DESKTOP ASSESSMENT OF VERTEBRATE FAUNA OF THE PROPOSED RAVENSTHORPE SPODUMENE PROJECT, WESTERN AUSTRALIA

Prepared for Galaxy Resources Ltd

By Ninox Wildlife Consulting & Biostat Pty Ltd

February 2018

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EXECUTIVE SUMMARY

Ninox Wildlife Consulting and BIOSTAT Pty Ltd were commissioned to review and update the fauna assessment for the Galaxy Resources Ltd Ravensthorpe Spodumene mine expansion project. The project area is located approximately 2 km north-west of the town of Ravensthorpe and has an area of approximately 103 ha with the greater part located to the east of Floater Road. The project area to the east of Floater Road also incorporates a 250 m buffer zone between the proposed open cut pit and the existing vegetation. A small area, approximately 11 ha, is located to the south of the existing waste dump and to the west of Floater Road. Within the greater landscape, the project area forms part of a remnant "green belt" sitting between Overshot Hill Nature Reserve to the north-west, Ravensthorpe Range to the north-east and east and remnant vegetation south of Ravensthorpe. This "green belt" is contained within a bioregion that has had just under 50% of native vegetation cleared for agricultural purposes.

The assessment is based on surveys and assessments carried out in 2008. This was complemented with a 3 day reconnaissance survey of the project area undertaken by BIOSTAT Pty Ltd in December 2017. The focus of the reconnaissance survey was to provide further insight into the quality of habitats present in the project area.

The project area is a mosaic of mallee form woodlands of diverse *Eucalyptus* species over variable shrub and ground cover on the slopes and crests. A woodland supporting Salmon Gum is located on the southern boundary valley floor at the base of the hill. A major ephemeral creekline and other drainage lines run through the project area.

The 250 m buffer area integrated in the project area pit design will, to some degree, provide protection to the remaining habitats. Areas to the north and east of the buffer would still represent valuable remnant habitats in a broader landscape that has largely been denuded of native vegetation for agricultural purposes. Due to the small size of the area under consideration for clearing, the potential impact on any of the threatened species that may occur in the area is limited.

An assessment of threatened species that may occur in or near the project area was undertaken within the context of existing habitats. Carnaby's Black Cockatoo has not been recorded within the project area but is known from the greater local area. The Salmon Gum woodland area located to the south of the project area provides potential foraging and roosting habitat for this species. Most of the Salmon Gum woodland is outside the project area but is associated with the major creekline. Discussions regarding a range of creek diversion options are currently being held; any impact on downstream habitats will be dependent upon maintenance of water flow within natural parameters.

A Malleefowl nest was located approximately 200 m outside the footprint of the project area. There is no further information to the existence and persistence of this species in the area which limits the confidence in impact assessment.

The likelihood of threatened species occurring in the area and the level of impact from the mine expansion is judged as low overall. However, the removal of habitats within a region already denuded of native vegetation is likely to magnify any local and regional impacts. The potential impacts in the project area have been mitigated to some degree with the inclusion of a buffer within the disturbance envelope. There needs to be further efforts in conserving remaining vegetation beyond the buffer.

Recommendations have been made for additional survey work to be undertaken for the Priority 1 skink, the Ravensthorpe Slider, and for a reporting procedure to be established for the Malleefowl.

1 INTRODUCTION

This report has been prepared for Galaxy Resources Ltd to update previous assessments of vertebrate fauna for the expansion of its Ravensthorpe Spodumene Project. The disturbance area (also referred to as the "project area") is located approximately 2 km north-west of the town of Ravensthorpe within mining leases M74/244 (Figure 1). It has an area of approximately 103 ha with the bulk of the site located to the east of Floater Road. The project area to the east of Floater Road also incorporates a 250 m buffer zone between the proposed open cut pit and the existing remnant vegetation. A small area, approximately 11 ha, is located to the south of the existing waste dump and to the west of Floater Road.

2 STUDY OBJECTIVES

The purpose of this report is to update existing information originally obtained in 2008 relating to the proposed project area. A desktop study has been undertaken to review the material and to identify potential gaps in information. This is equivalent to a preliminary investigation as defined for a Level 1 assessment (Environmental Protection Authority 2016).

The study objectives of the desktop study were to:

- prepare a list of species that could potentially occur within the project area; and
- review species considered to be rare, threatened, vulnerable or geographically restricted that could be present in the project area.

Database searches were carried out including:

- Western Australian Department of Biodiversity, Conservation and Attractions (DBCA) NatureMap (https://naturemap.dpaw.wa.gov.au/, accessed 17/10/2017);
- Department of Environment and Energy (DEE) Environment Protection and Biodiversity Conservation (EPBC) Protected Matters Database (http://www.environment.gov.au/epbc/protected-matters-search-tool, accessed 17/10/2017); and
- Atlas of Living Australia (ALA) database (https://www.ala.org.au/, accessed 17/10/2017). The ALA database stores records from numerous government and non-government organisations as well as providing an opportunity for records obtained via individuals or citizen science projects.

All searches were based on the centre point 33.5525S, 120.03943E with a search radius of 5 km. The NatureMap search returns invertebrate and aquatic species, which are excluded from further assessment in this document. The vertebrate fauna data searches provide a broad list of species for the area and may include species associated with habitats that do not occur in the local area of investigation.

A literature search for relevant information resulted in a limited number of documents, including:

- a Level 1 Flora, Vegetation and Fauna investigation including a four day reconnaissance survey of the area by a zoologists in April 2008 (ENV Australia 2008);
- a single season fauna trapping survey of several of the lease areas carried out in October 2008 (Keith Lindbeck and Associates 2008); and,
- a flora and vegetation survey also in October 2008 (Botanica Consulting 2008).

The flora and vegetation for the project area was updated with another survey also undertaken in 2017 by Mattiske Consulting (Mattiske Consulting Pty Ltd 2018). Further information on the biodiversity

values of the region was obtained from an overview prepared in 2004 and updated in 2010 from DBCA (Danks 2013).

An inspection of the site was carried out by an experienced zoologist over three days (18 – 20/12/2017). This involved foot transects through the project area recording:

- fauna habitats including the quality and extent of these habitats;
- the potential of the area as Black-Cockatoo habitat (feeding and breeding); and,
- vertebrate fauna or signs of their presence encountered during the assessment.

Figure 1. Regional context of the proposed spodumene project expansion area.

3 NOMENCLATURE, TAXONOMY AND DISTRIBUTION PATTERNS

The following literature sources have been employed to discuss fauna distribution patterns and ecology in the preparation of this report:

Birds:	Barrett *et al*. 2003; Johnstone & Storr 1998, 2004.
Mammals:	Churchill 2008; Jackson & Groves 2015; eds Van Dyck, Gynther & Baker 2013; eds Van Dyck & Strahan 2008.
Amphibians:	Tyler & Doughty 2009; Tyler & Knight 2011.

The nomenclature in this report follows the references listed above except where other, more recent, taxonomic revisions have been accepted.

4 SPECIES OF CONSERVATION SIGNIFICANCE

4.1 Statutory and other Requirements

This section summarises the various Australian Government and Western Australian Government Acts that cover rare, threatened and vulnerable vertebrate fauna species and was correct at the time of the preparation of this document. However, as changes are made to both State and Australian Government legislation and new treaties are entered into, all current documentation regarding rare, threatened and vulnerable fauna should be periodically reviewed for any changes to the status of fauna in each area.

Additionally, in any discussion of rare, threatened or vulnerable species, several aspects require clarification before the significance of these species can be considered in context of the development and operation of any project.

- Resident, habitat-specific rare fauna are much more susceptible to the influences of disturbance than nomadic or migratory species.
- Not all rare species are equally susceptible to disturbance. Some rare species such as the Peregrine Falcon can accommodate the high levels of disturbance present in urban and rural environments.
- The concept of species rarity is a dynamic process considerably influenced by the level of survey work carried out in a location.

4.2 Protected Species – Australian Government

The *Environmental Protection and Biodiversity Conservation Act 1999 (EPBC 1999)* (Commonwealth of Australia 1999) is administered by the Department of the Environment and Energy (DEE) (https://www.environment.gov.au/epbc) which also administers the international treaties discussed below.

Several animals are covered by the *EPBC Act 1999* under six categories of threat (S.179: *EPBC Act 1999*):

- Extinct (X);
- extinct in the wild (XW);
- critically endangered (CR);
- endangered (EN);
- vulnerable (VU); and,
- conservation dependent (CD).

A range of birds are listed under the Japan-Australia (JAMBA), China-Australia (CAMBA) and Republic of Korea/Australia (ROKAMBA) Migratory Bird Agreements. The main aim of these international agreements is to protect migratory birds and their breeding and/or feeding habitats. An earlier agreement, Bonn Convention (Bonn), binds signatories to the conservation of species of wild animals and aims to conserve terrestrial, marine and avian migratory species throughout their range. There are several birds listed on these international treaties that could occur within the Option sites and these are discussed in this report.

4.3 Protected Species - Western Australia

In Western Australia, species of conservation significance are currently protected under the *Wildlife Conservation Act 1950*[1] (*WC Act 1950*) (Government of Western Australia 1950). The schedules defined under this Act are:

Schedule 1 (CR): *fauna that is rare or likely to become extinct, as critically endangered fauna, are declared to be fauna that is in need of special protection*;

Schedule 2 (EN): *fauna that is rare or likely to become extinct, as endangered fauna, are declared to be fauna that is in need of special protection*;

Schedule 3 (VU): *fauna that is rare or likely to become extinct, as vulnerable fauna, are declared to be fauna that is in need of special protection*;

Schedule 4 (X): *fauna that is presumed to be extinct, are declared to be fauna that is in need of special protection*;

Schedule 5 (IA): *birds that are subject to international agreements relating to the protection of migratory birds, are declared to be fauna that is in need of special protection*;

Schedule 6 (S1): *fauna that are of special conservation need being species dependent on ongoing conservation intervention, are declared to be fauna that is in need of special protection*;

Schedule 7 (S2): *fauna that is in need of special protection, otherwise than for the reasons mentioned in* [previous schedules).

(Schedule definitions are quoted from Wildlife Conservation Act 1950 for consistency and relevancy)

This Act is periodically reviewed. The current list of protected fauna can be viewed on DBCA website (http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities).

The changes in Schedules and their definitions now allow for consistency between the act and the informal criterion used within DBCA.

4.4 Priority Species - Western Australia

There are several species not listed under the *WC Act 1950* that, for various reasons, require attention and these are listed on DBCA's Priority Fauna List which classifies species as[2]:

- Priority 1 - Poorly-known taxa with few, poorly known populations on threatened lands.

Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

- Priority 2 - Poorly-known taxa with few, poorly known populations on conservation lands.

[1] To be progressively replaced by the Biodiversity Conservation Act 2016

[2] Definitions can be found (http://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Conservation_code_definitions_18092013.pdf)

Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

- Priority 3 - Poorly-known taxa with several, poorly known populations, some on conservation lands.

Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

- Priority 4 - Rare, Near Threatened and other taxa in need of monitoring.

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

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

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

- Priority 5 - Conservation Dependent taxa

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

The Priority Fauna List does not confer any additional legal protection to the species listed apart from the normal protection afforded to most native animals. It does, however, indicate the need for vigilance during the construction and commissioning of development projects to manage native vegetation and rehabilitation, so that Priority Species do not meet the criteria for listing as Protected Species resulting from that development.

4.5 Other Classification

The International Union for Conservation of Nature (IUCN: https://www.iucn.org/) aims to assess the conservation status of species, subspecies, varieties and even selected subpopulations on a global scale to highlight taxa threatened with extinction, and therefore promote their conservation.

There are several animals that are shown on the IUCN Red List that are not listed on any Australian Government or Western Australian Acts. The IUCN Red List does not confer any additional protection over and above that provided to Australia's native animals. However, in the interests of good project management, where possible, conservation of species within a project area will reflect a comprehensive approach to environmental management of that project.

4.6 Significant Fauna Habitats

Australia-wide, a small number of Threatened Ecological Communities (TECs) have been defined in, and are protected by, the *EPBC Act 1999*. DPaW has developed a list of TECs specific to Western Australia that include communities in addition to those listed under the *EPBC Act 1999*. These communities are protected under the *WC Act 1950*.

Further to these lists and, while not defined under any legislation, some fauna habitats within a project may be defined as locally significant because they:

- support rare or vulnerable species;
- support specialised or habitat specific fauna;
- are regionally or locally uncommon; or
- are restricted in area.

Such habitats are not protected under any State or Australian Government legislation. In the interests of good project management and, where possible, conservation of such locations within a project will provide the basis for the fauna component of an environmental management plan to be put in place for the duration of a project.

5 BIOREGIONAL DESCRIPTION

Australia and its territories have been classified into 89 biogeographic regions (Thackway & Cresswell 1995) that are defined on the basis of climate, geology, landforms, vegetation and fauna. These biogeographic regions are reviewed regularly with V7 being the most current. These regions are further classified into subregions that are typified by the same combination of characteristics but at a much finer scale.

The project area is located in the Fitzgerald subregion of the Esperance Plains Interim Biogeographic Regionalisation for Australia (IBRA) region and is totally contained in the Ravensthorpe soil and landscape system (Tille 2006).

The bioregion is characterised by sandplains undulating to low hills away from the coast. The soils are mostly alkaline red shallow loams and with shallow gravels, clays and stony soils. Vegetation is diverse with a high level of local endemism. Eucalypt mallee systems over shrublands or heaths are a common feature (Comer & Gilfillan 2001). Around half of the region has been cleared of native vegetation increasing pressure on fauna through loss of habitat and loss of connectivity between remaining habitats. Even so, the bioregion forms the south-east portion of the south-west botanical province and is one of the 34 global biodiversity hotspots (Danks 2013).

6 RESULTS AND DISCUSSION

6.1 Data Review

The database searches of NatureMap and Atlas of Living Australia provided the basis for a species list to be constructed for the project area. The review of the literature also identified both additional species that may occur but did not feature in the searches and other species that are highly unlikely to occur over the same area and were removed from the list (Appendix 1).

There are some differences with lists from previous reports due to taxonomic changes and clarifications. They are:

- The gecko, *Diplodactylus granariensis*, is a member of the DIPLODACTYLIDAE family.
- Taxonomic revision of part of the *Diplodactylus* group (Hutchinson, Doughty & Oliver 2009) would make *Diplodactylus calciolus* more likely to occur in the area rather than *D. granariensis*. However, this can only be confirmed by taxonomic identification of the actual specimens for the area if they are available.
- The Barking Gecko, *Underwoodisaurus milii* is within the CARPHODACTYLIDAE family.
- All endemic Australian members of the TYPHLOPIDAE (blind-snake) family are now under the genera *Anilios*, not *Ramphotyphlops* (Pyron & Wallach 2014).

- The taxonomic revision of *Nyctophilus* (long-eared) bat complex (Parnaby 2009) resulted in the removal of *Nyctophilus timoriensis* from Australia, replaced a number of species (some originally recognised as subspecies of *N. timoriensis*). For the Ravensthorpe area, two *Nyctophilus* species are possible: *N. geoffroyi* and *N. major tor*. The latter is listed as a Priority 4 species by DCBA.
- Several species have been presented under more than species name or common epithet (including species obtained from database searches). These species were rationalised into a standardised taxonomic format for this assessment.

A total of 207 native vertebrate fauna species are known or could occur within 5 km of the project area. The list also contains an additional 7 introduced species; 3 birds and 4 mammals. The habitats present in the project area are limited in extent and diversity, and may not support all the species listed in this report.

6.2 Literature Review

The three main sources of information for this project are based on two reconnaissance surveys (2008 and 2017) and one Level 2 spring survey (2008). The information gained from Level 1 surveys and single Level 2 surveys is generally insufficient for detailed and robust interpretation of faunal values of an area (Environmental Protection Authority 2016). However, what the information can do is provide a general overview of the conditions within the project area and can be used to assess the likelihood of occurrence for fauna species.

6.3 Reconnaissance Survey

The primary focus of the reconnaissance survey was to assess existing fauna habitats and the potential for supporting threatened species. The area was explored by vehicle and on foot, and 13 representative fauna habitat sites were systematically described for comparative assessment (Appendix 3).

The fauna habitats were assessed on vegetation composition and structure, position in the landscape, and substrate. The flora and vegetation assessment undertaken for the area provided the basis for fauna habitat mapping in defining general boundaries (Mattiske Consulting Pty Ltd 2018). However, vegetation communities do not always correlate with fauna habitats as each is an expression of different metrics describing different characteristics.

The project area is a mosaic of woodland habitats ranging from mallee forms to taller tree stands (Figure 2). Creeklines with their dense shrub zones and occasional emergent tall trees quickly merged into the woodland systems located on the slopes. Habitat distinctions were primarily based on position in landscape, with habitats on hill slopes differentiated from hilltops primarily on slight differences in substrate (rocky loams on hilltops vs gravelly loam slopes). Pockets of relatively dense woodlands with little or no understorey or ground cover were located primarily on hilltops. The loamy clay valley floors south of the creekline supports an emergent woodland with Salmon Gum.

The mosaic nature of habitats encountered during the reconnaissance survey should be considered in interpreting the habitat maps produced for this study. Boundaries between habitats are fluid and pockets of several communities may exist within areas; as a result, the areas indicated on the map are based on the dominant forms of habitats.

- Tall Woodlands of mixed *Eucalyptus* sp., dominated by *Eucalyptus myriadena*, to 15 m with diverse understorey ranging from grasses to dense shrubs on rocky hill slopes (MTC01, MTC02, MTC05, MTC08, MTC10, MTC11, MTC12 and MTC13). Lower woodlands to 12 m occur on the rocky steeper slopes and generally support a denser shrub understory. Woodlands on crests and hilltops are more open with a sparse understorey.

  The growth forms of the *Eucalyptus* sp. in this habitat type are generally tall, multi-stemmed trees (each stem DBH is less than 30 cm diameter). This type of growth form does not support

large hollows suitable for Black-Cockatoo nesting although the smaller hollows that do form in these trees are suitable for a variety of other species (e.g., Purple-Crowned Lorikeet, Elegant Parrot, Striated Pardalote, Spotted Pardalote, Tree Martin, Western Pygmy-possum and a variety of bat species).

The areas of denser understorey provide suitable habitat for ground dwelling species such as Quenda (*Isoodon fusciventer*[3]), Western Brush Wallaby (*Notamacropus irma*), and native rodents.

A recently constructed (< 3 years) Malleefowl (*Leipoa ocellata*) nest was found in this habitat (Figure 3) approximately 200 m from the boundary of the project area. The area of the nest was located mid slope with relatively dense tall shrubs to 2 m but also a well-developed and complex lower shrub layer and groundcover. The presence of the nest is an indicator that a remnant Malleefowl population may persist in the general area, including the project area.

The abundant litter and clay loam soils found in these woodlands make it suitable habitat for the small skink, the Ravensthorpe Range Slider (*Lerista viduata*). Since the species was first described in 1986 they have been recorded outside of the Ravensthorpe Range near Kundip and other locations. These small skinks may be found in mallee woodlands with deep litter, where they live in the loose soil under litter at the base of the mallee trees (A. Sanders pers. comm.).

- Mid Mallee Woodlands of mixed *Eucalyptus* sp., dominated by stands of *Eucalyptus myriadena* and *E. cernua* with diverse understory but often with sparse low shrubs (MTC06). They are dominant on the crests of the hills among the rockier ground. The growth form of this is not capable of creating the large hollows needed by Black-Cockatoos but it provides suitable foraging habitat for species that feed on seeds and eucalypt flowers.

  As with the other woodlands, there is substantial litter coverage across this habitat. None of the ground dwelling species of conservation significance are exclusive to this type of habitat but will utilise it if part of a broader territory. There is suitable habitat for *Lerista viduata*.

- Salmon Gum (*Eucalyptus salmonophloia*) Woodland to 15 m on the southern boundary of the project area with variable but relatively dense shrub layer to 2m on clay loams (MTC09). Ground cover is sparse where there is a dense lower storey and is dominated by grasses and sedges in more open areas. The Salmon Gum quickly gives way to *Eucalyptus* mallee woodland on the slopes of the bordering hill. A wide but shallow creekline runs through this habitat and is a continuation of the major creekline on the western boundary of the project area running parallel to Floater Road.

  Salmon Gum can grow large enough single stems (>30 cm DBH) for hollows of suitable size to develop that would allow Carnaby's Black-Cockatoo nesting. This large tree is also a known food resource for Carnaby's (Groom 2011). One of the factors impacting on the viability of black-cockatoo populations is the distance to food and water from nesting sites (Saunders 1990; Saunders & Dawson 2017). This is an important factor to consider in landscapes with limited remnant vegetation. In this case, the Salmon Gum within the project area offers additional food resources and potentially a choice of nesting sites in the greater landscape.

- Creekline systems varied from relatively dense but narrow riparian habitat community of tall shrubs of *Melaleuca* sp. and *Dodonaea* sp. to 3 m and occasional tall *Melaleuca* sp. or *Eucalyptus* sp. trees to 15 m. This quickly opens to woodland over grasses and low shrubs on slopes. The western creekline flows south and is parallel to Floater Road (MTC03 and MTC04). It follows a shallow gully that is steep sided with dense shrubland covering the lower slopes. The shrubland quickly blends into mid and upper slope woodlands systems. Several hollows were recorded in some of the older trees located along this creekline. There

[3] A recent taxonomic change has elevated the Western Australian Quenda to full species (Travouillon & Phillips 2018).

were no signs of use and hollow entrances were estimated as being too small for Black-Cockatoo.

The continuation of this creek travels at the southern boundary of the project area through the Salmon Gum woodland (MTC09). A shallow ephemeral creek is located at the eastern area of the project site and flows south through open Mid Mallee woodland over grasses and low shrubs (MTC12). Another ephemeral creekline on the southern boundary of the waste dump located to the west of Floater Road travels through disturbed Mid Mallee woodland and drains into a small dam (MTC08).

Discussions are currently being undertaken to assess a proposal to divert the creekline around the proposed new pit (J. Hesford *pers. comm.*). The options for diversion include designs that would reintegrate a channel into the existing creek north and west of the Salmon Gum woodland.

- Roadside vegetation along the Old Newdegate Road of remnant low *E. myriadena* woodland heavily infested with introduced grasses (MTC14). The vegetation forms very narrow strips separating the road from adjoining cereal crop fields. Although in poor condition, these roadside verges can provide linkages for smaller bird species between stands of bushland.
- Open shrublands generally representing areas undergoing natural regeneration (MTC07). These are dispersed throughout the project area. These areas are sparsely treed and most individuals are regenerating tree species not exceeding 5 m in height. Shrubs are sparsely distributed in these areas with mixed *Acacia* sp., *Santalum* sp., and *Melaleuca* sp. as dominant species and sometimes occurring in small thickets. These habitats are also associated with drainage areas on hilltops and slope areas.
- Cleared areas including strategic firebreak and exploration tracks. As with the open shrublands these areas are sparsely vegetated. Exploration activities within the project area have added to these cleared areas although these have been kept clear to allow vehicle movements.

The project area reflects prolonged anthropogenic and natural disturbances, with all fauna habitats reflecting varying levels of disturbance. These disturbances include:

- logging, including selective and clear-felling, and firewood collection;
- historical and current mining activity;
- historical habitation;
- recreational use: evident from motorcycle tracks and the presence of non-mine vehicles during the survey;
- infrastructure developments including exploration tracks, logging tracks, “fire breaks” originally cleared for a power line;
- areas of regenerating Mallee woodland resulting from natural events (storms); and,
- incursions of introduced predators (cat and fox) and herbivores (rabbit).

Areas close to current exploration activity and in the south-eastern section of the project area are the most disturbed. The mixed woodlands at the top of hills are in very good condition with relatively intact understorey and ground litter cover. Woodlands on slopes are in relatively good condition. There is substantial regeneration of vegetation in most areas and this is relatively advanced. The tracks present in the area facilitate easy access for feral predators such as cat and fox which can have a major impact on native fauna.

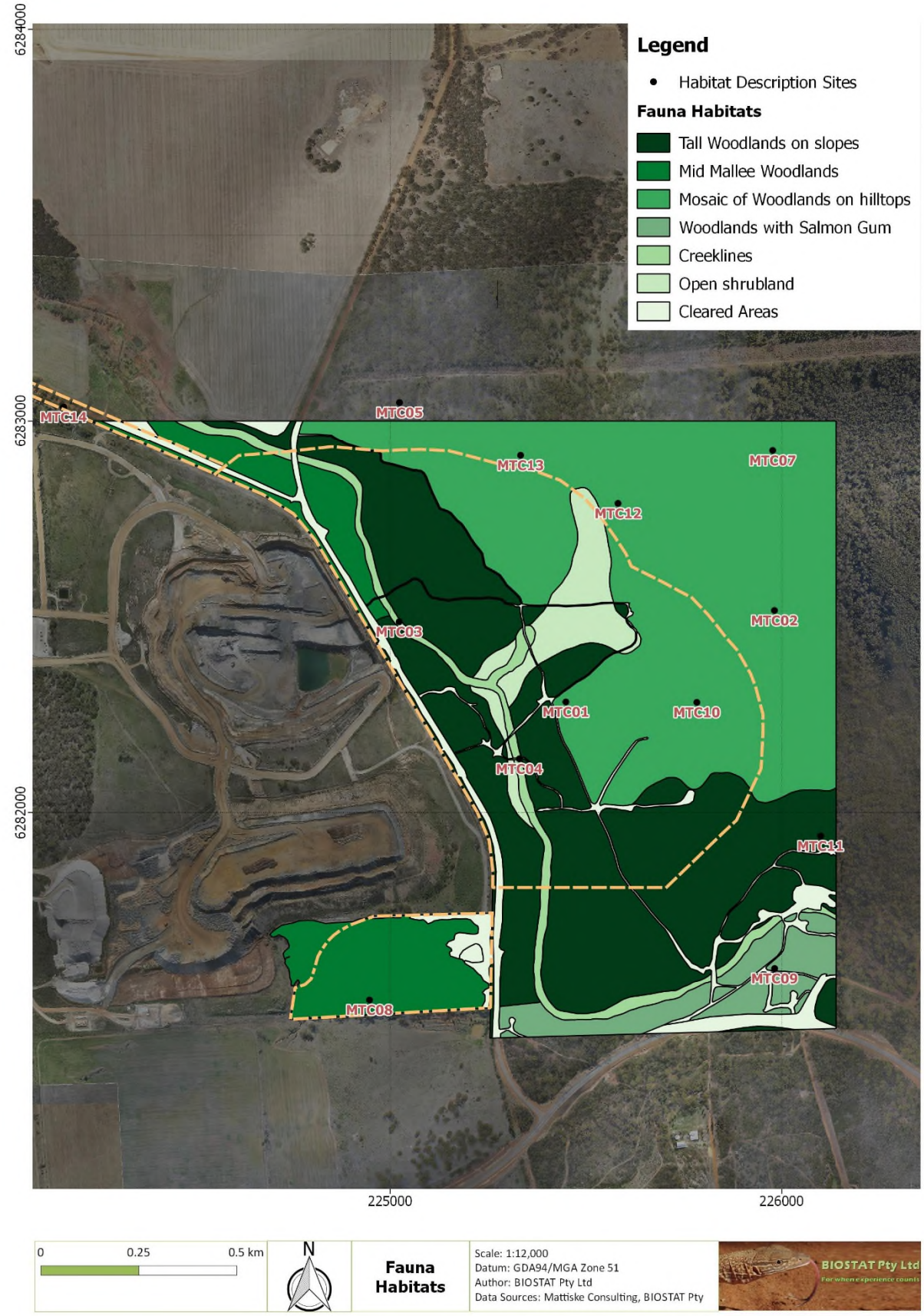

Figure 2. Fauna habitat identified in the project area.

Figure 3. Malleefowl nest recorded outside of project area.

7 TERRESTRIAL VERTEBRATE FAUNA SPECIES OF CONSERVATION SIGNIFICANCE

The data searches for the project area showed that 20 bird and 6 mammal species were identified as protected under State and Commonwealth legislation, with a further 2 bird, 3 mammal and 1 reptile species categorised as Priority Fauna by DBCA could potentially be present in the area. Table 1 includes those species of conservation significance that may occur in the area. Species such as the Malleefowl (*Leipoa ocellata*), Western Whipbird (*Psophodes nigrogularis oberon*), Heath Rat (*Pseudomys shortridgei*), and Western Mouse (*P. occidentalis*) are known to occur in areas within 35 km of the project area (Terrestrial Ecosystems 2015).

Likelihood	Description
Extremely Unlikely	no suitable habitat appears to be present;
Unlikely	preferred habitat does not appear to be present;
Low	has not been recorded in the general area in the recent past;
Moderate	has been recorded in the general area in the past and/or preferred habitat is present;
High	has been recorded near the area of interest and/or preferred habitat is present;
Seasonally high **moderate** **low**	a seasonal migrant or nomadic species that has a widespread distribution and little specific habitat requirements;
Recorded	Observed during the assessment.

These categories are necessarily broad given the lack of information specific to the area. In addition, the high mobility of many species of fauna, particularly migratory and nomadic birds, has required a combination of two or more categories.

Several threatened species have the potential to occur within the project area based on the presence of available habitats. However, it is necessary to update the assessment of habitats within the project area to consider any changes in conditions since the 2008 surveys. Some species are considered to be under-surveyed as described by State and Commonwealth recovery plans (e.g., Garnett, Szabo & Dutson 2011; Woinarski, Burbidge & Harrison 2014). These species include but are not limited to:

- Red-tailed Phascogale;
- Carnaby's Black-Cockatoo;
- Western Whipbird;
- Heath Rat;
- Western Mouse; and,
- Ravensthorpe Slider.

Table 1. Conservation significant vertebrate fauna species that could occur in the spodumene project expansion area.

Species	EPBC Act	WC Act	Notes	Potential Occurrence
Protected Species – Birds				
Pezoporus flaviventris **Western Ground Parrot**	Critically Endangered	S1	This is a geographically highly restricted species. Historically it was known from inland areas but has been extirpated from the Ravensthorpe area resulting from habitat loss and the introduced predators and herbivores.	Extremely Unlikely
Calyptorhynchus latirostris **Carnaby's Black-Cockatoo**	Endangered	S2	Carnaby's Black-Cockatoo has suffered a decline in distribution and population due to a reduction in available habitat. The availability of trees with suitable nesting hollows is of critical concern for these species. Nesting is most likely to occur in stands of tall mature trees with DBH > 30cm such as Salmon Gum. Foraging is likely to occur in all the native vegetation habitats present in the area and especially those that contain eucalypts and *Allocasuarina* stands. These trees, even when isolated in cleared areas, may be used for foraging by these large cockatoos. There are no records of Black-Cockatoo for the project area but there is the one confirmed sighting from the outskirts of Ravensthorpe township in 2016 (ALA Source Data ID bdfb58e7-40d0-41b5-8274-be6170941622, Ravensthorpe Caravan Park). The only suitable nesting habitat identified for this species was the Salmon Gum woodland at the southern edge of the project area. No suitable hollows were identified in this habitat during the reconnaissance survey but the Salmon Gum is a listed important feed and nesting tree species (Groom 2011). The Salmon Gum habitat is outside the proposed disturbance area. The quality of habitats within the project area is generally good due to the presence of feed species and roosting trees.	Likely
Leipoa ocellata **Malleefowl**	Vulnerable Migratory	S3	Malleefowl distributions have been generally restricted to the lower rainfall areas (<600mm isohyet) and are predominantly absent from the higher rainfall areas (Saunders & Ingram 1995). This species is generally wide ranging and establish large territories. They prefer shrublands with or without Mallee and in deep sand habitats. The species is known from the area with records within 30km of the project area (Terrestrial Ecosystems 2015). A recently constructed nest mound was located during the fauna assessment. The crispness of the construction and the minimal decomposition of the nest litter would suggest the mound is less than 3 years old. The size and viability of the population in the broader area is unknown.	High Recorded

Species	EPBC Act	WC Act	Notes	Potential Occurrence
Dasyornis longirostris **Western Bristlebird**	Endangered	S3	Another geographically highly restricted species associated with coastal heaths. There is no suitable habitat within the project area and it is unlikely to occur.	Extremely Unlikely
Numenius madagascariensis **Eastern Curlew**	Endangered	S3 S5	The Eastern Curlew tends to be found in coastal mudflats and wetlands, although, it does utilise inland waterbodies and wetland systems as roosts during their migration. However, this is a transient species and unlikely to be resident and its use of habitats would be regarded as opportunistic.	Seasonally Low Unlikely
Protected Species – Migratory Birds				
Ardea ibis **Cattle Egret**	Migratory JAMBA CAMBA	S5	The Cattle Egret has a sporadic distribution in the more arid areas of Australia and is more likely to be recorded around the better-watered areas of the State. It prefers damp grasslands and pastures and is often associated with cattle. It is most likely to be recorded in the cleared pastures surrounding the project area. There are dams and water collection points within the current project area and associated broader landscapes. Therefore, there is a Low to Medium likelihood that this species may be present as a transient.	Low to Medium
Ardea modesta **Eastern Great Egret**	Migratory JAMBA CAMBA		This bird is more commonly associated with northern Australia, although there has been an increased number recorded in the South-west (Barrett et al. 2003). It usually occurs in shallow waters, both fresh and salt, including estuaries. There are dams and water collection points within the current project area and associated broader landscapes. Therefore, there is a Low likelihood that this species may be present as a transient.	Low
Egretta sacra **Eastern Reef Egret**	Migratory JAMBA CAMBA		This bird is more commonly associated with northern Australia, although there has been an increased number recorded in the South-west (Barrett et al. 2003). It usually occurs in shallow waters, both fresh and salt, including estuaries. There are dams and water collection points within the current project area and associated broader landscapes. Therefore, there is a Low likelihood that this species may be present as a transient.	Low
Actitis hypoleucos **Common Sandpiper**	Migratory JAMBA CAMBA ROKAMBA		These waders are seasonal migrants to coastal wet areas of Western Australia. They can occur inland after heavy rains at ephemeral lakes and other water bodies. They are regarded as a transient utilising any suitable habitats (i.e., water bodies or riparian habitats) opportunistically. There is no suitable mudflat habitat for this species in the project area although individuals may be found along creek zone vegetation on occasion.	Seasonally Low Unlikely
Calidris acuminata **Sharp-tailed Sandpiper**	Migratory JAMBA CAMBA ROKAMBA			
Calidris ferruginea **Curlew Sandpiper**	Migratory JAMBA CAMBA ROKAMBA			

Species	EPBC Act	WC Act	Notes	Potential Occurrence
Calidris melanotos **Pectoral Sandpiper**	Migratory JAMBA ROKAMBA			
Merops ornatus **Rainbow Bee-eater**	Migratory		The Rainbow Bee-eater is a Spring/Summer migrant to southern Australia, but may be resident in the north. It prefers lightly wooded country near water and preferably with sandy soils suitable for its breeding burrows, i.e. soils that are easy to excavate, but firm enough to support burrows. It is likely to occur in the project area especially in vegetated creek zones but nesting burrows may also be found in cleared areas where the soil is suitable. It was recorded during the Level 2 survey (10 individuals) in 2008 (Keith Lindbeck and Associates 2008) and during the reconnaissance survey (4 individuals recorded).	Seasonally High Recorded
Apus pacificus **Fork-tailed Swift**	Migratory JAMBA CAMBA ROKAMBA		While spending the summer and most of the autumn in Australia, Fork-tailed Swifts are almost entirely aerial. They feed and sleep on the wing, sometimes occurring in extremely large flocks of up to 2,000 individuals. They are likely to be recorded flying over the project area especially during the onset of summer storms.	Seasonally High
Pandion cristatus **Eastern Osprey**	Bonn		Listed under the Bonn Treaty. This species is relatively common on the coastal fringes around Australia. It is also known from large Inland permanent waterbodies. It may be recorded as a transient within the project area but is unlikely to utilise the habitats within it except for temporary roosting.	Unlikely to Low
Haliaeetus leucogaster **White-bellied Sea-Eagle**	Migratory CAMBA		The White-bellied Sea-Eagle is a wide-ranging species that feeds on both aquatic and terrestrial prey species. It has a large home range and is often sighted in coastal and near-coastal regions. Although it could be recorded in the local area, it is not specifically associated with the habitats found in the project area. This species is not considered threatened in Australia but falls within the EPBC Act, primarily resulting from its nomination in the CAMBA international agreement.	Unlikely
Ninox novaeseelandiae **Southern Boobook**	JAMBA	Not listed under Act	This species is included in this list due to its nomination in JAMBA agreement. It is not classed as being a species of conservation significance under any other category. It is common to most woodland and treed urban environments. It is likely to occur in the project area.	High
Protected Species – Other Specially Protected Bird Species				
Falco peregrinus **Peregrine Falcon**	S7	As with all raptors, this species will range over a wide variety of habitat. It will breed in areas containing tall structures such as tall trees, cliffs or radio communication towers. This species is not specifically associated with the habitats identified in the project area and would not be impacted by clearing in this area.		Moderate to High

Species	DBCA Priority Listing	Notes	Potential Occurrence
Protected Species – Priority Bird Species			
Psophodes nigrogularis oberon **Western Whipbird**	4	This species is known from the local area within 30km of the project area (Terrestrial Ecosystems 2015). It prefers mallee woodlands with relatively dense undergrowth. They are highly territorial and faithful to that territory (Smith 1991). Limited suitable habitat exists in the project area, primarily in areas with dense undergrowth along the major creekline, and dispersing individuals may establish territories within the project area.	Low to Moderate
Oxyura australis **Blue-billed Duck**	4	There has been a pronounced population decline of this species across Australia which accounts for its priority status (Garnett, Szabo & Dutson 2011). This species is found around permanent large waterbodies which are not present in the project area.	Extremely Unlikely

Species	EPBC Act	WC Act	Notes	Potential Occurrence
Protected Species – Mammals				
Pseudantechinus apicalis **Dibbler**	Endangered	S2	A geographically highly restricted small carnivorous marsupial, the Dibbler is currently only known from a limited number of south coast National Parks, Conservation Reserves, and offshore islands. There have been attempts at reintroduction on offshore islands with varying success (Woinarski, Burbidge & Harrison 2014). They prefer long-unburnt heath communities. There is marginal habitat for this species within the project area.	Extremely Unlikely
Myrmecobius fasciatus **Numbat**	Endangered	S2	The Numbat has suffered a high degree of displacement and reduction in population numbers through loss of habitat and the introduction of predators (Woinarski, Burbidge & Harrison 2014). Although it has a historical distribution through the Ravensthorpe district it has been considered locally extinct since the commencement of land clearing and the incursion of fox and cat into these areas.	Extremely Unlikely
Dasyurus geoffroii **Chuditch**	Vulnerable	S3	This species had a much greater pre-European settlement distribution across Western Australia. The Chuditch suffered a sharp decline with the clearing of habitat and the introduction of herbivores and predators. The Chuditch requires denning hollows either on the ground or in tree hollows. The likelihood of this species in the area is limited due to the lack of suitably large areas of habitat. It is unlikely that this species has persisted except in the very large areas of remnant forests and woodlands in conservation areas.	Unlikely
Pseudomys shortridgei **Heath Rat**	Vulnerable	S3	The Heath Rat is restricted to a small number of known populations within the region containing the project area. As with many Australian rodents it is an eruptive species whose populations can expand dramatically during periods of high resource availability. It is during these "boom" periods that this species can be found in a greater diversity of habitats. There is suitable habitat for this species within the remnants including those in the project area.	Low (Eruptive species)

Species	EPBC Act	WC Act	Notes	Potential Occurrence
Protected Species – Mammals				
			However, no records of this species are known from the project area but are known from areas within 35 km (Terrestrial Ecosystems 2015).	
Phascogale calura **Red-tailed Phascogale**	Vulnerable	S6	This species has suffered a substantial decline since the arrival of Europeans onto the Australian continent. They show a preference for older growth *Eucalyptus* woodlands especially those in association with *Allocasuarina huegeliana* but is also known from shrublands and mosaics of shrublands/woodlands/heath (Woinarski, Burbidge & Harrison 2014). This is a cryptic species that is considered under-surveyed making it difficult to ascertain population sizes and distributions. There is marginal and limited habitat for this species in the project area.	Unlikely to Low

Species	DBCA Priority Listing	Notes	Potential Occurrence
Protected Species – Priority Mammal Species			
Notamacropus irma **Western Brush Wallaby**	4	This species is relatively common in forest and woodland habitats in the region. It is often associated with areas of denser vegetation including heaths and swamps. It is also regarded as resilient and able to adapt to limited impacts. It has been recorded in the project area during previous surveys.	High
Nyctophilus major tor **Central Long-eared Bat**	4	This species is relatively recent after a major review of the *Nyctophilus timoriensis* complex in 2009 (Parnaby 2009). It is limited to the south west of WA and extends to the Eyre Peninsula in South Australia. The taxonomic uncertainty over this species has limited the understanding of the population biology and its distribution. It is known to inhabit woodland systems but will utilise other habitats where suitable roosting opportunities exist. Suitable habitat exists for this species in the project area. The impact on this species is likely to be relatively low due to their ability to disperse widely.	Moderate to High
Pseudomys occidentalis **Western Mouse**	4	The Western Mouse is another rodent species known only from a very small number of sites in a much-reduced distribution range. The factors considered to have impacted most on this species include loss of habitats, introduced predators and climate change which is altering remaining habitats (Woinarski, Burbidge & Harrison 2014). This species utilises a variety of habitats in long-unburnt areas with dense understoreys. As with the Heath Rat, this species can quickly build up populations and radiate quickly into new habitats. There are no records of this species from the project area itself but are known from areas within 35 km (Terrestrial Ecosystems 2015).	Low (Eruptive species)
Isoodon fusciventer **Southern Brown Bandicoot (Quenda)**	5	The Southern Brown Bandicoot prefers more mesic (wetland, riparian or heath) habitats but will also be found in eucalypt forests and woodlands. A trapping survey carried out in 2008 did not encounter Quenda or report any signs of this species (Keith Lindbeck and Associates 2008). Suitable habitat for this species exists in the	Low to Moderate

Species	DBCA Priority Listing	Notes	Potential Occurrence
		project area but no signs of this species were recorded during the brief reconnaissance survey.	

Species	DBCA Priority Listing	Notes	Potential Occurrence
Protected Species – Reptiles			
Lerista viduata **Ravensthorpe Range Slider**	1	This small, cryptic skink was originally only known from the Ravensthorpe Range where it has been found in litter at the base of trees and shrubs on loam and clay loam soils. Subsequent surveys have expanded the distribution of this species to the Kundip area as well as recorded further individuals in the Ravensthorpe Range area to the north-east of the project area. Suitable habitat is found in the project area in most woodland habitats. The previous trapping survey carried out on the one occasion in 2008 failed to record this species but due to its cryptic nature, a single survey event is unlikely to be sufficient to determine its presence.	Moderate

8 CONCLUSIONS

This assessment has been based on information collated from investigations and surveys carried out in April (Level 1) and October (Level 2) 2008, and December (Level 1) 2017. Information obtained from Level 1 surveys are acceptable for broad overviews of ecosystems. Level 2 surveys can provide much greater detail, particularly if undertaken over multiple seasons. The 2008 Level 2 survey was conducted in spring which resulted in a significant but limited amount of information on the fauna assemblages for that area. The current reconnaissance survey provided further insight into the quality of habitats present in the area and allowed for up-dates of available data from the region.

The project area is a mosaic of mallee form woodlands of diverse *Eucalyptus* species over variable shrub and ground cover on the slopes and crests. A Salmon Gum woodland is located on the southern boundary valley floor at the base of the hill. A major ephemeral creekline and other drainage lines run through the project area.

Within the greater landscape, the project area forms part of a remnant "green belt" sitting between Overshot Hill Nature Reserve to the north-west, Ravensthorpe Range to the north-east and east and remnant vegetation south of Ravensthorpe. This "green belt" is contained within a bioregion that has had just under 50% of native vegetation cleared for agricultural purposes. The project area is located within a predominantly agricultural landscape but is located between the relatively intact Ravensthorpe Range and Overshot Hill Nature Reserve both of which are known for high ecological and biodiversity values (Majer, Harris & Williams 2008). The few remnants that exist within these landscapes have the potential to act as movement corridors linking larger remnants and providing some level of ecological continuity.

The project area to the east of Floater Road incorporates a 250 m buffer around the proposed pit. This will, to some degree, provide protection to the remaining habitats. Areas to the north and east of the buffer would still represent valuable remnant habitats in a broader landscape that has largely been denuded of native vegetation for agricultural purposes. Due to the small size of the area under consideration for clearing, the potential impact on any of the threatened species that may occur in the area is limited.

The conclusions from the review of available data and the reconnaissance survey are:

- There are no records of any Black-Cockatoo species within the project area although Carnaby's Black-cockatoos are known from surrounding areas. The threatening processes acting on this species result from accumulated loss of feeding and breeding habitat. The suitable nesting habitat existing near the project area, the Salmon Gum Woodland, is limited and most exists outside of the proposed buffer zone.
- The major creek line at the western edge of the project area drains south before turning east and flowing into the Salmon Gum Woodland. Various options for diversion of this creekline around the proposed mine pit are currently under discussion. Most of the options indicate that the artificial channel will reintegrate with the natural creekline to the north and west of the Salmon Gum woodland. As no decision had been made at the time of this report, the conclusion is that any impact on downstream habitats will be dependent upon maintenance of water flow within natural parameters.
- A Malleefowl nest was located outside the project area. Being of relatively new construction (less than 3 years), it is likely that a remnant population of Malleefowl persists in the area.
- There is adequate habitat for the small skink *Lerista viduata* throughout the project area.

The development can be managed through careful planning that:

- minimises clearing of vegetation;
- ensures integrity of existing surface hydrology to minimise downstream impacts;
- establishes strict environmental management practices to avoid disturbance beyond the disturbance boundary assessed in this report;
- consideration be given to a pre-clearing assessment of the presence of Malleefowl and recently constructed nesting mounds to ensure there is no disturbance to current breeding activity;
- the mine induction program should include information regarding the Malleefowl, including visual aids to identify the bird, plus the nesting mound. A simple reporting procedure is established to ensure any future sightings of birds, or indications of breeding, are known to mine managers and DBCA;
- consideration is given to a brief but intensive hand-foraging search to be undertaken by experienced herpetologists in late autumn/early winter to establish whether the small and cryptic Ravensthorpe Range Slider, *Lerista viduata*, occurs in conservation lands within the Ravensthorpe area. If located within conservation lands, the information gained may lead to a revision of the status of this skink; and,
- considers the retention of areas of remnant vegetation for conservation reserve and permanent buffers surrounding the mine.

9 ACKNOWLEDGEMENTS

Ninox Wildlife Consulting would like to thank the efforts of Galaxy Lithium Australia and Colin Woolard for their assistance in preparing for the reconnaissance survey.

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APPENDIX 1. SPECIES LIST FOR PROJECT AREA.

The conservation categories covered by the EPBC Act 1999 (S.179: EPBC Act 1999) are:

- extinct (EX);
- extinct in the wild (EW);
- critically endangered (CR);
- endangered (EN);
- vulnerable (VU); and
- conservation dependent (CD).

There is also a Migratory (M) category that covers species listed under international agreements.
Conservation categories under the Wildlife Conservation Act 1950 (WC Act 1950) are (EPBC equivalents are shown in parentheses):

- Schedule 1 (S1) = CR;
- Schedule 2 (S2) = EN;
- Schedule 3 (S3) = VU;
- Schedule 4 (S4) = EX;
- Schedule 5 (S5) = M;
- Schedule 6 (SP1) = no equivalent;
- Schedule 7 (SP2) = no equivalent.

DBCA Priority Fauna List which classifies species as[4]:

- Priority 1 - Poorly-known taxa with few, poorly known populations on threatened lands.
- Priority 2 - Poorly-known taxa with few, poorly known populations on conservation lands.
- Priority 3 - Poorly-known taxa with several, poorly known populations, some on conservation lands.
- Priority 4 - Rare, Near Threatened and other taxa in need of monitoring.
- Priority 5 - Conservation Dependent taxa

Recorded refers to species recorded during the Reconnaissance Survey and previous Level 1 and Level 2 surveys

[4] Definitions can be found (http://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Conservation_code_definitions_18092013.pdf)

BIRDS

		WA	EPBC	Introduced	JAMBA	CAMBA	ROKAMBA	Notes	Recorded
CASUARIIDAE									
Dromaius novaehollandiae	Emu								
MEGAPODIIDAE									
Leipoa ocellata	Malleefowl	S3	VU						X
PHASIANIDAE									
Coturnix pectoralis	Stubble Quail								
ANATIDAE									
Biziura lobata	Musk Duck								
Stictonetta naevosa	Freckled Duck								
Oxyura australis	Blue-billed Duck	P4							
Cygnus atratus	Black Swan								
Tadorna tadornoides	Australian Shelduck								
Chenonetta jubata	Australian Wood Duck								
Malacorhynchus membranaceus	Pink-eared Duck								
Anas rhynchotis	Australasian Shoveler								
Anas gracilis	Grey Teal								
Anas castanea	Chestnut Teal								X
Anas superciliosa	Pacific Black Duck								
Aythya australis	Hardhead								
PODICIPEDIDAE									
Tachybaptus novaehollandiae	Australasian Grebe								
Poliocephalus poliocephalus	Hoary-headed Grebe								
Podiceps cristatus	Great Crested Grebe								
COLUMBIDAE									
Columba livia	Rock Dove			X					
Streptopelia senegalensis	Laughing Turtle-Dove			X					X
Phaps chalcoptera	Common Bronzewing								
Phaps elegans	Brush Bronzewing								X
Ocyphaps lophotes	Crested Pigeon								X
PODARGIDAE									

		WA	EPBC	Introduced	JAMBA	CAMBA	ROKAMBA	Notes	Recorded
Podargus strigoides	Tawny Frogmouth								
EUROSTOPODIDAE									
Eurostopodus argus	Spotted Nightjar								
AEGOTHELIDAE									
Aegotheles cristatus	Australian Owlet-nightjar								
APODIDAE									
Apus pacificus	Fork-tailed Swift	S5	M		X	X	X		
PHALACROCORACIDAE									
Phalacrocorax melanoleucos	Little Pied Cormorant							May occur as vagrants in dams, riparian systems and wetlands but these are more likely to be found in coastal and marine habitats.	
Phalacrocorax carbo	Great Cormorant								
Phalacrocorax sulcirostris	Little Black Cormorant								
Phalacrocorax varius	Pied Cormorant								
Phalacrocorax fuscescens	Black-faced Cormorant								
PELECANIDAE									
Pelecanus conspicillatus	Australian Pelican								
ARDEIDAE									
Botaurus poiciloptilus	Australasian Bittern	S2	EN						
Ardea modesta	Eastern Great Egret	S5	M		X	X			
Egretta sacra	Eastern Reef Egret		M			X			
Ardea pacifica	White-necked Heron								
Ardea ibis	Cattle Egret	S5	M		X	X			
Egretta novaehollandiae	White-faced Heron								
THRESKIORNITHIDAE									
Threskiornis molucca	Australian White Ibis								
Platalea flavipes	Yellow-billed Spoonbill								
ACCIPITRIDAE									
Pandion cristatus	Eastern Osprey	S5	M					Mostly associated with marine, riparian or wetland systems. These species have very large home ranges but are unlikely residents within the search area.	
Haliaeetus leucogaster	White-bellied Sea-Eagle	S5				X			
Elanus axillaris	Black-shouldered Kite								X
Lophoictinia isura	Square-tailed Kite								

		WA	EPBC	Introduced	JAMBA	CAMBA	ROKAMBA	Notes	Recorded
Haliastur sphenurus	Whistling Kite								
Accipiter cirrocephalus	Collared Sparrowhawk								
Accipiter fasciatus	Brown Goshawk								
Circus assimilis	Spotted Harrier								
Circus approximans	Swamp Harrier								
Aquila audax	Wedge-tailed Eagle								
Hieraaetus morphnoides	Little Eagle								
FALCONIDAE									
Falco cenchroides	Nankeen Kestrel								
Falco berigora	Brown Falcon								
Falco longipennis	Australian Hobby								
Falco peregrinus	Peregrine Falcon	S7							
RALLIDAE									
Porzana tabuensis	Spotless Crake								
Tribonyx ventralis	Black-tailed Native-hen								
Fulica atra	Eurasian Coot								
OTIDIDAE									
Ardeotis australis	Australian Bustard								
CHARADRIIDAE									
Vanellus tricolor	Banded Lapwing								
Elseyornis melanops	Black-fronted Dotterel								
SCOLOPACIDAE									
Numenius madagascariensis	Eastern Curlew	S3 S5	EN		X	X	X	May occur as vagrants in dams, riparian systems, and wetlands but these are more likely to be found in coastal and mudflat habitats.	
Actitis hypoleucos	Common Sandpiper	S5	M		X	X	X		
Calidris melanotos	Pectoral Sandpiper	S5	M		X		X		
Calidris acuminata	Sharp-tailed Sandpiper	S5	M		X	X	X		
Calidris ferruginea	Curlew Sandpiper	S3 S5	CE		X	X	X		
TURNICIDAE									
Turnix varius	Painted Button-quail								
CACATUIDAE									
Calyptorhynchus latirostris	Carnaby's Black-Cockatoo	S2	EN						

		WA	EPBC	Introduced	JAMBA	CAMBA	ROKAMBA	Notes	Recorded
Eolophus roseicapillus	Galah								X
Nymphicus hollandicus	Cockatiel								
PSITTACIDAE									
Glossopsitta porphyrocephala	Purple-crowned Lorikeet								X
Polytelis anthopeplus	Regent Parrot								
Barnardius zonarius	Australian Ringneck								X
Purpureicephalus spurius	Red-capped Parrot								
Melopsittacus undulatus	Budgerigar								
Neophema elegans	Elegant Parrot								
Pezoporus flaviventris	Western Ground Parrot	S1	CR						
CUCULIDAE									
Chalcites basalis	Horsfield's Bronze-Cuckoo								
Chalcites lucidus	Shining Bronze-Cuckoo								
Chalcites osculans	Black-eared Cuckoo								
Cuculus pallidus	Pallid Cuckoo								
Cacomantis flabelliformis	Fan-tailed Cuckoo								X
STRIGIDAE									
Ninox novaeseelandiae	Southern Boobook		M		X			Listed as marine under the EPBC but not considered as a matter of environmental significance.	X
TYTONIDAE									
Tyto javanica	Eastern Barn Owl								
HALCYONIDAE									
Dacelo novaeguineae	Laughing Kookaburra			X					X
Todirhamphus sanctus	Sacred Kingfisher								
MEROPIDAE									
Merops ornatus	Rainbow Bee-eater	S5	M						X
MALURIDAE									
Malurus splendens	Splendid Fairy-wren								X
Malurus pulcherrimus	Blue-breasted Fairy-wren								
Stipiturus malachurus westernensis	Southern Emu-wren								
DASYORNITHIDAE									
Dasyornis longirostris	Western Bristlebird	S3	VU						

		WA	EPBC	Introduced	JAMBA	CAMBA	ROKAMBA	Notes	Recorded
ACANTHIZIDAE									
Pyrrholaemus brunneus	Redthroat								
Gerygone fusca	Western Gerygone								X
Sericornis frontalis	White-browed Scrubwren								X
Hylacola cauta	Shy Heathwren								
Calamanthus campestris montanellus	Rufous Fieldwren								
Smicrornis brevirostris	Weebill								X
Acanthiza chrysorrhoa	Yellow-rumped Thornbill								
Acanthiza uropygialis	Chestnut-rumped Thornbill								
Acanthiza inornata	Western Thornbill								
Acanthiza apicalis	Inland Thornbill								X
PARDALOTIDAE									
Pardalotus punctatus	Spotted Pardalote								
Pardalotus striatus	Striated Pardalote								X
MELIPHAGIDAE									
Lichenostomus virescens	Singing Honeyeater								X
Lichenostomus leucotis	White-eared Honeyeater								
Lichenostomus cratitius	Purple-gaped Honeyeater								
Lichenostomus ornatus	Yellow-plumed Honeyeater								X
Purnella albifrons	White-fronted Honeyeater								X
Manorina flavigula	Yellow-throated Miner								X
Acanthagenys rufogularis	Spiny-cheeked Honeyeater								
Anthochaera lunalata	Western Little Wattlebird								
Anthochaera carunculata	Red Wattlebird								X
Ephthianura albifrons	White-fronted Chat								
Sugomel niger	Black Honeyeater								
Glyciphila melanops	Tawny-crowned Honeyeater								X
Lichmera indistincta	Brown Honeyeater								X
Phylidonyris novaehollandiae	New Holland Honeyeater								X
Phylidonyris niger	White-cheeked Honeyeater								
Melithreptus brevirostris	Brown-headed Honeyeater								X

		WA	EPBC	Introduced	JAMBA	CAMBA	ROKAMBA	Notes	Recorded
Melithreptus chloropsis	Western White-naped Honeyeater								X
EUPETIDAE									
Psophodes nigrogularis oberon	Western Whipbird	P4							
POMATOSTOMIDAE									
Pomatostomus superciliosus	White-browed Babbler								X
NEOSITTIDAE									
Daphoenositta chrysoptera	Varied Sittella								X
CAMPEPHAGIDAE									
Coracina novaehollandiae	Black-faced Cuckoo-shrike								
Lalage sueurii	White-winged Triller								
PACHYCEPHALIDAE									
Falcunculus frontatus leucogaster	Crested Shrike-tit (SW ssp)								
Pachycephala inornata	Gilbert's Whistler								
Pachycephala pectoralis	Golden Whistler								X
Pachycephala rufiventris	Rufous Whistler								X
Colluricincla harmonica	Grey Shrike-thrush								X
Oreoica gutturalis gutturalis	Crested Bellbird								
ARTAMIDAE									
Artamus cinereus	Black-faced Woodswallow								X
Artamus cyanopterus	Dusky Woodswallow								
Cracticus torquatus	Grey Butcherbird								X
Cracticus nigrogularis	Pied Butcherbird								
Gymnorhina tibicen	Australian Magpie								X
Strepera versicolor	Grey Currawong								X
RHIPIDURIDAE									
Rhipidura albiscapa	Grey Fantail								X
Rhipidura leucophrys	Willie Wagtail								X
CORVIDAE									
Corvus coronoides	Australian Raven								X
Corvus bennetti	Little Crow								
MONARCHIDAE									

		WA	EPBC	Introduced	JAMBA	CAMBA	ROKAMBA	Notes	Recorded
Myiagra inquieta	Restless Flycatcher								X
Grallina cyanoleuca	Magpie-lark								X
PETROICIDAE									
Petroica boodang campbelli	Scarlet Robin								X
Petroica goodenovii	Red-capped Robin								
Melanodryas cucullata	Hooded Robin								
Eopsaltria griseogularis	Western Yellow Robin								
Drymodes brunneopygia	Southern Scrub-robin								
MEGALURIDAE									
Cinclorhamphus mathewsi	Rufous Songlark								
Cinclorhamphus cruralis	Brown Songlark								
TIMALIIDAE									
Zosterops lateralis	Silvereye								
HIRUNDINIDAE									
Hirundo neoxena	Welcome Swallow								X
Petrochelidon nigricans	Tree Martin								X
Petrocheilidon ariel	Fairy Martin								
ESTRILDIDAE									
Stagonopleura oculata	Red-eared Firetail								
MOTACILLIDAE									
Anthus novaeseelandiae	Australian Pipit								
Motacilla cinerea	Grey Wagtail	S5	M		X	X	X		

MAMMALS

		WA	EPBC	Introduced	Notes	Recorded
TACHYGLOSSIDAE						
Tachyglossus aculeatus acanthion	Echidna					X
DASYURIDAE						
Dasyurus geoffroii fortis	Chuditch	S3	VU			
Pseudantechinus apicalis	Dibbler	S2	EN			
Phascogale calura	Red-tailed Phascogale	S6	VU			

		WA	EPBC	Introduced	Notes	Recorded
Sminthopsis crassicaudata crassicaudata	Fat-tailed Dunnart					
Sminthopsis fuliginosus fuliginosus	Grey-bellied Dunnart					
MYRMECOBIIDAE						
Myrmecobius fasciatus rufus	Numbat	S2	VU			
PERAMELIDAE						
Isoodon fusciventer	Quenda	P4	EN			
BURRAMYIDAE						
Cercartetus concinnus	Western Pygmy-possum					X
TARSIPEDIDAE						
Tarsipes rostratus	Honey Possum					
MACROPODIDAE						
Macropus fuliginosus melanops	Western Grey Kangaroo					X
Notamacropus irma	Western Brush Wallaby	P4				
MURIDAE						
Pseudomys albocinereus	Ash-grey Mouse					
Pseudomys occidentalis	Western Mouse	P4				
Pseudomys shortridgei	Heath Rat	S3	VU			
Mus musculus	House Mouse			X		
Rattus fuscipes	Bush Rat					
LEPORIDAE						
Oryctolagus cuniculus	Rabbit			X		X
MOLOSSIDAE						
Austronomus australis	White-striped Free-tailed Bat					
VESPERTILIONIDAE						
Nyctophilus geoffroyi	Lesser Long-eared Bat					
Nyctophilus major tor	Central Long-eared Bat	P4				
Chalinolobus gouldii	Gould's Wattled Bat					
Chalinolobus morio	Chocolate Wattled Bat					
Vespadelus regulus	Southern Forest Bat					
FELIDAE						
Felix catus	Cat			X		X
CANIDAE						
Canis familiaris	Wild/Domestic Dog			X		
Canis lupus dingo	Dingo				The likelihood of pure-bred dingo is very low due to the introduction of wild/domestic dog into the area.	

		WA	EPBC	Introduced	Notes	Recorded
Vulpes vulpes	Fox					X
BOVIDAE						
Ovis aries	Sheep			X		

HERPETOFAUNA

		WA	Recorded
HYLIDAE - Tree Frogs			
Litoria adelaidensis	Slender Tree Frog		
Litoria cyclorhynchus	Spotted-thighed Frog		X
LYMNODYNASTIDAE - Burrowing Frogs			
Limnodynastes dorsalis	Western Banjo Frog		X
Neobatrachus albipes	White-footed Frog		
Neobatrachus kunapalari	Wheatbelt Frog		
MYOBATRACHIDAE - Froglets			
Crinia pseudinsignifera	Bleating Froglet		
Pseudophryne guentheri	Gunther's Toadlet		
Pseudophryne occidentalis	Western Toadlet		
CARPHODACTYLIDAE - Leaf and Knob-tailed Geckos			
Underwoodisaurus milii	Barking Gecko		X
DIPLODACTYLIDAE - Diplodactylid Geckos			
Crenadactylus ocellatus	South-west Clawless Gecko		X
Diplodactylus calcicolus	South Coast Gecko		X
Strophurus spinigerus inornatus	Soft Spiny-tailed Gecko		
GEKKONIDAE - Cosmopolitan Geckos			
Christinus marmoratus	Marbled Gecko		X
PYGOPODIDAE - Legless Lizards			
Aprasia striolata	Lined Worm-lizard		
Delma fraseri	Fraser's Delma		X
Pygopus lepidopodus	Common Scaly-foot		
SCINCIDAE - Skinks			
Acritoscincus trilineatus	Western Three-lined Skink		
Cryptoblepharus pulcher clarus	Bright Snake-eyed Skink		
Hemiergis initialis brookeri	Western Earless Skink (brookeri)		
Hemiergis initialis initialis	Western Earless Skink (initialis)		

		WA	Recorded
Hemiergis peronii peronii	Peron's Earless skink		X
Lerista distinguenda	South-western Four-toed Slider		X
Lerista viduata	Ravensthorpe Range Slider	P1	
Menetia greyii	Common Dwarf Skink		X
Morethia obscura	Shrubland Pale-flecked Morethia		X
Tiliqua rugosa rugosa	Shingleback		X
AGAMIDAE - Dragons			
Ctenophorus maculatus griseus	Spotted Military Dragon		
VARANIDAE - Goannas			
Varanus rosenbergi	Heath Monitor		X
TYPHLOPIDAE - Blind Snakes			
Anilios australis	Southern Blind Snake		
Anilios bituberculatus	Prong-snouted Blind Snake		
ELAPIDAE - Front-fanged Snakes			
Parasuta gouldii	Gould's Hooded Snake		
Pseudonaja affinis	Dugite		

APPENDIX 2. PROTECTED MATTERS SEARCH TOOL REPORT

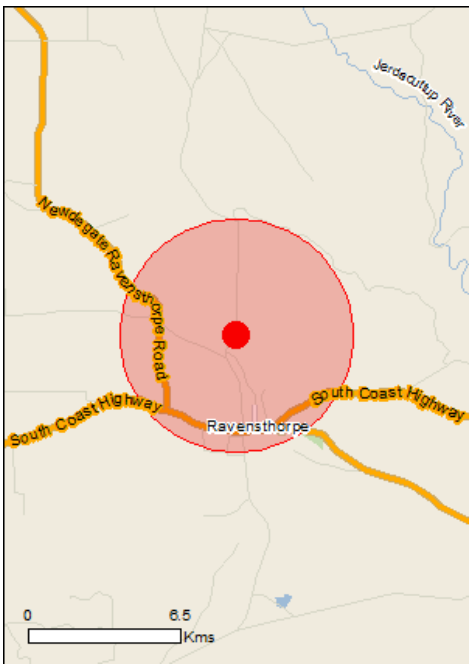
EPBC Act Protected Matters Report

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

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

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

Report created: 17/10/17 16:23:35



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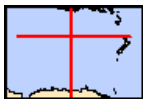


Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	21
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	12
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	12
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

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

Name	Status	Type of Presence
Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia	Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding likely to occur within area
Dasyornis longirostris Western Bristlebird [515]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pezoporus flaviventris Western Ground Parrot, Kyloring [84650]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
Parantechinus apicalis Dibbler [313]	Endangered	Species or species habitat likely to occur within area
Phascogale calura Red-tailed Phascogale, Red-tailed Wambenger, Kenngoor [316]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Pseudomys shortridgei Heath Mouse, Dayang, Heath Rat [77]	Endangered	Species or species habitat may occur within area
Plants		
Acacia rhamphophylla Kundip Wattle [64659]	Endangered	Species or species habitat may occur within area
Anigozanthos bicolor subsp. minor Little Kangaroo Paw, Two-coloured Kangaroo Paw, Small Two-colour Kangaroo Paw [21241]	Endangered	Species or species habitat likely to occur within area
Darwinia oxylepis Gillam's Bell [13188]	Endangered	Species or species habitat may occur within area
Darwinia wittwerorum Wittwer's Mountain Bell [15626]	Endangered	Species or species habitat may occur within area
Daviesia megacalyx Long-sepalled Daviesia [56785]	Endangered	Species or species habitat known to occur within area
Eremophila denticulata subsp. denticulata Fitzgerald Eremophila [64569]	Vulnerable	Species or species habitat likely to occur within area
Marianthus mollis Hairy-fruited Billardiera [82825]	Endangered	Species or species habitat known to occur within area
Ricinocarpos trichophorus Barrens Wedding Bush [19931]	Endangered	Species or species habitat likely to occur within area
Roycea pycnophylloides Saltmat [21161]	Endangered	Species or species habitat may occur within area
Thelymitra psammophila Sandplain Sun-orchid [4908]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -

Listed Marine Species [Resource Information]

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

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Overshot Hill	WA

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Caveat

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

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

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

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

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-33.5525 120.03943

Acknowledgements

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

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

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

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

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

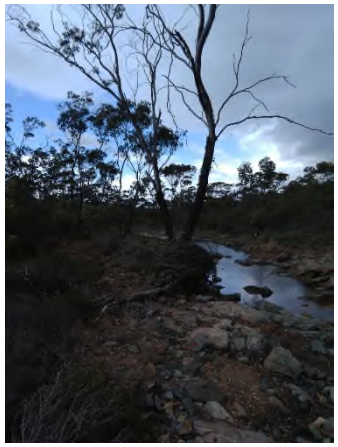
APPENDIX 3. REPRESENTATIVE FAUNA HABITATS.

MTC01

MTC01

MTC02

MTC02



MTC03

MTC03

MTC04

MTC04

MTC05

MTC05

MTC06

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