

30 September 2022

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**Re: Site reconnaissance for threatened vertebrate fauna - Ravensthorpe**

Dear James

Terrestrial Ecosystems is pleased to provide a report on a site reconnaissance survey to determine the probability of threatened vertebrate fauna for a small project area (~100ha; Figure 1) near Ravensthorpe and north-east of the existing Galaxy Lithium mining operations.

**Fauna surveys in adjacent areas**

There have been multiple surveys and assessments undertaken in the vicinity of the project area, including:

- Bamford Consulting Ecologists (2018) *Galaxy Lithium Australia Limited Spodumene Project, Ravensthorpe – Advice on Risk to Carnaby's Black Cockatoo*, Unpublished report for Galaxy Resources Ltd, Perth;
- Harris, R.J., Majer, J.D., Williams, C., Buckley, A., Stehlik, D. (2008) *Ravensthorpe Range and Overshot Hill - an overview of biodiversity values, threats and conservation*, Unpublished report for the Alcoa Foundation's Conservation and Sustainability Fellowship Program, Perth;
- Keith Lindbeck and Associates (2008) *Ravensthorpe Spodumene Project - Spring 2008 Fauna Survey*, Unpublished report for Galaxy Resources, Perth;
- Keith Lindbeck and Associates (2011) *Ravensthorpe Spodumene Project East Pit Development Targeted Fauna Survey*, Unpublished report for Galaxy Resources, Perth;
- Ninox Consulting and Biostat Pty Ltd (2018) *Desktop Assessment of Vertebrate Fauna of the Proposed Ravensthorpe Spodumene Project*, Western Australia, Unpublished report for Galaxy Resources Ltd, Perth; and
- Terrestrial Ecosystems (2021) *Proposed exploration at the Mt Cattlin project near Ravensthorpe on E74/401 (excluding Environmentally Sensitive Area)*, Unpublished report for Traka Resources Ltd, Perth.

**Methodology**

The project area was searched for Malleefowl, and their mounds and tracks, and Black-Cockatoo habitat trees. This search was undertaken by Dr Scott Thompson and Joel Wilson along with mine site staff and another environmental consultant.

**Site inspection**

A site inspection was undertaken by Dr Scott Thompson and Joel Wilson (Terrestrial Ecosystems) on 6-7 September 2022 to determine fauna habitats present in the project area, their quality, and their suitability to support conservation significant species. The site assessment was completed with the assistance of James Hesford (Tetris Environmental) and Galaxy site environmental staff.

**Vegetation in the project area**

Mattiske Consulting Pty Ltd (2018) reported the following two vegetation communities in the project area:

- W2 *Eucalyptus oleosa* subsp. *corvina* and *Eucalyptus extensa* mid mallee woodland over *Senna artemisioides* mid sparse shrubland over *Acacia erinacea*, *Rhagodia crassifolia* and *Sclerolaena diacantha* low sparse shrubland on brown clay-loam soils on slopes; and
- W3 *Eucalyptus myriadena* subsp. *myriadena* and *Eucalyptus oleosa* subsp. *corvina* mid mallee woodland over *Acacia bifaria* (P3), *Acacia erinacea* and *Senna artemisioides* low sparse shrubland over *Austrostipa puberula* isolated grasses on brown clay-loam soils on slopes.

The site inspection indicated that excluding areas that had been disturbed, the western section of the project area was in poor – good condition and the eastern section was in very good condition, with both sections generally having a sparse shrubland. Plates 5 to 13 are images of the fauna habitat in the project area. The quality of fauna habitat improves from west to east, with evidence of disturbance in the western sections. There was an abundance of rabbits (*Oryctolagus cuniculus*) in the project area (Plates 14-16) and a small number of Western Grey Kangaroos (*Macropus fuliginosus*; Plate 7). The openness of the fauna habitats, the high probability of foxes and feral cats in the project area, and an abundance of rabbits would have significantly depleted the native fauna in the project area over many years.

### Conservation significant species

A search of the EPBC online MNES database, and the Department of Biodiversity, Conservation and Attractions threatened species database indicates species that could potentially be in areas around the project area (Table 1). The list in Table 1 excludes marine and shorebirds as there is no suitable habitat for these birds in the project area.

**Table 1. Conservation significant vertebrate fauna species potentially in and near the project area**

Species	Common Name	EPBC Act status	BC Act status	DBCA Priority Species	Comment on the potential presence of a species
<i>Pezoporus flaviventris</i>	Western Ground Parrot	Cr	Cr		Unlikely to be present in the project area.
<i>Pezoporus occidentalis</i>	Night Parrot	En	Cr		Highly unlikely to be present in the project area.
<i>Botaurus poiciloptilus</i>	Australian Bittern	En	En		Highly unlikely to be present in the project area.
<i>Calyptorhynchus latirostris</i>	Carnaby's Black-Cockatoo	En	En		May infrequently forage in the vicinity of the project area.
<i>Calyptorhynchus baudinii</i>	Baudin's Black-Cockatoo	En	En		May infrequently forage in the vicinity of the project area.
<i>Panantechinus apicalis</i>	Dibbler	En	En		Highly unlikely to be present in the project area.
<i>Myrmecobius fasciatus</i>	Numbat	En	En		Highly unlikely to be present in the project area.
<i>Dasyornis longirostris</i>	Western Bristlebird	En	En		Unlikely to be present in the project area.
<i>Phascogale calura</i>	Red-tailed Phascogale	Vu	CD		Unlikely to be present in the project area.
<i>Pseudomys shortridgei</i>	Heath Mouse	En	En		Unlikely to be present in the project area.
<i>Calyptorhynchus banksia naso</i>	Forest Red-tailed Black-Cockatoo	Vu	Vu		Unlikely to be present in the project area.
<i>Cereopsis novaehollandiae grisea</i>	Cape Barron Goose	Vu	Vu		Highly unlikely to be present in the project area.
<i>Leipoa ocellata</i>	Malleefowl	Vu	Vu		Highly unlikely to be present in the project area.
<i>Dasyurus geoffroi</i>	Chuditch	Vu	Vu		Unlikely to be present in the project area.
<i>Falco hyaeleucos</i>	Grey Falcon	Vu	Vu		Unlikely to be present in the project area.
<i>Falco peregrinus</i>	Peregrine Falcon		OS		Mostly an aerial species that may very occasionally forage in the project area.
<i>Lerista viduata</i>	Ravensthorpe Range Slider			P1	Unlikely to be present in the project area.

Species	Common Name	EPBC Act status	BC Act status	DBCA Priority Species	Comment on the potential presence of a species
<i>Ninox connivens</i>	Barking Owl			P2	Unlikely to be present in the project area.
<i>Acanthophis antarcticus</i>	Southern Death Adder			P3	Very low possibility it is present in the project area.
<i>Macropus eugenii</i>	Tammar Wallaby			P4	Unlikely to be present in the project area.
<i>Psophodes nigrogularis oberon</i>	Western Whipbird (western mallee subspecies)			P4	Unlikely to be present in the project area.
<i>Pseudomys occidentalis</i>	Western Mouse			P4	Unlikely to be present in the project area.
<i>Macropus irma</i>	Western Brush Wallaby			P4	Low possibility it is present in the project area.
<i>Isodon fusciventer</i>	Quenda			P4	Unlikely to be present in the project area.
<i>Motacilla cinerea</i>	Grey Wagtail	Migratory	Migratory		Highly unlikely to be present in the project area.
<i>Pandion haliaetus</i>	Osprey	Migratory	Migratory		Highly unlikely to be present in the project area.
<i>Apus pacificus</i>	Fork-tailed Swift	Migratory	Migratory		May infrequently be seen flying over the area.

Below is information for each of this species and an assessment for each species presence in the project area.

**Western Ground Parrot (*Pezoporus flaviventris*)** – Critically endangered under the *EPBC Act* and *BC Act*

The Western Ground Parrot is a medium sized, slender, long-tailed parrot about 30cm in length and 84-110g in weight (Johnstone and Storr 1998, Higgins 1999). Its known extant geographic distribution is confined to the Waychincup-Manypeaks, Fitzgerald River National Park and the Cape Arid National Park-Nuytsland Nature Reserve (Threatened Species Scientific Committee 2013). The Western Ground Parrot has not recently been recorded in or near the project area. Its known geographic distribution is in low, mid-dense heathland within a few tens of kilometres of the south coast.

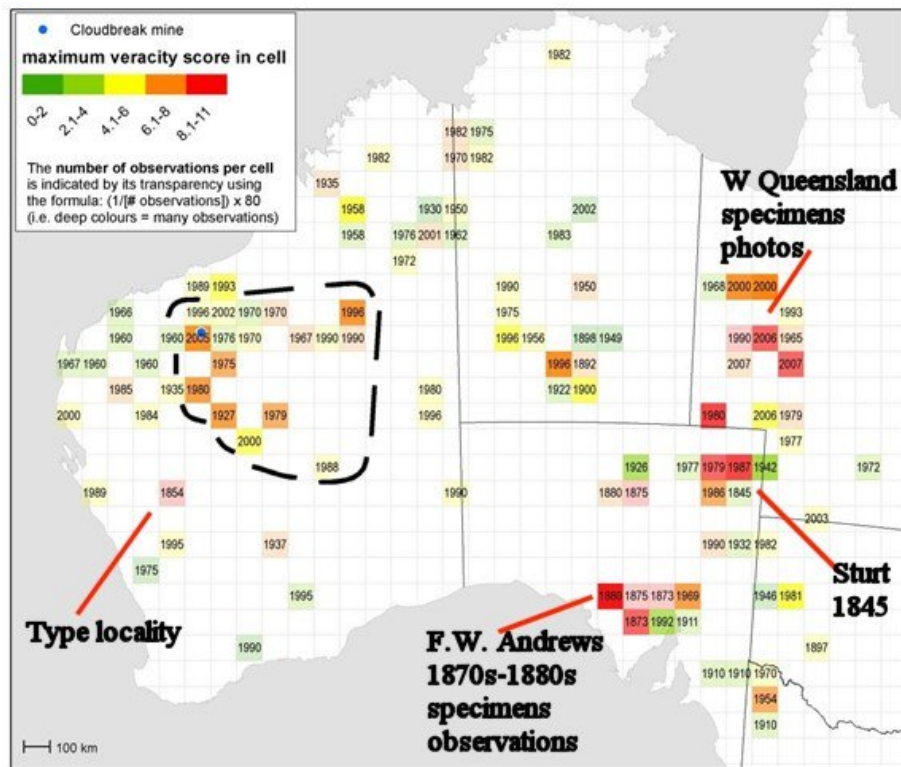
Loss of habitat due to too frequent and extensive fires, predation by feral cats and foxes, habitat fragmentation and degradation of remnant vegetation, particularly by herbivores, invasion of weeds and *Phytophthora* sp. altering the vegetation composition are major threats to its survival.

The project area is outside the known geographical distribution of this species. Based on the known distribution and lack of appropriate habitat, it is highly unlikely that the Western Ground Parrot is present in the project area.

**Night Parrot (*Pezoporus occidentalis*)** - Critically Endangered under the *BC Act 2016* and Endangered under the *EPBC Act 1999*

The Night Parrot is a small, arid-adapted, nocturnal, ground-feeding parrot (Johnstone and Storr 1998, Threatened Species Scientific Committee 2016). Its length is 22-25cm with a body mass of approximately 104g (Threatened Species Scientific Committee 2016), although it was suggested that they were semi-nomadic, the Night Parrots in south-western Queensland appear to be sedentary (Murphy 2015).

The Night Parrot was probably originally distributed over much of the semi-arid and arid Australia (Garnett *et al.* 2011, Threatened Species Scientific Committee 2016). Recordings in north-west and western Queensland in the early 1990-2000s were in a broad cross section of the habitats available (Cupitt and Cupitt 2008, Garnett *et al.* 2011, Boles *et al.* 2016). There have been recent sightings in the Pilbara in 1980, 2005 and 2017, central WA in 1979, north-eastern South Australia in 1979, western Queensland (including Pullen-Pullen-Mt Windsor-Diamantina population) in 1980, 1990, 1993, 2006 and 2013-17 (Davis and Metcalf 2008, Garnett *et al.* 2011, Charalambous 2016, Pickrell 2016, AG staff 2017, Palaszczuk and Miles 2017, Rykers 2017, AG staff 2018), Pilbara in 2017 (Jones 2017), and the northern Goldfields (Jackett *et al.* 2017). Garnett *et al.* (2011) suggested that there were between 50-250 mature individuals in less than 5% of its previous range. Prior to 2007 there were very few records of the Night Parrot (Plate 1).



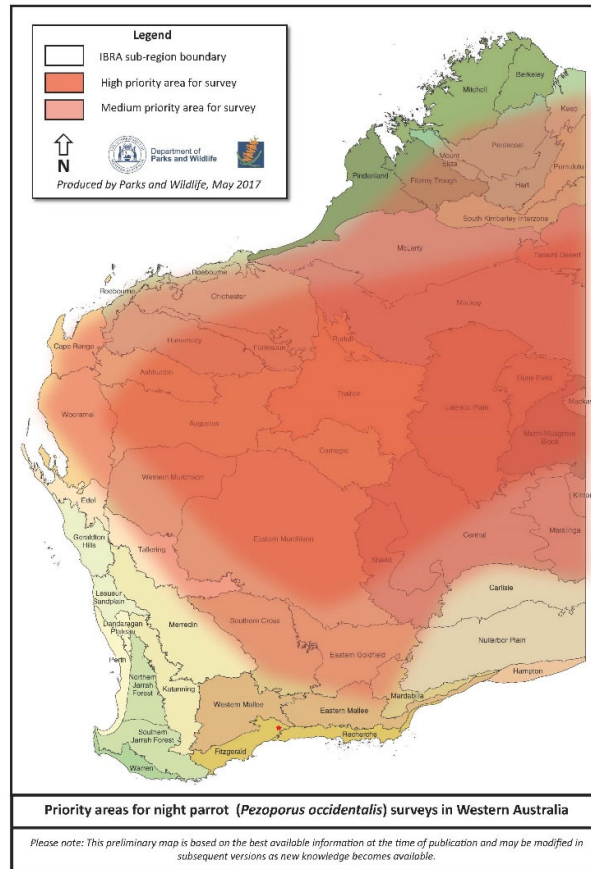
**Plate 1. Map of historical Night Parrot records compiled by S. Murphy *et al.*, including records to 2007**

(taken from <https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals/night-parrot>)

Wilson's (1937) summary of observations provided information on the early records of Night Parrots' preferred habitat and breeding sites. Recent information indicates its preferred habitat appears to be in *Triodia* grasslands, chenopod shrublands, shrubby samphire and floristically diverse habitats dominated by large-seeded species (Threatened Species Scientific Committee 2016, McCarthy 2017, Murphy *et al.* 2017b). At Pullen Reserve it nests in large, more or less ring-shaped *Triodia*, and the nest consists of a tunnel (25-30° and 0° to the ground; 20-33cm long) through an apron of dead spinifex leaves that leads to a chamber under a live hummock, with a shallow depression (3-4cm) excavated into the gravelly/sandy soil (Murphy *et al.* 2017a). In the northern Goldfields the nest was again in a spinifex hummock; it was circular, with an excavated depression (~1.5-2.0cm) in sandy substrate (Hamilton *et al.* 2017, Jackett *et al.* 2017). The entrance tunnel was 62cm long, and was downward sloping (27°) with the entrance 28cm above the ground (Hamilton *et al.* 2017). It has clutches of two to four sub-elliptical, white eggs with a lustrous appearance (Murphy *et al.* 2017a). Breeding followed significant rains in March for the observations in Pullen-Pullen Reserve and in April in the northern Goldfields (Hamilton *et al.* 2017, Murphy *et al.* 2017a), but it is thought that breeding generally occurs between April and October (Murphy *et al.* 2017a).

Murphy *et al.* (2017b) placed a GPS tag on Night Parrots and reported that the two birds called at dusk from their diurnal roosts among spinifex hummocks and then flew to more floristically diverse habitats dominated by large-seeded, prolifically seeding species to feed.

The project area is outside the priority area (Plate 2) for Night Parrots as indicated by the then Department of Parks and Wildlife (2017) and there is no mature spinifex hummocks. It is highly improbable that the Night Parrot would be recorded in the project area.



**Plate 2. Probability of finding a Night Parrot in Western Australia**

**Australasian Bittern (*Botaurus poiciloptilus*)** - Endangered under the *EPBC Act 1999* and *BC Act*

The Australasian Bittern is a heavy-set, partially nocturnal heron (Birdlife Australia 2017). Its preferred habitat is beds of tall dense Typha, Baumea and sedges in the shallows of freshwater swamps. Its distribution ranges from Moora east to Cape Arid and the south-west of Western Australia. Johnstone and Storr (1998) reported it as locally common in the wetter parts of the south-west and Garnett et al. (2011) more recently indicated that the WA sub-population is restricted to a few records away from the south coast and Lake Muir wetlands, with few confirmed records from the Swan Coastal Plain since 1992.

Threats include drainage of permanent and ephemeral swamps for agriculture and urban development (Garnett et al. 2011) and droughts (Birdlife International 2016a). There is no suitable habitat for this species in the project area, so it is highly unlikely to be present.

**Carnaby’s Black Cockatoo (*Calyptorhynchus latirostris*)** - Endangered under the *BC Act 1950* and *EPBC Act 1999*

Carnaby’s Black-Cockatoo (*Calyptorhynchus latirostris*) is a large, pied, cockatoo which inhabits the south-west of Western Australia, from Kalbarri to Cape Arid east of Esperance (Department of Sustainability Environment Water Population and Communities 2011, Garnett et al. 2011). On the Swan Coastal Plain, it has shifted its activity area in a westerly direction (Department of the Environment and Energy 2017). It mostly breeds inland from the Stirling Ranges to near Three Springs and moves to the coastal areas when chicks have fledged (Saunders et al. 1985).

In some locations, breeding populations have decreased or become locally extinct (Saunders 1986, Saunders and Ingram 1987). For example, in the Coomallo Creek area north of Perth, Black-Cockatoos laid 74 clutches in 1973, 75 in 1974, 82 in 1975 but only 20 in 1994 and 19 in 1996 (Saunders and Ingram 1987). Nesting success has subsequently increased at this site with the installation of artificial hollows (Taillier 2016).

Saunders (1986) reported finding 13 nests at Manmanning in 1969 but by 1977, the species had stopped breeding in the area. Saunders (1990) reported failed nestings due to predation by a cat, galahs broke Carnaby's Black-Cockatoo eggs and took over nests, while other adult birds were killed by vehicles and Wedge-tailed Eagles (*Aquila audax*).

Carnaby's Black-Cockatoos are partly migratory and partly sedentary (Higgins 1999). In the drier regions of their geographic range where most of the native vegetation has been cleared (e.g. wheatbelt), Carnaby's Black-Cockatoos are postnuptial migrants (Saunders 1980, Saunders and Ingram 1995). After breeding, individuals in these areas migrate to feed in higher rainfall areas including the Swan Coastal Plain, and to a lesser extent, forests dominated by *E. marginata* (Jarrah), *C. calophylla* (Marri) and *E. diversicolor* (Karri; Saunders 1980).

Saunders (1980) recorded non-breeding cockatoos at Coomallo Creek, 200km north of Perth, foraging within a 50km radius of their breeding area, whereas, cockatoos at Manmanning, 180km north-east of Perth moved a much greater distance to the coastal plain during their non-breeding season. These data suggest that Carnaby's Black-Cockatoo move from areas where there is little food to southern and western coastal areas where food is presumably more plentiful during summer and autumn (Davies 1966, Saunders 1980).

Carnaby's Black-Cockatoo breed between July and November mostly in eucalypt woodland (Saunders 1980, 1986) and nest in tree hollows that are created by fire, fungi, termites or old age, with hollows between 2.5 and 12m above the ground (Saunders 1979). Hollows are large, ranging from 10 to over 250cm in depth (Higgins 1999) and are usually in live or dead smooth-barked *Eucalyptus salmonophloia* (Salmon Gum) or *Eucalyptus wandoo* (Wandoo). However, Carnaby's Black-Cockatoo will also nest in *E. longicornis* (Red Morrell), *E. loxophleba* (York Gum), *E. gomphocephala* (Tuart), *E. rudis* (Flooded Gum), *E. salubris* (Gimlet), *E. occidentalis* (Swamp Yate) and *C. calophylla* (Marri; Higgins 1999, Cale 2003). When breeding, they most often forage in the surrounding shrub land and kwongan heath (Higgins 1999).

Eggs are laid on a mat of wood chips chewed from the sides of the hollow. Clutches are 1-2, but most often only one chick is raised. Incubation takes 29 days, and only the female incubates and broods (Johnstone et al. 2011). Initially the female will return to the nest mid-morning to feed the chick, but after about 2-3 weeks both parents leave in the early morning and return late evening.

Young remain with their parents until the parents return to the breeding area in the following year (Saunders 1980). Immature birds probably do not move into the breeding areas until they are ready to breed, although little is known of the movements of immature Carnaby's Black-Cockatoo until they are ready to breed (Saunders 1977).

The breeding success of Carnaby's Black-Cockatoo is influenced by the availability of food at breeding sites (Saunders et al. 1985). Saunders (1977) found that birds that foraged within one or two kilometres from nesting sites had greater fledgling success than those from populations that had to travel up to four kilometres to obtain food. In a study that monitored Carnaby's Black-Cockatoo's breeding over 25 years at Coomallo Creek, Saunders and Ingram (1998) showed that the number of breeding attempts halved by the end of the study. During this period, native vegetation cover was reduced from 90% in 1959 to 25% in 1996. Their study revealed that although there was a surplus of trees with hollows of sufficient sizes, clearing of adjacent foraging habitat had adversely impacted on the success of breeding birds. Therefore, breeding sites typically have nearby areas of scrub and heath where birds forage on seeds and flowers of numerous trees and shrubs including *Banksia*, *Hakea*, *Dryandra*, *Grevillea* and *Callistemon* spp. (Robinson 1965, Saunders 1980, Higgins 1999). Unlike other cockatoo species, Carnaby's Black-Cockatoo will not utilise cereal crops (Saunders et al. 1985), but will feed on *Erodium* seed (Saunders 1980). Breeding success of females in their first two breeding seasons had failure rates four times that of older and more experienced females and older females tended to produce lighter nestlings (Saunders et al. 2016).

Threats to this species include loss of foraging areas, habitat fragmentation, fires and plant pathogen *Phytophthora cinnamomi*, loss of suitable nesting hollows due to fires, vegetation clearing and competition from other species and lack of suitable a sufficient foraging opportunities near breeding areas (Birdlife International 2016d).

The DBCA threatened species database and Terrestrial Ecosystem's fauna survey database have records of Carnaby's Black-Cockatoo in the vicinity of the project area. It is known that clearing of vegetation that contains *Banksia*, *Dryandra* and *Hakea* may impact on foraging opportunities for Carnaby's Black-Cockatoo.

Galaxy Resources own and are mining the tenements immediately to the south-east of the project area. When Galaxy Resources were proposing to develop Stage 2 East of Floater Road Expansion, it commissioned multiple environmental assessments (ENV Australia 2008, Keith Lindbeck and Associates 2008, 2011, Ninox

Consulting and Biostat Pty Ltd 2018). Keith Lindbeck and Associates (2011) found no breeding hollows or potential tree hollows for Black-Cockatoos in the area immediately to the south and indicated that the area did not contain preferred habitat for Carnaby's Black-Cockatoo. The EPA in considering these reports raised concerns about the possible risk to Carnaby's Black-Cockatoo. Bamford Consulting Ecologists (2018) was then asked to undertake as an expert peer review of these earlier reports, and to provide an overview of the information available and make a judgement as to whether the Stage 2 Expansion would significantly impact on Carnaby's Black-Cockatoo. Bamford Consulting Ecologists (2018) stated the 'most likely patterns of usage of the site by Carnaby's Black-Cockatoo consists of birds making occasional visits, usually when *en-route* between higher quality sites, including breeding sites nearby'. It went on to conclude that the proposed development will not be a significant impact on this cockatoo.

Trees in the project area are too small to support nesting hollows for Black-Cockatoos. Based on Matiske Consulting Pty Ltd (2018) vegetation assessment and the site inspection, the project area does not support vegetation that would commonly be foraged by Carnaby's Black-Cockatoos. According to the Department of Biodiversity, Conservation and Attractions' database of breeding activity, the nearest Black-Cockatoo breeding sites are approximately 12km to the south-west of the project area. So, Carnaby's Black-Cockatoo may infrequently forage in the vicinity of the project area.

**Baudin's Black-Cockatoo (*Calyptorhynchus baudinii*)** - Endangered under the *EPBC Act 1999* and *BC Act*

Baudin's Black-Cockatoo occurs in the humid and sub-humid forests of Western Australia, an area within the 750mm isohyet, from Gidgegannup and Clackline in the north to about 50km east of Albany and all the forest to the south-west coast (Chapman 2007).

Baudin's Black-Cockatoo is typically found in flocks and it utilises the taller, more open *E. marginata*, *C. calophylla* and *E. diversicolor* forests, where it feeds mainly on *C. calophylla* seeds and various Proteaceous species. Johnstone and Kirkby (2008) reported Baudin's Black-Cockatoo feedings on the seeds, nectar, buds and flowers of a wide variety of *Eucalyptus*, *Corymbia*, *Banksia*, *Hakea*, *Dryandra* and other species. They also eat insect larvae and insects from under the bark. Baudin's Black-Cockatoo damages apples and pears in domestic and commercial orchards, and for this reason has been shot by orchardists (Chapman 2007).

It breeds in the southern forests north to Collie and east to near Kojonup in large vertical hollows of *E. diversicolor*, *C. calophylla* and *E. wandoo* (Johnstone and Kirkby 2008). Johnstone and Storr (1998) reported eggs are laid in August to December, with a clutch of 1-2, but normally only a single chick is fledged. Only the female incubates and broods.

A search of the DBCA Threatened Species and Terrestrial Ecosystems' databases indicates there are multiple records of Baudin's Black-Cockatoo in all directions around the project area. Trees in the project area are too small to support nesting hollows for Black-Cockatoos. Based on Matiske Consulting Pty Ltd (2018) vegetation assessment and the site inspection, the project area does not support vegetation that would commonly be foraged by Baudin's Black-Cockatoos. According to the Department of Biodiversity, Conservation and Attractions' database of breeding activity, the nearest Black-Cockatoo breeding sites are approximately 12km to the south-west of the project area. So, Baudin's Black-Cockatoo may infrequently forage in the vicinity of the project area.

**Dibbler (*Parantechinus apicalis*)** - Endangered under the *EPBC Act 1999* and *BC Act*

Woinarski et al. (2014) indicated that Dibblers are a semi-arboreal and mainly crepuscular dasyurid that occur in long-unburnt heathland. The preferred vegetation structure is a dense shrubland <1 metre high that has not been burnt for 10 years (Woinarski et al. 2014).

The Dibbler is a small dasyurid with males growing to about 100g and females to about 75g; its geographic distribution includes the Fitzgerald River National Park, east of Cheyne Beach and Torndirrup National Park. It is also found on Boullanger and Whitlock Island off the coast of Jurien Bay and Gunton Island (Van Dyck and Strahan 2008). They have been introduced to Escape Island (11ha) Jurien Bay, in 1998-2000, and reintroduced to Peniup Nature Reserve (2001) and Stirling Range National Park (2004) and an enclosure free of foxes and feral cats in Waychinicup National Park (Burbidge and Woinarski 2016c).

There are records of Dibbler being caught south of the project area (i.e. >12km), but none in the vicinity of the project area in DBCA's threatened species and Terrestrial Ecosystems' fauna survey databases. It is highly unlikely to be found in the project area due to a lack of suitable habitat.

**Numbat (*Myrmecobius fasciatus*)** - Endangered under the *EPBC Act 1999* and *BC Act*

The Numbat is a small marsupial to 45cm long and up to 700g in weight. Numbats were once present across southern semi-arid and arid Australia, including parts of NSW, SA and southern NT, as well as the south-west of Western Australia. In Western Australia, there are small residual populations at Dryandra and Perup, with recent translocations at Boyagin Nature Reserve, Tutanning Nature Reserve, Batalling block and Karroun Hill Nature Reserve. Numbats are essentially solitary, forage during the day in winter and in the early morning and late afternoon in summer.

Major threats are listed as predation by foxes, feral cats and raptors and changed fire regimes (Woinarski and Burbidge 2016).

There are old records of Numbats near the project area, and they have been reintroduced in the Cocanarup area west of Ravensthorpe from 2006 to 2010 (Department of Environment and Conservation 2012b). It is highly unlikely to be present in the project area, due to the long-term presence of predators (i.e. foxes and feral cats).

**Western Bristlebird (*Dasyornis longirostris*)** - Endangered under the *EPBC Act 1999* and *BC Act*

The Western Bristlebird is a small, brownish bird that prefers dense heath, especially in damp places with a mix of shrubs and tall sedges. Its present known geographic distribution is along the south coast of WA from Wilson Inlet east to Waychinicup River, and further east in the Fitzgerald River National Park (Smith 1987, Johnstone and Storr 2004) as well as at Two Peoples Bay Nature Reserve, Betty's Beach, Mount Manypeaks to Bluff Creek, and in the Fitzgerald River National Park.

It occurs in floristically diverse, closed, near-coastal heaths 1-1.5m high with a wide variety of shrubs, usually with abundant sedges and thickets of low eucalypts 2-4m tall. In the Fitzgerald River National Park, the habitat is more open, but contains patches of dense shrubs. This bird is terrestrial and sedentary, with defined home-ranges, which suggests that it has a relatively limited capacity to disperse, and is susceptible to burning (Smith 1987).

A search of the DBCA Threatened and Priority Species database indicates that all Western Bristlebird records are to the west or south of the project area. The lack of substantial areas of dense heath, particularly around shrubs and tall sedges in damp places suggests that Western Bristlebirds are unlikely to be in the project area.

**Red-tailed Phascogale (*Phascogale calura*)** - Endangered under the *EPBC Act 1999* and conservation dependent under the *BC Act*

This small, nocturnal, arboreal marsupial grows to 12cm long and 68g in weight and lives mostly in unburnt eucalypt woodlands such as wandoo in areas that receive 350-600mm of rain per year. It is an opportunistic predator, preying on insects, spiders, small birds and small mammals. It constructs a small nest either in a tree fork or tree hollow of leaves and twigs. It is currently found in remnant bushland in the Western Australian wheatbelt between Brookton and the Fitzgerald River National Park.

It is threatened by habitat loss and fragmentation associated with clearing for agriculture, and possibly by predation by foxes and cats (Friend 2008). Altered fire regimes resulting in a loss of old, long-unburnt vegetation is also considered a primary reason for the contraction in its geographic distribution (Friend 2008).

There are two old records of Red-tailed Phascogale to the east of Ravensthorpe, but there are no records since 2000 within 50km of the project area. Its current known distribution does not include the project area, and the project area does not support wandoo woodland, so it is unlikely to be present and impacted on by the proposed development.

**Heath Mouse (*Pseudomys shortridgei*)** - Endangered under the *EPBC Act 1999* and Vulnerable under the *WA BC Act*

The Heath Mouse is a small rodent with a body mass of 55-90g, and is similar in appearance to the native rat *Rattus fuscipes* (Cockburn 2000). It was once present from Shark Bay in the north of WA to Eucla in the east. The Heath Mouse has been recorded at Lake Magenta Nature Reserve and the Fitzgerald River National Park (Cancilla and Johnson 2013). It is now known in WA from a population around Ravensthorpe, Lake Magenta Nature Reserve, Fitzgerald River National Park, Dragon Rocks Reserve and Kundip. Animal Plant Mineral (2016) recorded a Heath Mouse in habitat it described as *Eucalyptus falcata* / *E. pleurocarpa* - Proteaceous mallee-heath and the same as used by *Rattus fuscipes* at Kundip.

Woinarski et al. (2014) reported it being caught in long unburnt dry heath that is floristically rich, however, Cooper et al. (2003) using unpublished records from Chapman et al. indicated that its habitat varied as did soil



type in the vicinity of the Fitzgerald Biosphere Reserve, with the predominant vegetation being shrub mallee over either heath or scrub over sedges and soils included loamy sands or sandy loams with lateritic scree and clayey soils. At Lake Magenta 93% of the Heath Mouse were caught associated with mixed laterite heath communities with a dense structural layer up to 1.2m (Quinlan et al. 2004).

Heath Mice build multiple shallow burrows, usually dug under a low bush, in which they seek shelter, and in Lake Magenta Nature Reserve they predominantly build their burrows under thick *Dryandra pteridifolia* clumps and if this was not available, such as in areas around Ravensthorpe, thick Banksia or even the root mass of Eucalypts are chosen as burrow building sites (Cancilla and Johnson 2013). It has a generalist diet which is varied based on what is seasonally available (Cancilla and Johnson 2013, Di Stefano et al. 2014). The density of Heath Mice at Lake Magenta Nature Reserve was estimated at 1.95ha<sup>-1</sup> (Cancilla and Johnson 2013).

A search of the DBCA Threatened and Priority Species and Terrestrial Ecosystems' databases indicate that most of the recent records for the Heath Mouse are either east (i.e. <10km), south (i.e. <20km), or south-east (i.e. <30km). Based on these data and a lack of suitable habitat, the Heath Mouse is unlikely to be present in the project area.

**Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksia naso*)** – Vulnerable under the *EPBC Act 1999* and *BC Act 2016*

The Forest Red-tailed Black-Cockatoo is one of three large black-cockatoos found in Western Australia. *Calyptorhynchus banksii naso* frequents the humid to sub-humid south-west of Western Australia from Gingin in the north, to Albany in the south and west to Cape Leeuwin and Bunbury (Department of Sustainability Environment Water Population and Communities 2012).

Forest Red-tailed Black-Cockatoo nest in hollows between 6.5 and 33m above the ground, with entrance sizes ranging from 10 x 12cm to 44 x 150cm and a depth of 0.3-8.2m (Johnstone et al. 2013). Breeding occurs in all months, but peaks in April-June and August-October with an incubation period of 29-31 days. A female broods her hatchling for the first 3-10 days after hatching and then leaves the nest each day at dawn and returns to feed the chick at dusk. Hatchlings are fully feathered at about 48 days. Most nests are in Marri, but they have also been recorded in Jarrah (*E. marginata*), Blackbutt (*Eucalyptus patens*), Bullich (*E. megacarpa*) and Wandoo (*E. wandoo*). Nest sites are often clustered in an area.

Forest Red-tailed Black-Cockatoos feed mostly on seeds from *Marri*, *Jarrah*, but also on Sheoak (*Allocasuarina fraseriana*), Snottygobble (*Persoonia longifolia*), (Blackbutt) and introduced species such as Cape Lilac (*M. azedarach*) and Lemon-scented Gum (*Corymbia citrovorum*) (Johnstone et al. 2011).

Loss of breeding habitat in the form of suitable hollows and adequate feeding resources near nesting hollows to enable adults to feed chicks is a primary threat. Abbott (1998) reported that trees within its known breeding distribution was not a factor in limiting breeding. He estimated there were about 15,000 birds and Garnett et al. (2011) thought about 10% of these birds bred each year. Competition for nesting hollows by other cockatoos, Wood Ducks, Galahs and feral Honey Bees appears to also be a significant threat (Garnett et al. 2011).

A search of the DBCA Threatened and Priority Species database indicates there are no records of the Forest Red-tailed Black-Cockatoo in the vicinity of the project area. Trees in the project area are too small to support nesting hollows for Black-Cockatoos and none of the trees are recognised as providing a high-quality feeding resource, therefore clearing of the vegetation is unlikely to have a significant impact on Forest Red-tailed Black-Cockatoo.

**Cape Barren Goose (*Ceropsis novaehollandiae grisea*)** - Vulnerable under the *BC Act 2016* and *EPBC Act 1999*

Garnett et al. (2011) reported that Cape Barren Goose breeds on many of the islands in the Archipelago of the Recherche, but it is also found in small numbers on the mainland between Busselton and Nullarbor Plain.

This bird is primarily found in the grassland on rocky islands where it is sedentary (Garnett et al. 2011). There is no record of the Cape Barren Goose around the project area, so it is highly unlikely to be seen in the project area, so potential impacts on this species are very low.

**Malleefowl (*Leipoa ocellata*)** - Vulnerable under the *BC Act 2016* and *EPBC Act 1999*

Malleefowl are large, ground-dwelling birds that rarely fly unless alarmed or are perching for the night. Historically, Malleefowl have been found in mallee regions of southern Australia from approximately the 26th parallel of latitude southwards. Prior to vegetation clearing for agriculture, Malleefowl were abundant in the WA Wheatbelt. Vegetation clearing for agriculture also opened adjacent bushland to predators, and in the south-west of WA, Malleefowl often only persist in isolated remnant patches of native vegetation.

Sheep and other herbivores (e.g. goats, kangaroos) grazing in remnant vegetation removes or thins the undergrowth, and they also compete with Malleefowl for herbaceous foods and can cause changes to the structure and floristic diversity of foraging habitats (Benshemesh 2007).

Malleefowl and their eggs are vulnerable to predation by foxes, and newly hatched chicks are vulnerable to foxes, cats and raptors (Priddel and Wheeler 1990, Benshemesh and Burton 1999, Benshemesh 2007, Lewis and Hines 2014). Malleefowl build distinctive nests that comprise a large mound of soil/rock covering a central core of leaf litter. These nest mounds range in diameter but can span more than five metres and may be up to one metre high. Malleefowl are generally monogamous and once breeding commences, they pair for life. The presence of nest mounds provides an indication of the presence of Malleefowl in the area.

A search of DBCA's threatened species and Terrestrial Ecosystems' fauna survey databases indicates that there are multiple records of Malleefowl in the dense bushland areas around the project area, in particular, to the south and north in the remnant bushland. However, Keith Lindbeck and Associates (2011) indicated that the area immediately to the south of the project area was unlikely to support Malleefowl due to the disturbance throughout the area. A search in 2020 of the bushland immediately north of the project area indicated the presence of old mounds, but no active mounds or tracks. The vegetation in the project area is very open; therefore it is probable that feral predators (e.g. foxes and feral cats) would have removed any Malleefowl that may have been in the project area years ago. No Malleefowl mounds or tracks were seen during the site investigation.

It is highly unlikely that Malleefowl are present in the project area or be significantly impacted by development.

#### **Chuditch (*Dasyurus geoffroii*) - Vulnerable under the EPBC Act 1999 and BC Act 2016**

The Chuditch is a medium-sized arboreal-terrestrial dasyurid that is carnivorous/insectivorous and nocturnal (Serena and Soderquist 2008). Its range has declined since European settlement, and is now restricted to the south-west of Western Australia, mostly in the Jarrah forest, but they are also in the Fitzgerald River National Park, Ravensthorpe Range (Orell and Morris 1994, Woinarski et al. 2014) and dense shrubland east of Ravensthorpe.

Formally known from over 70% of Australia, the Chuditch now has a patchy distribution throughout the Jarrah forest and mixed Karri/Marri/Jarrah forest of south-west WA (Department of Environment and Conservation 2012a, Woinarski et al. 2014). The Department of Biodiversity, Conservation and Attractions (2012a) estimated there were less than 10,000 Chuditch in 2007, with 75% of these occurring in the eucalypt forest and woodlands, and mallee heath and shrub lands of the south-west and south coast. It dens in hollow logs and burrows and has also been recorded in tree hollows and cavities (Van Dyck and Strahan 2008).

In the Jarrah forest male Chuditch have a home range of up to 15km<sup>2</sup> and for females 3-4km<sup>2</sup> (Serena and Soderquist 2008). The core activity area of females, as defined by denning sites, do not overlap but they do for males (Serena and Soderquist 1989b). Serena and Soderquist (1989b) reported core activity areas along the Murray River, WA being 55-120ha for females and about 438ha for males. For most of the time, individuals live a solitary life. In a semi-arid area near Forrestania, under-estimates of home range size (because of inadequate fixes) was 189ha (range 174-202 ha) for females and 2,125ha (range 662-3,522 ha) for males. The estimated density of Chuditch at Forrestania was 0.039 individuals km<sup>2</sup>, which was lower than at Dwellingup at 0.11 individuals km<sup>2</sup>, Batalling at 0.34 individuals km<sup>2</sup> and Julimur at 0.68 individuals km<sup>2</sup> (Rayner et al. 2012).

Chuditch has a generalist diet which includes mammals, birds, reptiles, invertebrates and plant material (Rayner et al. 2012, Woinarski et al. 2014). Major threats are listed as habitat alteration due to vegetation clearing, frequent fires and predation by foxes (Morris et al. 2008).

Litters are born from May to September, with most appearing in June to July. For nine weeks the young are left in the den while the female goes in search of food and they are first seen outside the den at about 17 weeks (Soderquist and Serena 2000). Young are weaned by 22-24 weeks (Serena and Soderquist 2008) in late October and early November. In the Jarrah Forest along the Murray River, denning sites were all ground burrows (Serena and Soderquist 1989a). Of the 22 dens located by Serena and Soderquist (1989a), six were in the base

of a tree with entrances located under large surface roots, five followed root channels exposed under remnants of burnt rotting stumps, one was under a large boulder and other were either abandoned rabbit burrows or not associated with a particular surface feature.

A search of DBCA Threatened and Priority Species and Terrestrial Ecosystems' databases indicates there are multiple records for Chuditch in all directions around the project area (i.e. < 10km). Keith Lindbeck and Associates (2011) indicated that the area immediately to the south did contain habitat that may be utilised by Chuditch, however, it concluded based on the existing habitat fragmentation and disturbance in the remaining vegetation and the proximity to urbanisation Chuditch was unlikely to have persisted in the area.

The vegetation in the project area is very open and the probable presence of predators would mean that it is unlikely that Chuditch would be present in the vicinity of the project area, and therefore significantly impacted by vegetation clearing.

**Grey Falcon (*Falco hypoleucos*)** - Vulnerable species under the *EPBC Act 1999* and *BC Act 2016*

The Grey Falcon is a moderately large raptor that is found mostly in the northern half of Western Australia, mostly in lightly wooded, coastal or riverine areas.

There are multiple records of the Grey Falcon in the Pilbara, but very few in the Goldfields and south-west of WA. They are mostly recorded along the drainage lines and around the permanent or semi-permanent pools.

It is unlikely that the Grey Falcon is in the project area.

**Peregrine Falcon (*Falco peregrinus*)** - Otherwise specially protected under the *BC Act 2016*

The Peregrine Falcon is uncommon, although widespread throughout much of Australia excluding the extremely dry areas and has a wide and patchy distribution. It shows habitat preference for areas near cliffs along coastlines, rivers and ranges and within woodlands along watercourses and around lakes. Nesting sites include ledges along cliffs, granite outcrops and quarries, hollow trees near wetlands and old nests of other large bird species. There is no evidence to suggest any change in status in the last 50 years.

A search of DBCA's threatened species database and Terrestrial Ecosystems' fauna survey database indicate that the Peregrine Falcon has been recorded in the bioregion. However, this raptor typically has a large home range, and will readily move from a disturbance, so vegetation clearing is unlikely to have a significant impact on this species.

**Ravensthorpe Range Slider (*Lerista viduata*)** – DBCA Priority 1

*Lerista viduata* is a fossorial skink, up to 45mm snout to vent length and endemic to the Ravensthorpe Range (Cogger 2014). The species has been recorded in the Ravensthorpe Range, at the Kundip mine site south-east of Ravensthorpe off the Hopetoun-Ravensthorpe Road. There are no records of this species in the vicinity of the project area.

It was not recorded in the survey of the Galaxy mine site by Keith Lindbeck and Associates (2008), so it is unlikely to be in the project area and therefore significantly impacted by vegetation clearing.

**Barking Owl (*Ninox connivens connivens*)** – DBCA Priority 2

The Barking Owl is found on the south coast of WA from Greenough to Esperance (Garnett et al. 2011). It occurs in dry sclerophyll woodland, associate with water courses, wetlands and forest edges (Garnett et al. 2011). There are no records of the Barking Owl in the Atlas of Living Australia near the project area, and they were not recorded in the search of DBCA's threatened species database search. Therefore, this owl is unlikely to be found in the project area.

**Southern Death Adder (*Acanthophis antarcticus*)** – DBCA Priority 4

The Southern Death Adder is a variable coloured, cryptic, slow moving, but a quick to strike snake that is found in the south-west of Western Australia, southern Nullarbor to the eastern side of the Gulf of St Vincent in South Australia (Cogger 2014).

There is a single old record of this snake just north of the project area in the DBCA's threatened species database. There are no records for this species in the Atlas of Living Australia near the project area, therefore the probability of them being found in the project area is very low.

**Tammar Wallaby (*Macropus eugenii derbianus*) – DBCA Priority 4**

Van Dyck and Strahan (2008) reported that the Tammar Wallaby retreats to dense low vegetation during the day and feeds in open grassy areas at night. It inhabits coastal scrub, heath, dry sclerophyll forest and thickets of mallee and woodlands.

Major threats are predation by foxes and cats, and inappropriate fire regimes (Burbidge and Woinarski 2016b).

A search of the DBCA Threatened and Priority Species database indicates that there are old records of the Tammar Wallaby around the project area. Its preference for dense heath, scrubs and thickets almost certainly means that it is unlikely to be found in the project area and therefore significantly impacted by vegetation clearing.

**Western Whipbird – (Western Mallee race; *Psophodes nigrogularis oregon*) – DBCA Priority 4**

The Western Whipbird is a medium-sized, ground-dwelling songbird with a short crest, powerful legs, short wings and a long tail, with the upper body being greyish olive-green and the underbody is whitish (Schodde and Mason 1991). It has a slight crest, a black throat bordered on either side by white whiskers and outer tail feathers with a subterminal black band prominently tipped white. Both sexes construct domed nests in dense vegetation over a period of 1-2 weeks and lay two eggs up to 10 days later. Incubation of the eggs is shared and lasts about 21 days. Both parent birds feed the chicks, and take care of one chick each when they leave the nest (Smith 1991). The nestlings fledge at about 12 days and remain with their parents for about two months (Smith 1991).

The western mallee subspecies of Western Whipbird is restricted to a scattered distribution throughout the southern wheatbelt and central south coast region, with the majority in the Fitzgerald River National Park and the Stirling Ranges National Park. It occurs in open mallee eucalypt woodland with a dense, tall shrub layer up to 1.5m tall, dominated by such species as *Hakea*, *Lambertia* or *Banksia*.

A search of the DBCA Threatened and Priority Species and Terrestrial Ecosystems' databases indicate that the mallee subspecies of the Western Whipbird has been recorded in multiple locations around the project area. The absence of the dense, tall shrub layer of vegetation dominated by *Hakea*, *Lambertia* or *Banksia* species almost certainly means it is unlikely to be present in the project area and therefore will not be significantly impacted by vegetation clearing.

**Western Mouse (*Pseudomys occidentalis*) – DBCA Priority 4**

The Western Mouse is a rodent up to 14cm long with an average weight of 34g. Its preferred habitat is tall shrub land with mallee eucalypts and a heath understorey on a substrate of gravelly loam (Kitchener and Chapman 1977), and particularly long unburnt habitat (30-50 years) on sandy clay loam or sandy loam surfaces supporting variable vegetation communities from sparse low shrubland, tall dense shrub land, sparse to dense shrub mallee and mid-dense woodland (Department of Environment and Conservation 2012c).

It lives in a burrow with a vertical entrance connected to a loop that is 2-3m in diameter and 20-30cm deep and has a diet of fibrous plant material, flowers of *Acacia* sp. and *Hibbertia* spp., invertebrates and fruits and seeds from native plants (Department of Environment and Conservation 2012c).

Whisson and Kitchener (2000) reported its geographic distribution was once from the southern Wheatbelt in Western Australia, Nullarbor Plain to the Eyre Peninsula and a now extinct population on the mid-west coast north of Perth. It possibly still occurs in the following conservation reserves: Anderson Lake, Dragon Rocks, Bending, Harris, Lake Grace, North Kalgarin, Rock View and Tarin Rock Nature Reserves, Fitzgerald River National Park and Ravensthorpe Range ([www.environment.gov.au/node/14809](http://www.environment.gov.au/node/14809)). Vegetation clearing and altered fire regimes have probably had a significant impact on this species (Morris et al. 2008b).

A search of the DBCA Threatened and Priority Species database and Terrestrial Ecosystems' fauna survey database indicates that there are multiple records for the Western Mouse around the project area. Like other small mammals potentially in the project area, predation by cats and foxes has probably removed the Western Mouse from this area many years ago. The lack of long-unburnt areas of dense vegetation in the project area would also suggest that this mouse is unlikely to be found in the project area.

#### **Western Brush Wallaby (*Macropus irma*) – DBCA Priority 4**

The Western Brush Wallaby is a medium sized wallaby that is found in a variety of habitats from open forest or woodland, around seasonally wet flats to dry open shrub land and scrubby thickets (Christensen 2000). Woinarski et al. (2014) reported its geographic distribution extending from Kalbarri to Cape Arid in WA.

Wann and Bell (1997) reported on the Swan Coastal Plain near Whiteman Park Western Brush Wallabies fed on a variety of foliage including *Cynodon dactylon*, the dominant grass of the lawn areas, *Carpobrotus edulis*, a succulent species in roadside disturbed sites, and the native cycad, *Macrozamia riedlei*, similar finding to Shepherd et al. (1997) in the Perup Nature Reserve in south-west of WA.

A search of the DBCA Threatened and Priority Species and Terrestrial Ecosystems' databases indicates that there are numerous records of the Western Brush Wallaby to the east and south-east of the project area, and to the west in the Fitzgerald River National Park. The presence of this wallaby in the vicinity of the project area would be heavily influenced by the abundance of foxes. No Western Brush Wallabies were seen during the site visit, so there is only a low possibility of it being present in the project area.

#### **Quenda (*Isodon fusciventer*) – DBCA Priority 4**

The Quenda is a medium-sized, ground-dwelling marsupial that belongs to the Peramelidae family (Paull 1992, Travouillon and Phillips 2018) and populations of Quenda occur widely throughout southern WA (Bramwell 1998) including the Fitzgerald River area (Woinarski et al. 2014).

Quenda's prefer habitats with a dense shrub understorey, a thick ground cover layer in dry sclerophyll forests, grasslands and heathlands where they can establish runways that are difficult to detect beneath the interlocking vegetation (Stoddard and Braithwaite 1979). Often, suitable Quenda habitat occurs in low lying and swampy areas and close to waterways. They are active late in the afternoon, during the night and often early in the morning.

They are omnivorous, mostly eating ground level foliage, fruit and seeds, and invertebrates. Quenda reach sexual maturity at five to six months of age when they weigh approximately 600g (Paull 1992). They have a gestation period of less than 15 days and litters of one to six young are produced, although litters of two to four are most common. Peak breeding period is in spring.

A search of the DBCA Threatened and Priority Species and Terrestrial Ecosystems' databases indicates there are numerous records for the Quenda around the project area. Predation by foxes and cats has a significant impact on Quenda along with changed fire regimes and vegetation clearing (Burbidge and Woinarski 2016a).

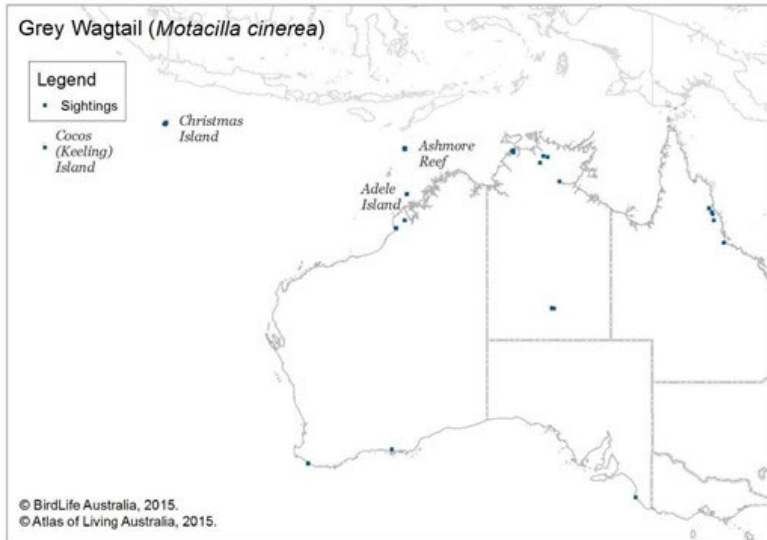
The lack of dense undergrowth in the project area would indicate that Quenda is unlikely to be present and therefore would not be significantly impacted by vegetation clearing.

#### **Grey Wagtail (*Motacilla cinerea*) - Migratory under the EPBC Act 1999 and BC Act 2016**

The Grey Wagtail is a small yellow breasted bird with a grey back and head. Johnstone and Storr (2004) reported this migratory species as breeding in Palearctic from western Europe and north-west Africa to eastern Asia and wintering in Africa, south-east Asia, Indonesia, the Philippines, New Guinea and Australia. Its preferred habitat in Australia is banks and rocks in fast-running fresh water including rivers, streams and creeks where it feeds on insects.

Its preferred habitat in Australia is around the banks and rocks of fast-running fresh water including rivers, streams and creeks where it feeds on insects. It is also found in more lowland watercourses, even canals, where there are artificial waterfalls, weirs, millraces or lock gates. Outside of the breeding season it occupies a wider variety of habitats, including farmyards, sewage farms, forest tracks, tea estates and even town centres (Birdlife International 2016b). It feeds mainly on insects but also takes freshwater shrimps (Gammarus), terrestrial snails (Mollusca) and spiders (Araneae) (Birdlife International 2016b).

The Atlas of Living Australia records two sightings on the south-coast of Western Australia (Plate 3) and none around the project area. It is highly unlikely to be seen in the project area due to a lack of records and suitable habitat, so it is highly unlikely to be impacted by the proposed development.



**Plate 3. Reported sightings of the Grey Wagtail**

(taken from <http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds>)

**Osprey (*Pandion haliaetus*)** – Migratory under the *EPBC Act 1999* and *BC Act*

The Osprey is a large raptor that is mostly found in coastal areas, offshore islands and the lower sections of rivers. It mainly feeds on fish, sea-snakes and large lizards. Individuals in the tropics and subtropics are resident, but others migrate to the lower latitudes of the Amazon Basin, South America’s northern coast, or West Africa in the non-breeding season (Birdlife International 2016c).

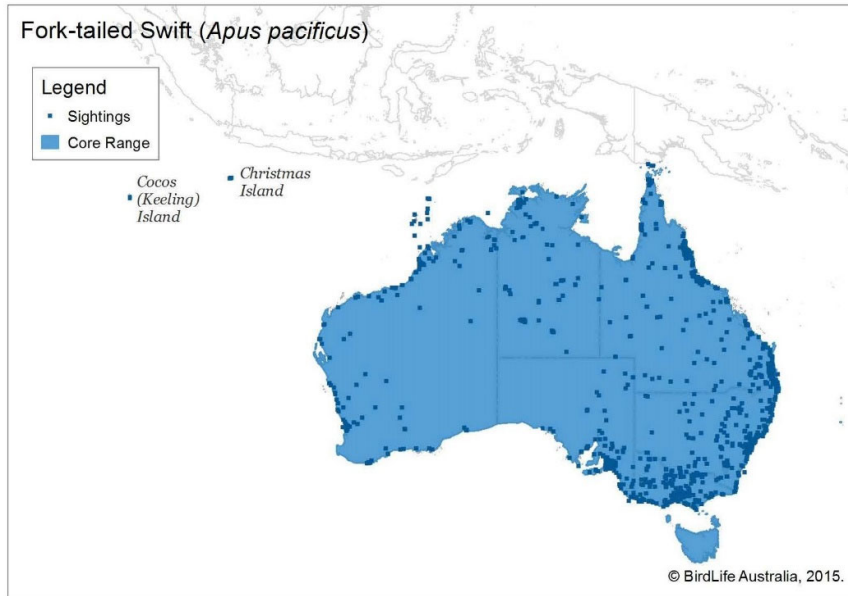
It is Terrestrial Ecosystems’ assessment that it is unlikely to be seen in the project area, given its distance from the ocean, so clearing vegetation in the project area is highly unlikely to significantly impact this species.

**Fork-tailed Swift (*Apus pacificus*)** – Migratory species under the *EPBC Act 1999* and *BC Act 2016*

This species breeds in the northeast and mid-east Asia and winters in Australia and southern New Guinea. It is a visitor to most parts of Western Australia, beginning to arrive in the Kimberley in late September, in the Pilbara in November and in the southwest land division in mid-December, and leaving by late April. The Fork-tailed swift is an almost exclusively aerial species, foraging and sleeping on the wing. It rarely comes to earth, usually only for breeding. It is common in the Kimberley, uncommon to moderately common near northwest, west and southeast coasts and rare to scarce elsewhere (Plate 4).

There are isolated records of the Fork-tailed Swift in the DBCA’s threatened species database along the coast east of Hopetoun, but none around the project area.

This is mostly an aerial species, sleeping while flying, and it typically only come to ground to nest. It is highly unlikely that clearing of vegetation will have a significant impact on this species.



**Plate 4. Range and actual reported sightings of the Fork-tailed Swift**

(taken from <http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds>)

### Summary

Based on a site investigation, a review of species in the EPBC online MNES data based, a search of DBCA’s threatened species database, a search of Terrestrial Ecosystems’ fauna survey database and a review of the vegetation communities in the project area (Mattiske Consulting 2018), it is improbable that any of the conservation significant species recorded in adjacent areas are likely to be significantly impacted by vegetation clearing in the project area.

Please do not hesitate in contacting the undersigned (0407 385 239), if you require any further information regarding this proposal.

Yours sincerely

Dr Scott Thompson  
Partner and Principal Zoologist

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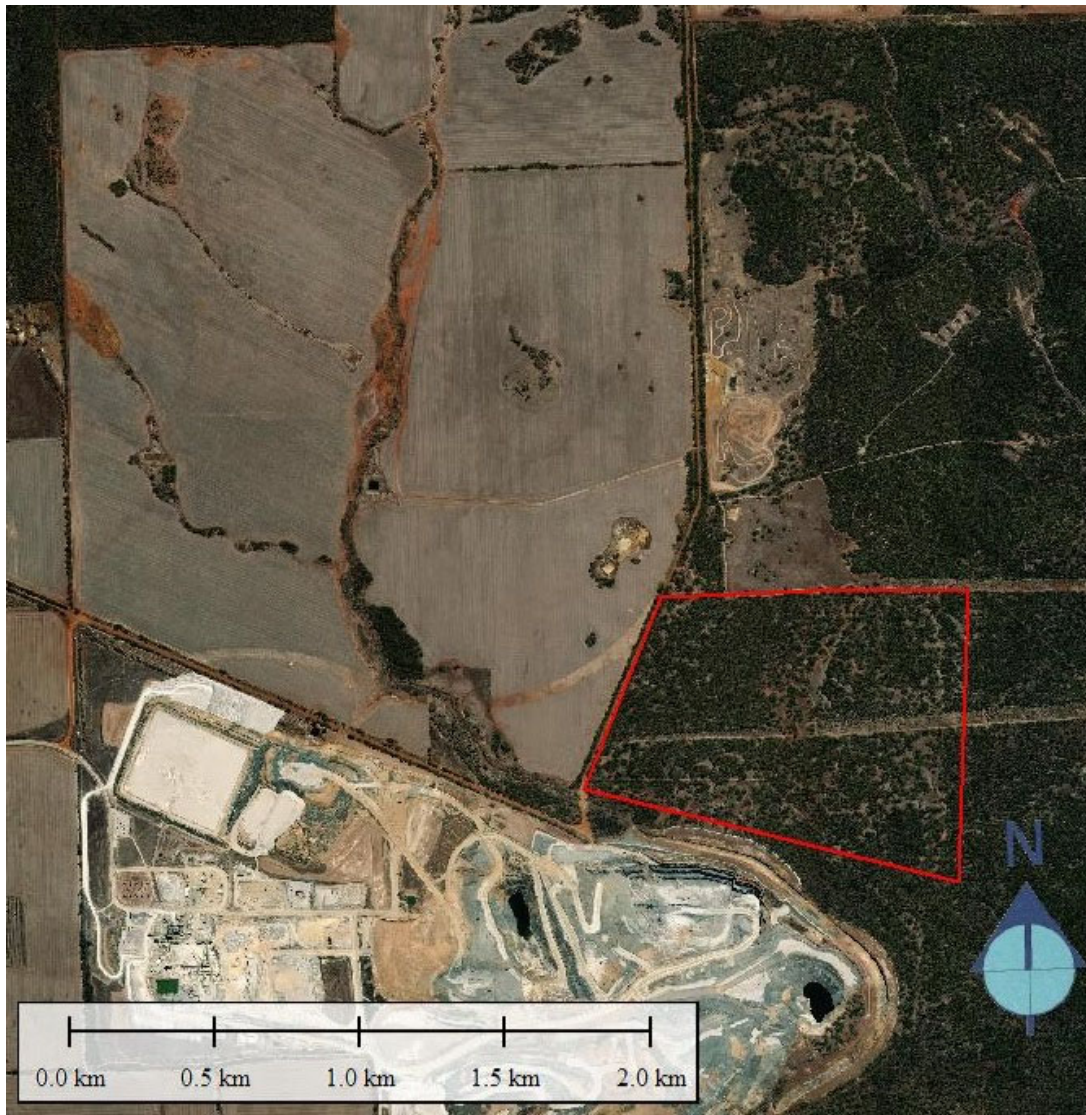


Figure 1. Project area shown with a red boundary



**Plate 5. Fauna habitat**



**Plate 6. Fauna habitat**



**Plate 7. Fauna habitat**



**Plate 8. Fauna habitat**



**Plate 9. Fauna habitat**



**Plate 10. Fauna habitat**



**Plate 11. Fauna habitat**



**Plate 12. Fauna habitat**



**Plate 13. Fauna habitat**



**Plate 14. Rabbit warren**



**Plate 15. Rabbit diggings and scats**



**Plate 16. Rabbit warren**