medium impact depending what species might actually be present there, their biology and distribution, the amount of similar habitat nearby and, in the case of SRE, whether they are present in nearby habitat, as they are extremely restricted. More detail about these species and their scientific names can be found in Table 1.

Other fauna habitats within the present study area.

The other eight fauna habitats combined are important for two parameters. The impact of clearing the other eight fauna habitats is potentially Moderate-Low (Table 2), but is potentially Low if appropriate management is applied (see Section 6).

These fauna habitats support the Peregrine Falcon and may also potentially support Malleefowl (for foraging) and possibly Good-legged Lerista. These are all conservation significant species.

The Peregrine Falcon (listed as Other Specially Protected Fauna, Schedule 7, under the Biodiversity Conservation Act, 2016) was seen using Gilbey's Pit and the tree-form Mulga, in the nearby Mulga habitat, and may nest there between September and December (see section 3.2.2 and Table 1). The impact on the Peregrine Falcon, if the study area was cleared, would be relatively minor providing its nest is not cleared or disturbed during the breeding season from September to December. The draining of the Golden Wings and Gilbey's Pits is likely to impact the species, however these are more recent and man-made anyway.

Malleefowl (listed as Vulnerable under the EPBC Act 1999 and Vulnerable, Schedule 3, under the Biodiversity Conservation Act, 2016) have nested in the study area in the past, but are not nesting there now as indicated by the results of the present Targeted Malleefowl survey. However, they could potentially be foraging there in both the breeding and non-breeding seasons (see discussion in section 3.3 and Table 1). The impact of clearing in the present study area on the Malleefowl would depend on the amount of area cleared, but would be relatively low.

The impact on the Good-legged Lerista (listed as a DBCA Priority 1 species), if it were present (see discussion in section 3.2.1 and Table 1) would depend on the amount of area cleared, but would be relatively low.

5.2 Loss of Habitat and Fragmentation of Habitat

The general case. Any large-scale clearing or severe disturbance of an area will result in significant loss of habitat for the majority of fauna species currently residing there. When the habitat becomes fragmented, individual fragments may become too small to support many species of fauna, causing long term changes and usually loss of biodiversity in the fauna assemblages present. The establishment of closely placed exploration drill lines, cleared camp sites, storage areas, dams, small sumps and small waste dumps can also potentially have this effect. In dense habitat, tracks, exploration lines and other exploration features may 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 present study area, for the mining operation, will cause habitat loss for the majority of fauna species currently residing there. Notably, previous and present mining activity has already fragmented some of the area from the Golden Wings Mine Pit to the Gilbey's Mine Pit (not in the present study area). The current exploration, involving dense drill grids at approximately 25 m intervals, is currently removing significant amounts of vegetation (50% – 60%) in Habitat 3, from within the present study area, immediately south - west of Gilbey's pit. This habitat, which would have been in very good condition (based on the surrounding vegetation) is now significantly degraded. However, with the exception of the rock outcrops (Habitat 9), the disturbed fauna habitats (past and present) are fairly common and there are vast areas of them nearby.

The exception, the rock outcrops (Habitat 9), could potentially be important to a number of species, as described above, including at least two conservation significant skink species as well as some SRE species/species groups, if they are present. The disturbance or removal of this fauna habitat could potentially have a medium to high impact, particularly if SRE species are present.

5.3 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. When the habitat becomes fragmented, individual fragments may become too small to support many species of fauna, causing long term changes and usually loss of biodiversity in the fauna assemblages present (involving direct and indirect mortality). 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 during clearing, construction and the operation of the facilities.

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. For example, as described above, the current exploration, involving drill grids at approximately 25 m intervals, is currently fragmenting and removing significant amounts of vegetation (50% – 60%) in Habitat 3, from within the present study area, south - west of Gilbey's pit. This will be causing both direct and indirect mortality at this time. However, with the exception of the rock outcrops (Habitat 9), the mortality will occur in fairly common fauna habitat types represented with vast amounts of them existing nearby.

The exception, the rock outcrops (Habitat 9), is likely to be important to a number of species, as described above, including at least two conservation significant skink species as well as some SRE species/species groups, if they are present. Therefore, disturbance or removal of this fauna habitat, causing subsequent direct and indirect mortality, could potentially have a medium to high impact, particularly if SRE species are present.

5.4 Increased Mortality due to Accidental Trapping

The general case. Mortality due to accidental 'pit fall trapping' in mine features including holes and shafts can be considerable (Pedler 2010). Death can occur when exploratory drill holes are accidentally left open or interfered with. Alternatively, capped drill holes can eventually become re-opened, over time, by the breaking down and degradation of the materials capping the hole, or the degradation of the sides of the pipe where it is exposed to the sun and weather. Old historical gold mine diggings, and sometimes even more modern diggings, may include large, steep-walled mining shafts/holes that can potentially 'pit fall trap', injure and kill macro fauna. In the local area these could include, for example, kangaroos, wallabies, Emu and Malleefowl.

Dalgaranga study area. During the present Level 1 Reconnaissance Fauna Survey, extensive exploration involving AC and RC drilling was observed over most of the study area, with dense approximately 25m drill grids being used to explore immediately south-west of the Gilbey's Pit. With one exception, all the drill holes encountered incidentally during the survey were either temporarily closed with black plastic caps or fully closed i.e. capped and covered in soil. One drill hole found had been left open. A field team was working on site to fully close all the temporarily capped drill holes. The impact of drill holes accidentally trapping fauna in the Dalgaranga Gold Project should therefore be negligible under the current management regime. There are no steep-walled holes or mine shafts on the tenement except the Gilbey's Pit (Belinda Clark, Clark Lindbeck and Associates, pers. comm.).

5.5 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. Sometimes fires can be contained, whilst others may spread over large areas into neighbouring lands, causing both loss and fragmentation of habitat and direct and indirect mortality of the species residing there. The impact of fire to the local fauna communities will depend on the frequency, extent and intensity of the fire(s) in question.

Dalgaranga study area. The clearing of the study area and the expansion of the mine will involve an increase in human activity and operating machinery at the study site causing an increase in the risk of wild fire occurring in the area. At the Dalgaranga Gold Project, the impact related to this increase in wild fire risk could range from low to high, depending on the pre-cautions in place including fire breaks and protocols, the fire equipment and services readily and effectively available, their ability to access the areas under threat to protect them and their training, ability and willingness to fight a wild bushfire no longer contained within their boundaries.

5.6 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 a small extent. The clearing of the study area and development of the mine will increase human usage of the area, including accommodating a large number of people on site, which has the potential to introduce weeds to the area. At the Dalgaranga Gold Project, the impact related increasing weed infestation could range from low to medium-low, depending on hygiene procedures, monitoring and adaptive management procedures used. 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.

5.7 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 including predators (foxes, cats, dog/dingos) and competitors (e.g. goats and rodents). The development of an area often coincides with an increase in these species. This effect is particularly exaggerated by the opening up of dense vegetation and the general habitation of the human population on site including the provision of fresh water and rubbish dumps.

Dalgaranga study area. In the study area, this impact will apply. Gascoyne Resources is currently establishing a 180 man mining camp adjacent to the present study area (Gary Moore, Construction Manager, Gascoyne Resources, pers. com.), which will increase predation and competition by these introduced exotic species, to some extent. At the Dalgaranga Gold Project, the impact related to increasing predation and competition could range from low to medium-low depending on the precautions, monitoring and adaptive management procedures taken. However, the present study site, itself, already contains open vegetation which is disturbed by sheep, goats and camels, foxes and cats and would almost certainly have dingo/dogs and living there too, as they are usually widespread through this type of habitat.

6. Recommendations

6.1 Specific Recommendations

6.1.1 Specific Recommendation 1.

Avoid disturbing or clearing the rocky outcrops in the south – east of the present study area and the immediate surrounding vegetation out to 45 m (Fauna Habitat 9 and its immediate surrounds) (Figure 2), as this habitat is significant under six parameters used to assess the scale and nature of impact to fauna biodiversity (Table 2). As it is likely to support one or more conservation significant species listed under the EPBC Act (1999), this potentially important area requires a further 50 m of buffer zone around it. Avoid disturbing or clearing within this additional buffer zone area (Figure 2).

6.1.2 Specific Recommendation 2.

If Gascoyne Resources does not wish to avoid the rocky out crops and their buffer zone (Fauna Habitat 9) as recommended in Specific Recommendation 1, then determine if this potentially important area contains any of the following conservation significant species - Gilled Slender Blue-tongue, Western Spiny-tailed Skink, or SRE invertebrates particularly from the garypid (pseudoscorpions) and selenopid (wall crab spiders) groups.

To achieve this, conduct Targeted Fauna Surveys for the Gilled Slender Blue-tongue, Western Spiny-tailed Skink and SRE. Document the size and nature of the rocky out crops

(Habitat 9) and the quality of their immediate surrounds. Also collect this data outside the study area, in order to place the rocky outcrops within the study area in context with the nearby surrounding areas.

6.1.3 Specific Recommendation 3.

If disturbance is to occur in the Gilbey's Pit in spring, or clearing of large tree-form Mulga is to take place near the Gilbey's Pit or the Golden Wings Pit, in spring and within 1 km of these pits, conduct a Targeted Peregrine Falcon nest survey of the largest trees in the areas proposed to be cleared and the wall of the Gilbey's Pit. If a Peregrine Falcon nest is found and is being used, do not disturb the area within 100 m of the nest until the young have fledged.

6.1.4 Specific Recommendation 4.

Malleefowl mounds often cannot be removed, for the purposes of development, because they are very important habitat to the Malleefowl which will often return to re-activate and nest again in these aged mounds. They also normally indicate that the surrounding habitat is both nesting habitat and foraging habitat for Malleefowl. However, the vegetation within the vicinity of this particular, extinct mound has clearly changed since it was originally built (see Sections 3.3 and 4.0). It has become so open and sparse that Malleefowl will not re-nest in this particular mound while the vegetation remains open, and it is likely to stay this way for the foreseeable future.

If Gascoyne Resources wishes to disturb or clear the extinct Malleefowl mound in the study area it must be approved. As this only involves one species, AES has been advised by the Department of Water and Environment Regulation (DWER), that the matter should be referred directly to the Species and Communities Branch of DBCA. This may be able to be accomplished efficiently via a pre-referral meeting.

6.1.5 Specific Recommendation 5.

The possible presence of Malleefowl foraging in the study area, while nesting in nearby dense vegetation, should be a management consideration when running the Dalgara Gold Mine.

6.1.6 Specific Recommendation 6.

The scale and nature of the impacts to fauna biodiversity in this bio-region is based on the assessment of 10 independent parameters (EPA 2016b). These parameters are also used to help assess what level of fauna survey is required to support a clearing proposal. The assessment in Table 2 suggests the level of fauna survey should be reviewed in relation to these impacts, though notably many of the potentially higher impacts pertain more to the rocky outcrops. Consider reviewing this with the DMIRS.

6.2. General Management Recommendations

Impact upon fauna, due to the area being, explored, cleared and mined will relate to habitat loss and fragmentation and direct and indirect mortality as a result of clearing. Impact may also relate to the accidental trapping of animals, increased fire risk, increase in weeds and introduced exotic predators and competitors due to the increased human activity, and the ‘opening up’ of vegetation and other factors related to human habitation.

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

6.2.1 Management Recommendation 1.

Limit clearing and fragmentation of native vegetation as much as possible. Plan to clear any disturbed areas, rather than the natural bushland. Reduce the amount and extent of tracks and drill lines, particularly drill grids as much as possible.

6.2.2 Management Recommendation 2.

Maintain the existing program of temporarily capping drill holes and then fully capping them shortly after.

6.2.3 Management Recommendation 3.

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

6.2.4 Management Recommendation 4.

Ensure a weed management program is developed/maintained and applied to the study area. This will include implementing adequate vehicle and equipment hygiene as appropriate. There are currently only a few weeds in the area so the main aim is to ensure no further weeds are introduced.

6.2.5 Management Recommendation 5.

Consider implementing exotic predator (dog, fox and cat) eradication programs to the study area and surrounding tenements, as appropriate to the region. Conform to community efforts, in conjunction with adjacent land owners who include pastoralists and the DBCA. DBCA already run an exotic predator control program.

6.2.6 Management Recommendation 6.

Manage waste, especially food waste, and the availability of water, so as not to encourage the growth or influx of feral predators or feral competitors e.g. goats, camels, or exotic rodents, by making them inaccessible to these species. Monitor and adapt this management ongoingly as the mine is developed.

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Appendix 1.

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

DATA SOURCES

Combined data from DBCA 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 Reconnaissance Fauna Survey.

* - Species recorded during on-site Level 1 Reconnaissance 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 -Biodiversity Conservation Act (2016) (Western Australia) Specially Protected Fauna Schedules

S1 Critically Endangered	S5 Migratory birds under International Agreement
S2 Endangered	S6. Conservation Dependent
S3 Vulnerable	S7. Other Specially Protected Fauna
S4 Presumed Extinct	

KEY - Department of Biodiversity, Conservation and Attractions Priority Species List

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

P2 = Taxa with few poorly known populations on conservation lands/several poorly known populations not on conservation lands. Appear to be under threat.

P3 = Taxa with several poorly known populations, some on conservation lands. Known threats could affect them. but require monitoring in case circumstances change, or Near threatened or recently removed from Threatened list.

P4 = Taxa in need of monitoring. Taxa sufficiently known and not currently in need of protection, but require monitoring in case circumstances change, or Near threatened or recently removed from Threatened list.

Appendix 1 continued...

	Species	EPBC Act 1999	Biodiversity Conservation Act 2016	DBCAs Priority Species
	Amphibia			
	<i>Neobatrachus kunapalari</i> (Kunapalari Frog)			
	<i>Neobatrachus sutor</i> (Shoemaker Frog)			
	Aves (Birds)			
*	<i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
*	<i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
	<i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
	<i>Acanthiza iredalei</i> (Slender-billed Thornbill)	V		
*	<i>Acanthiza robustirostris</i> (Slaty-backed Thornbill)			
*	<i>Acanthiza uropygialis</i> (Chestnut-rumped Thornbill)			
	<i>Accipiter cirrocephalus</i> (Collard Sparrowhawk)			
*	<i>Accipiter fasciatus</i> (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)			
	<i>Apus pacificus</i> (Fork-tailed Swift)	M		
*	<i>Aquila audax</i> (Wedge-tailed Eagle)			
	<i>Ardeotis australis</i> (Australian Bustard)			
*	<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>Cheramoeca leucosternus</i> (White-backed Swallow)			
	<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)			
*		<i>Cracticus torquatus</i> (Grey Butcherbird)			
*		<i>Cracticus tibicen</i> (Australian Magpie)			
*		<i>Cygnus atratus</i> (Black Swan)			
*		<i>Daphoenositta chrysoptera</i> (Varied Sitella)			
*		<i>Dromaius novaehollandiae</i> (Emu)			
		<i>Epthianura tricolor</i> (Crimson Chat)			
*		<i>Elseyornis melanops</i> (Black-fronted Dotterel)			
*		<i>Erythrogonyx cinctus</i> (Red-kneed Dotterel)			
		<i>Falco berigora</i> (Brown Falcon)			
		<i>Falco cenchroides</i> (Australian Kestrel)			
		<i>Falco longipennis</i> (Australian Hobby)			
		<i>Falco peregrinus</i> (Peregrine Falcon)		S4	
*		<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)			
		<i>Leipoa ocellata</i> (Malleefowl)	V	SI	
*		<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)			
		<i>Merops ornatus</i> (Rainbow Bee-eater)			
		<i>Neopsephotus bourkii</i> (Bourke's Parrot)			
		<i>Ninox novaeseelandiae</i> (Southern Boobook)			
		<i>Nymphicus hollandicus</i> (Cockatiel)			
*		<i>Ocyphaps lophotes</i> (Crested Pigeon)			
*		<i>Oreoica gutturalis</i> (Crested Bellbird)			
*		<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)	E	SI	
		<i>Phaps chalcoptera</i> (Common Bronzewing)			
*		<i>Platycercus icterotis xanthogenys</i> (Western Rosella)(inland)			P4
*		<i>Pomatostomus superciliosus</i> (White-browed Babbler)(ssp superciliosus)			
*		<i>Pomatostomus temporalis</i> (Grey-crowned Babbler)			
		<i>Ptilonorhynchus maculatus</i> (Western Bowerbird)			
*		<i>Pyrrholaemus brunneus</i> (Redthroat)			
*		<i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			

*		<i>Rhipidura leucophrys</i> (Willie Wagtail)			
		<i>Smicrornis brevirostris</i> (Weebill)			
*		<i>Strepera versicolor</i> (Grey Currawong)			
*		<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 pyrrhopygius</i> (Red-backed Kingfisher)			
		<i>Vanellus tricolour</i> (Banded Lapwing)			
		Mammalia			
*	+	<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>Osphranter rufus</i> (Red Kangaroo)			
*	+	<i>Oryctolagus cuniculus</i> (Rabbit)			
*	+	<i>Ovis aries</i> (Sheep)			
		<i>Petrogale lateralis</i> subsp <i>lateralis</i> (Black-flanked Rock Wallaby)	V	S3	
		<i>Sminthopsis crassicaudata</i> (Fat-tailed Dunnart)			
		<i>Tadarida australis</i> (White-striped Freetail Bat)			
	+	<i>Vulpes vulpes</i> (Red Fox)			
		Reptilia			
		<i>Ctenophorus caudicinctus</i> (Ring-tailed Dragon)			
		<i>Ctenophorus reticulatus</i> (Western Nettle Dragon)			
*		<i>Ctenophorus scutulatus</i> (Lozenge-marked Dragon)			
		<i>Ctenotus leonhardii</i>			
		<i>Ctenotus severus</i>			
		<i>Cyclodomorphus branchialis</i> (Gilled Slender Blue-tongue)	V	S3	
		<i>Egernia depressa</i> (Southern Pygmy Spiny-tailed Skink)			
		<i>Egernia stokesii</i> spp <i>badia</i> (Western Spiny-tailed Skink)	V	S3	
		<i>Gehyra punctata</i>			
		<i>Gehyra variegata</i>			
		<i>Lerista nichollsi</i>			
		<i>Lerista timida</i>			
		<i>Lerista eupoda</i> (Good-legged Lerista)			P1
		<i>Liopholis striata</i> (Night Skink)			
		<i>Menetia greyii</i>			

		<i>Neelaps bimaculatus</i> (<i>Black-naped Snake</i>)			
		<i>Oedura marmorata</i> (<i>Marbled Velvet Gecko</i>)			
		<i>Pseudechis butleri</i> (<i>Spotted Mulga Snake</i>)			
		<i>Rhynchoedura ornata</i> (<i>Western Beaked Gecko</i>)			
		<i>Simoselaps bertholdi</i> (<i>Jan's Banded Snake</i>)			
		<i>Strophurus strophurus</i>			
		<i>Varanus caudolineatus</i>			
*		<i>Varanus gouldii</i> (<i>Bungarra or Sand Goanna</i>)			
		Invertebrates			
		<i>Idiosoma nigrum</i> (<i>Shield-backed Spider</i>)	V	SI	

Appendix 2

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

Possible Limitation	Comment
Level and scope of survey.	Level 1 appropriate under circumstances and may preface a Level 2 survey. See Introduction section. Targeted Malleefowl Survey applied appropriate to circumstances.
Competency/experience of the consultant(s) in carrying out the survey.	Survey overseen by senior zoologist with over 30 years of experience in vertebrate ecology.
What faunal groups were sampled and were some sampling methods not able to be employed because of constraints?	Sampling quite appropriate 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. Contextual information.	Sources include a range of previous records from the area, species distribution information and newer observations. Results put into wider context.
The proportion of the task achieved and further work that might be needed.	Site inspection completed and all fauna habitat types identified and sampled. Targeted Malleefowl survey appropriate.
Timing/weather/season/cycle.	Appropriate for a Level 1 reconnaissance survey which focuses on habitat and identifying signs of the presence of fauna species particularly significant species. Appropriate for Malleefowl habitat and mound 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 reconnaissance survey in this type of habitat and Malleefowl survey.
Completeness (e.g. was relevant area fully surveyed). Remoteness and access.	Desktop study covered project area and adjacent habitats. Site inspection covered fauna habitats from within the study site.
Resources (e.g. degree of expertise available in animal identification to taxon level).	Survey well resourced. All vertebrate fauna species identified to taxon level by experienced personnel.