Fauna Assessment

Capel Dry Plant

May 2018
V4

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SUMMARY

This report details the results of a fauna assessment of an area of land at Iluka Resources Limited's Capel Dry Plant (CDP; the subject site). The subject site has a total area of about 7.0 hectares and is comprised of a combination of car parks, buildings, completely degraded grasslands and native woodland over pasture or weeds, planted endemic and non-endemic trees and shrubs, and an artificial wetland.

The scope of works was to conduct a Level 1 fauna survey as defined by the Environmental Protection Authority (EPA 2016). Because some listed threatened species (i.e. black cockatoos and western ringtail possums (WRPs)) are known to occur in the general area, the scope of the survey work was expanded to include targeted assessment of the site's significance to these particular species. The assessment has included a literature review ("desktop study") and a series of field surveys (day and night) carried out in December 2017 and March 2018.

The subject site itself is highly degraded and with the exception of some scattered/groves of marri (*Corymbia calophylla*) and flooded gum (*Eucalyptus rudis*) and contains only a small percentage of native vegetation.

The northern section of the subject site contains a decommissioned by-product dam with some limited regrowth in a central high point. The by-product dam is bordered by a grassland of introduced species with some areas of highly degraded open woodland of marri, flooded gum and/or planted non-endemic eucalyptus. The western most portion of the subject site contains a paddock area with widely scattered trees.

The southern half of the subject site contains an artificial lake into which process water was historically pumped. The lake has some open water though most areas are covered with a dense *Typha orientalis* reed bed. The lake is bordered mainly by planted endemic and non-endemic eucalyptus trees and shrubs with some marri, flooded gum, peppermint (*Agonis flexuosa*), tuart (*Eucalyptus gomphocephala*) and paperbark (*Melaleuca* sp.) also being present. A small grove of paperbark, marri and flooded gum covers a section of the subject site in its south west corner.

The subject site also contains two buildings in its southern section and these are also bordered in part by planted vegetation including endemic and non-endemic eucalyptus trees and various shrubs. The balance of the site contains carparks.

Overall fauna habitat quality is poor as a result of the sites high degree of historical disturbance. This coupled with the fact that the area is relatively small and isolated would suggest that the original biodiversity of the subject site has been significantly reduced from its original levels with only a fraction of the original fauna assemblage likely to occur.

A total of 27 native fauna species were observed (or positively identified from foraging evidence, scats, tracks, skeletons or calls) within the subject site during the day and night time surveys. One introduced species was also confirmed as being present.

The black cockatoo habitat assessment identified 55 trees within the subject site with a Diameter at Breast height (DBH) of ≥50 cm. The majority of the trees (49) appeared to contain no hollows of any size, a consequence of their relatively young age. It is assumed that these trees have either been planted (tuarts and non-endemic species) or represent regrowth (mostly marri) after a clearing event.

Two trees (2, ~3.6%) were identified as potentially containing hollows that appeared possibly big enough to allow the entry of a black cockatoo into a suitably sized and orientated branch/trunk though conclusive evidence of actual use by black cockatoos was not seen. It should be noted that these trees are unlikely to fall within the proposed works footprint and therefore will not be directly impacted on.

The 16 unidentified non-endemic eucalypt trees making up the total were represented by at least two presumed eastern states species. It is not known if these tree species have the propensity to develop hollows suitable for black cockatoos.

Foraging evidence left by two species of black cockatoos within the subject site was observed. This foraging evidence was in the form of chewed marri fruits and was attributed to the Forest Red-tailed black cockatoo and Baudin's cockatoo depending on the nature of the marks left on discarded fruits. Marri woodland makes up about 1.2 ha of the subject site. No existing roosting trees (trees used at night by black cockatoos to rest) were positively identified during the survey.

Thirteen WRP dreys were observed within the subject site during the day surveys. Eight WRPs and three common brushtail possums were recorded within a section of the subject site during the first nocturnal survey. Six WRPs and one common brushtail possum were recorded within a section of the subject site during the second nocturnal survey.

By combining the two nocturnal survey results, which were carried out over largely different areas, but excluding likely recounts, it is estimated that the subject site is currently being utilised by at least ten WRPs.

Based on the observations made, the majority of the vegetation (natural and planted) within the subject site represents WRP habitat of some type (i.e. refuge, foraging and/or dispersal). The area of planted vegetation with a dense midstorey component surrounding the artificial lake and administration building in the southern half of the subject site would appear to be the best quality area given it is characterised by a coherent canopy structure, provides good drey building opportunities and contains the widest variety of potential food sources.

In summary three vertebrate fauna species of conservation significance were positively identified as utilising the subject site for some purpose during the survey period:

- Baudin's cockatoo – Endangered (WA/Federal)
- forest red-tailed black cockatoo – Vulnerable (WA/Federal)
- WRP – Critically Endangered (WA), Vulnerable (Federal).

An additional three species of conservation significance may also utilise the subject site, though, as no evidence of these species presence was identified during the field survey, the status of some in the area remains uncertain. These are:

- Carnaby's cockatoo – Endangered (WA/Federal)
- peregrine falcon – Schedule 7 (WA)
- quenda – Priority 4 (WA).

1. INTRODUCTION

This report details the result of a fauna assessment of the Capel Dry Plant (CDP). The CDP site (subject site) is located within the town of Capel (Figure 1). The subject site has a total area of about 7.0 hectares (ha) and is comprised of a combination of car parks, buildings, completely degraded grasslands and native woodland over pasture or weeds, planted endemic and non-endemic trees and shrubs and an artificial wetland (Figure 2).

This fauna assessment represents one of several technical reports that will be used to provide an understanding of the suite of environmental values present within the subject site to assist with further planning.

It should be noted that field survey work at the subject site was completed in two phases after the area requiring assessment was expanded subsequent to the completion of the first phase.

2. SCOPE OF WORKS

The scope of works was to conduct a Level 1 fauna survey as defined by the Environmental Protection Authority (EPA 2016). Because the general area is known to be utilised by black cockatoos and western ringtail possums (WRP) the scope of the survey work was expanded to include a baseline assessment of the sites significance to these species as well. The fauna assessment has therefore included:

1. Level 1 fauna assessment (in accordance with EPA (2016) guidelines);
2. Targeted searches for black cockatoo habitat/site use (habitat trees, existing and potential nest hollows, foraging and roosting habitat);
3. Targeted day and night searches for WRP habitat/site use (foraging, refuge and dispersal habitat and individuals); and
4. Report summarising results, methods.

Note: For the purposes of this report the term black cockatoo is in reference to Baudin's Cockatoo *(Calyptorhynchus baudinii*), Carnaby's Cockatoo (*Calyptorhynchus latirostris*) and the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*).

3. METHODS

3.1 POTENTIAL FAUNA INVENTORY - LITERATURE REVIEW

3.1.1 Database Searches

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

- Department of Biodiversity, Conservation and Attractions' (DBCA) NatureMap database search (combined data from DBCA, WAM, BA, ALA and consultant's reports) (DBCA 2018b); and

- Department of Environment and Energy's (DotEE) Protected matters search tool (DotEE 2018).

It should be noted that lists produced during the abovementioned database searches contain observations/inferred distributions from a broader area than the subject site and therefore may include species that would only ever occur as vagrants due to a lack of suitable habitat or the presence of only marginal habitat within the subject site itself. The databases also often include or are based on very old records and in some cases certain fauna species have become locally or regionally extinct.

Information from these sources is therefore taken as indicative only and local knowledge and information is taken into consideration when determining what actual species may be present within the specific area being investigated. Fauna considered unlikely to be present even if appearing in these database searches are not shown in the potential species list.

3.1.2 Previous Fauna Surveys in the Area

Fauna surveys, assessments and reviews have been undertaken in nearby areas in the past. The most significant of the publicly available surveys have been used as the primary reference material for compiling the potential fauna assemblage for the general area.

Those reports referred to included, but were not limited to:

- Bamford, M.J and A.R. (2000). Proposed Gwindinup Mineral Sands Mine. Fauna Surveys; August and December 1999. Unpublished report for Cable Sands WA. January 2000.

- Bamford, M.J and A.R (2001). Fauna Survey of the Ludlow Mining Lease. Final Report. Unpublished report for Cable Sands (WA) Pty Ltd. November 2001.

- Bancroft, W. and Bamford, M. (2008). Fauna values of Bemax's Happy Valley mineral sands deposit. Unpublished report for Bemax Resources Limited. January 2008.

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- Harewood, G (2017). Fauna Assessment Lot 3833 (Part), Hyder Road. Unpublished report for Iluka Resources Limited. February 2017.
- Hart, Simpson and Assoc. (1997). Wonnerup -Tutunup Road - Vertebrate Fauna. Unpublished report for Westralian Sands Ltd.
- Ninox (2006). A Vertebrate Fauna Assessment of the Yoganup Mineral Sands Project Area. Unpublished report for Iluka Resources. March 2006.

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

3.1.3 Fauna of Conservation Significance

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

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Administered by the Australian Government DotEE;
- *Wildlife Conservation Act 1950* (WC Act). Administered by the Western Australia DBCA. It should be noted that the WC Act is soon to be repealed and replaced by the *Biodiversity Conservation Act 2016*;

- Wildlife Conservation (Specially Protected Fauna) Notice 2017 (Government of Western Australia 2018);
- Red List produced by the Species Survival Commission (SSC) of the World Conservation Union (also known as the IUCN Red List - the acronym derived from its former name of the International Union for Conservation of Nature and Natural Resources). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria; and
- DBCA Priority Fauna list. A non-statutory list maintained by the DBCA for management purposes (DBCA 2018a).

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

- Japan Australia Migratory Bird Agreement 1981 (JAMBA)[1];
- China Australia Migratory Bird Agreement 1998 (CAMBA);
- Republic of Korea-Australia Migratory Bird Agreement 2007 (ROKAMBA); and
- Bonn Convention 1979 (The Convention on the Conservation of Migratory Species of Wild Animals).

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

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

A number of other species not listed in official lists can also be considered of local or regional conservation significance. These include species that have a restricted range, those that occur in breeding colonies and those at the limit of their range.

While not classified as rare, threatened or vulnerable under any State or Commonwealth legislation, a number of birds have been listed as species of significance on the Swan Coastal portion of the Perth Metropolitan Region (Bush Forever - Government of Western Australia 1998, 2000a and 2000b). The bird species are often referred to as “Bush Forever Decreaser Species”.

[1] Note – Some species listed under JAMBA are also protected under Schedule 5 of the WC Act.

The three categories used for birds within the Bush Forever documents are:

- Habitat specialists with reduced distribution on the Swan Coastal Plain (code Bh)
- Wide ranging Species with reduced populations on the Swan Coastal Plain. (code Bp)
- Extinct in the Perth region (code Be).

The presence of Bush Forever species was taken into some consideration when determining the fauna values of an area. Bush Forever decreaser species are indicated as such within the species list held in Appendix B.

3.1.4 Invertebrate Fauna of Conservation Significance

For this assessment the review of potential conservation significant invertebrates has been limited to those listed by the DBCA and EPBC Act database searches (which rely on distribution records and known habitat preferences).

3.1.5 Likelihood of Occurrence – Fauna of Conservation Significance

Fauna of conservation significance identified during the literature review as previously being recorded in the general area were assessed and ranked for their likelihood of occurrence within the subject site itself. The rankings and criteria used were:

- Would Not Occur: There is no suitable habitat for the species in the subject site and/or there is no documented record of the species in the general area since records have been kept and/or the species is generally accepted as being locally/regionally extinct (supported by a lack of recent records).
    - Locally Extinct: Populations no longer occur within a small part of the species natural range, in this case within 10 or 20 km of the subject site. Populations do however persist outside of this area.
    - Regionally Extinct: Populations no longer occur in a large part of the species natural range, in this case within the southern forest regions. Populations do however persist outside of this area.
- Unlikely to Occur: The subject site is outside of the currently documented distribution for the species in question, or no suitable habitat (type, quality and extent) was identified as being present during the field assessment. Individuals of some species may occur occasionally as vagrants/transients especially if suitable habitat is located nearby but the subject site itself would not support a population or part population of the species.

- Possibly Occurs: The subject site is within the known distribution of the species in question and habitat of at least marginal quality was identified as being present during the field assessment, supported in some cases by recent records being documented in literature from within or near the subject site. In some cases, while a species may be classified as possibly occurring, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

- Known to Occur: The species in question was positively identified as being present (for sedentary species) or as using the subject site as habitat for some other purpose (for non-sedentary/mobile species) during the field survey. This information may have been obtained by direct observation of individuals or by way of secondary evidence (e.g. foraging debris, tracks and scats). In some cases, while a species may be classified as known to occur, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

3.1.6 Taxonomy and Nomenclature

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

Common names are taken from the Western Australia Museum (WAM) recognised primary common name listings when specified, though where common names are not provided they have been acquired from other publications. Sources include Cogger (2014), Wilson and Swan (2017), Van Dyck *et al.* (2013), Christidis and Boles (2008), Bush *et al.* (2010), Bush *et al.* (2007), Tyler *et al*. (2009), and Glauret (1961). Not all common names are generally accepted.

3.2 SITE SURVEYS

The first phase of the assessment of the subject site involved a day time field survey on 1 December 2017 and a nocturnal survey on 4 December 2017. The second phase of day and night time survey work over some additional areas added subsequent to the first round of surveys was carried out on 8 and 9 March 2018, respectively. All survey work was done by Greg Harewood (Zoologist).

Weather conditions at the time of the surveys in December 2017 were mild with temperatures ranging from about 7°C to 24°C. Some light drizzle was experienced on the morning of 4 December 2017. Weather conditions in March 2018 were warmer with temperatures ranging from 16°C up to about 26°C.

3.2.1 Fauna Habitat Assessment

Vegetation units, landforms and soils observed during the field reconnaissance survey have been used to define broad fauna habitat types across the subject site. This information has been supplemented with observations made during a flora and vegetation survey carried out by EcoEdge (2015).

The main aim of this facet of the assessment was to determine if it was likely that any species of conservation significance would be utilising the subject site based on the presence of suitable habitat. The habitat information obtained was also used to aid in finalising the overall potential fauna list.

As part of the literature review, available information on the habitat requirements of the species of conservation significance listed as possibly occurring in the area was researched. During the field survey the habitats within the subject site were assessed and specific elements identified, if present, to determine the likelihood of listed threatened species utilising the area and its significance to them.

3.2.2 Opportunistic Fauna Observations

Opportunistic observations of fauna species were made during all field survey work which primarily involved a series of transects across the subject site during the day surveys while searching microhabitats such as logs, rocks, leaf litter and observations of bird species with binoculars. Secondary evidence of a species presence such as tracks, scats, skeletal remains, foraging evidence or calls were also noted if observed/heard.

Evidence of the presence or likely presence of fauna species of conservation significance (including suitable habitat) was searched for and recorded concurrent with this aspect of the survey work. The aim was to obtain sufficient information to make a definitive comment on the likely significance of the subject site to species of conservation significance which may be present which were not the subject to targeted assessments.

3.2.3 Black Cockatoo Habitat Assessment

The following methods were employed to comply with the defined scope of works and are based on guidelines published by the federal DotEE (Commonwealth of Australia 2012) which states that surveys for black cockatoo habitat should:

- be done by a suitably qualified person with experience in vegetation or cockatoo surveys, depending on the type of survey being undertaken;
- maximise the chance of detecting the species' habitat and/or signs of use;
- determine the context of the site within the broader landscape—for example, the amount and quality of habitat nearby and in the local region (for example, within 10 km);

- account for uncertainty and error (false presence and absences); and
- include collation of existing data on known locations of breeding and feeding birds and night roost locations.

Habitat used by black cockatoos have been placed into three categories by the DotEE (Commonwealth of Australia 2012) these being:

- breeding habitat;
- foraging habitat; and
- night roosting habitat.

So as to comply with the requested scope of works and in line with the published guidelines the following was carried out.

3.2.3.1 Black Cockatoo Breeding Habitat

The black cockatoo breeding habitat assessment has involved the identification of all suitable breeding trees species within the subject site that have a Diameter at Breast Height (DBH) of equal to or over 50 cm. The DBH of each tree was estimated using a pre-made 50 cm caliper.

Target tree species included marri and jarrah and any other *Corymbia/Eucalyptus* species of a suitable size that were present. Peppermints, *banksia*, sheoak and melaleuca tree species (for example) were not assessed as they typically do not develop hollows that are used by black cockatoos.

The location of each tree identified as being over the threshold DBH was recorded with a GPS and details on tree species, number and size of hollows (if any) noted. Trees observed to contain hollows (of any size/type) were marked with “H” using spray paint.

Potential hollows were placed into one of four categories, based on the size of the apparent hollow entrance, these being:

- Small = ~<5 cm diameter (i.e. entrance too small for a black cockatoo);
- Medium = ~5 cm-10 cm diameter (i.e. entrance too small for a black cockatoo);
- Large = ~>10 cm diameter (entrance large enough for a black cockatoo but possible hollow appears to be unsuitable for nesting i.e. wrong orientation, too small, too low or too shallow); or
- Large (cockatoo) = ~>10cm diameter (entrance appears big enough to provide access to a possible hollow that maybe suitable for a black cockatoo to use for nesting).

Based on this assessment, trees present within the subject site have then been placed into one of four categories:

- Tree < 50 cm DBH or an unsuitable species (not assessed/recorded);
- Tree >50 cm DBH, no hollows seen;
- Tree >50 cm DBH, one or more hollows seen, none of which were considered suitable for black cockatoos to use for nesting; or
- Tree >50 cm DBH, one or more hollows seen, with at least one considered suitable for black cockatoos to use for nesting.

For the purposes of this study a tree containing a potential cockatoo nest hollow was defined as generally, any tree which is alive or dead that contains one or more visible hollows (cavities within the trunk or branches) suitable for occupation by black cockatoos for the purpose of nesting/breeding. Hollows that had an entrance greater than about 10 cm in diameter and would allow the entry of a black cockatoo into a suitably orientated and sized branch/trunk, was recorded as a “potential nest hollow”.

Identified hollows were examined using binoculars for evidence of actual use by black cockatoos (e.g. chewing around hollow entrance, scarring and scratch marks on trunks and branches).

3.2.3.2 Black Cockatoo Foraging Habitat

The location and nature of black cockatoo foraging evidence (e.g. chewed fruits around the base of trees) observed during the field survey was recorded. The nature and extent of potential foraging habitat present was also documented irrespective of the presence of any actual foraging evidence.

3.2.3.3 Black Cockatoo Roosting Habitat

Direct and indirect evidence of black cockatoos roosting within trees within the subject site was noted if observed (e.g. branch clippings, droppings or moulted feathers).

3.2.4 Western Ringtail Possum Assessment

3.2.4.1 Daytime Survey

Two day time surveys to locate and record dreys, obvious tree hollows, scats and individual WRPs were carried out concurrent with the black cockatoo habitat assessments and involved a series of close spaced traverses on foot across the subject site.

3.2.4.2 Night Time Survey

Two night time surveys to locate and record individual WRPs were carried out and involved a series traverses across sections of the subject site, on foot using a LED head torch.

3.2.4.3 Habitat Assessment

Description and comments on the amount and quality of WRP habitat within the subject site are provided based on observations made during the site surveys.

4. SURVEY CONSTRAINTS

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

Some fauna species are reported as potentially occurring within the subject site based on there being suitable habitat (quality and extent) within the subject site or immediately adjacent. With respect to opportunistic observations, the possibility exists that certain species may not have been detected during field investigations due to:

- seasonal inactivity during the field survey;
- species present within micro habitats not surveyed;
- cryptic species able to avoid detection; and
- transient wide-ranging species not present during the survey period.

Lack of observational data on some species should therefore not necessarily be taken as an indication that a species is absent from the subject site.

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

In recognition of survey limitations, a precautionary approach has been adopted for this assessment. Any fauna species that would possibly occur within the subject site (or immediately adjacent), as identified through ecological databases, publications,

discussions with local experts/residents and the habitat knowledge of the Author, has been assumed to potentially occur in the subject site.

During the black cockatoo habitat survey a search for trees containing hollows was completed. It should be noted that identifying hollows suitable for fauna species from ground level has limitations. Generally, the full characteristics of any hollow seen are not fully evident (e.g. internal dimensions). It is also difficult to locate all hollows within all trees as some are not observable from ground level.

It should also be noted that even under ideal conditions not all WRPs present in an area being surveyed may be observed. As such the results of the survey presented here should be taken as representing the minimum number of WRPs present within the area surveyed at the time.

The location of observations was recorded using a handheld GPS. The accuracy of the GPS cannot be guaranteed above a level of about 5 to 10 m, though it should be noted that in some circumstance the accuracy can increase or decrease beyond this range.

5. RESULTS

5.1 POTENTIAL FAUNA INVENTORY – LITERATURE REVIEW

A list of fauna species considered most likely to occur in the subject site has been compiled from information obtained during the literature review and is presented in Appendix B.

With respect to native vertebrate fauna, 11 mammals (includes eight bat species), 89 bird, 13 reptile and eight frog species have previously been recorded in the general area, some of which have the potential to occur in or utilise sections of the subject area at times. Eight species of introduced animals could also frequent the area.

Of the 121 native animals that are listed as potentially occurring in the area, five are considered to be endangered/vulnerable or in need of special protection under State and/or Federal law. One DBCA priority species has also been listed as potentially present (Table 1).

Table 1: Potential Vertebrate Fauna of Conservation Significance using the Subject Site.

Species	Conservation Status	
	WC Act/ DBCA Priority	EPBC Act
Peregrine Falcon *Falco peregrinus*	S7	-
Carnaby`s Cockatoo *Calyptorhynchus latirostris*	S2	EN
Baudin's Cockatoo *Calyptorhynchus baudinii*	S2	EN
Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*	S3	VU
Quenda *Isoodon fusciventer*	P4	-
Western Ringtail Possum *Pseudocheirus occidentalis*	S1	VU

See Appendix A for conservation status codes

5.2 SITE SURVEYS

5.2.1 Fauna Habitat Assessment

The subject site is located in the western section of the southern Swan Coastal Plain. The Swan Coastal Plain (SWA) was classified as part of the Interim Biogeographic Regionalisation for Australia (IUCN) and is in broad terms described as a:

"Low lying coastal plain mainly covered with Woodlands. It is dominated by Banksia or Tuart on sandy soils, Allocasuarina obesa on outwash plains, and paperbark in swampy areas. In the east, the plain rises to duricrusted Mesozoic sediments dominated by Jarrah Woodland. Warm Mediterranean. Three phases of marine sand dune development provide relief. The outwash plains, once dominated by A. obesa – Marri Woodlands and Melaleuca shrublands, are extensive only in the south." (Thackway and Cresswell, 1995)

The subject site itself is within a further defined subregion of the SWA referred to as the Swan Coastal Plan subregion or the Perth subregion (SWA2). This is defined as:

"Colluvial and aeolian sands, alluvial river flats, coastal limestone. Heath and/or Tuart woodlands on limestone, Banksia and Jarrah - Banksia woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvials. Includes a complex series of seasonal wetlands and also includes Rottnest, Carnac and Garden Islands etc. Rainfall ranges between 600 and 1000 mm annually and the climate is Mediterranean". The subregion has an area of about 1,333,900 ha (Mitchell *et al.* 2002).

The subject site itself is highly degraded and with the exception of some scattered/groves of marri (*Corymbia calophylla*) and flooded gum (*Eucalyptus rudis*) contains only a small percentage of native vegetation.

The northern section of the subject site contains a decommissioned residue dam with some limited regrowth in a central high point. The residue dam is bordered by a grassland of introduced species with some areas of highly degraded open woodland of marri, flooded gum and/or planted non-endemic eucalyptus. The western most portion of the subject site contains a paddock area with widely scattered trees.

The southern half of the subject site contains an artificial lake into which process water was historically pumped. The lake has some open water though most areas are covered with a dense *Typha orientalis* reed bed. The lake is bordered mainly by planted endemic and non-endemic eucalyptus trees and shrubs with some marri, flooded gum, peppermint (*Agonis flexuosa*), tuart (*Eucalyptus gomphocephala*) and paperbark (*Melaleuca* sp.) also being present. A small grove of paperbark, marri and flooded gum covers a section of the subject site in its south west corner.

The subject site also contains two buildings in its southern section and these are also bordered in part by planted vegetation including endemic and non-endemic eucalyptus trees and various shrubs. The balance of the site contains carparks.

Overall fauna habitat quality is poor as a result of the sites high degree of historical disturbance. Connectivity to other areas of bushland is also very limited with the patchy, degraded bushland along Gavin's Road providing a tenuous linkage to vegetation within the railway reserve to the east. These factors coupled with relatively small size of the subject site suggest that the original biodiversity has been significantly reduced from its original levels with only a fraction of the original fauna assemblage likely to occur.

Descriptions and example images of the main fauna habitats/dominant vegetation present within the subject site are provided in Table 2. The location and extent of each of the identified habitat/vegetation units is shown in Figure 3.

Table 2: Main Fauna Habitats within the Subject Site

Fauna Habitat Description	Example Image
Decommissioned residue dam with some limited regrowth of trees and shrubs. Total Area = ~0.8 ha	
Open woodland of flooded gum and planted non-endemic eucalypts and shrubs over a grassland of introduced species. Total Area = ~0.3 ha	
Open woodland of marri over a grassland of introduced species with small number of planted trees/shrubs and regrowth peppermint. Total Area = ~1.2 ha	

Fauna Habitat Description	Example Image
Planted endemic (e.g. Tuart) and non-endemic eucalyptus trees, exotic trees and shrubs with some marri, flooded gum, peppermint and paperbark. over a grassland of introduced species. Includes planted gardens around administration buildings. Total Area = ~1.4 ha	
	
Low Woodland of paperbark with emergent marri and flooded gum over grassland of introduced species Total Area = ~0.2 ha	

Fauna Habitat Description	Example Image
Grassland with occasional scattered marri, flooded gum and planted non-endemic eucalypts or shrubs. Total Area = ~1.8 ha	
Artificial lake – mainly covered by a dense bed of *Typha orientalis* with some small areas of open water. Total Area = ~0.6 ha	

5.2.2 Opportunistic Fauna Observations

Opportunistic fauna observations are listed in Appendix B. A total of 27 native fauna species were observed (or positively identified from foraging evidence, scats, tracks, skeletons or calls) within the subject site during the day and night time surveys. One introduced species was also confirmed as being present. Besides the two species of black cockatoo and the WRPs recorded, no conclusive evidence of any additional fauna species of conservation significance being present was observed.

- Clicking Frog - *Crinia glauerti*
- Slender Tree Frog - *Litoria adelaidensis*
- Common Bronzewing - *Phaps chalcoptera*
- Pacific Black Duck - *Anas superciliosa*
- Australian Wood Duck - *Chenonetta jubata*
- Brown Honeyeater - *Lichmera indistincta*

- Red Wattlebird - *Anthochaera carunculata*
- New Holland Honeyeater - *Phylidonyris novaehollandiae*
- Weebill - *Smicrornis brevirostris*
- Western Gerygone - *Gerygone fusca*
- Silvereye - *Chrysococcyx lucidus*
- Splendid Fairy-wren - *Malurus splendens*
- Striated Pardalote - *Pardalotus striatus*
- Straw-necked Ibis - *Threskiornis spinicollis*
- Grey Butcherbird - *Cracticus torquatus*
- Shining Bronze Cuckoo - *Chrysococcyx lucidus*
- Willie Wagtail - *Rhipidura leucophrys*
- Rufous Whistler - *Pachycephala rufiventris*
- Grey Fantail - *Rhipidura fuliginosa*
- Tree Martin - *Hirundo nigricans*
- Galah - *Cacatua roseicapilla*
- Australian Ringneck - *Platycercus zonarius*
- Red-capped Parrot - *Platycercus spurius*
- Baudin's Cockatoo - *Calyptorhynchus baudinii* (Endangered (WA/Federal))
- Forest Red-tailed Black Cockatoo - *Calyptorhynchus banksii naso* (Vulnerable (WA/Federal))
- Red Fox - *Vulpes vulpes* (Introduced)
- Common Brushtail Possum - *Trichosurus vulpecula*
- Western Ringtail Possum - *Pseudocheirus occidentalis* (Critically Endangered (WA), Vulnerable (Federal))

5.2.3 Black Cockatoo Habitat Assessment

5.2.3.1 Black Cockatoo Breeding Habitat

Trees considered potentially suitable for black cockatoos to use as nesting habitat (using DotEE criteria i.e. DBH ≥50 cm (Commonwealth of Australia 2012) but ultimately subject to a suitable hollow being present or developing and a range of other factors) which were found within the subject site comprised the following species:

- Marri – *Corymbia calophylla*;
- Tuart – *Eucalyptus gomphocephala* (planted);
- Flooded Gum – (*Eucalyptus rudis*);
- Dead unidentified eucalyptus; and
- Unidentified non-endemic eucalyptus (planted).

A summary of the potential black cockatoo habitat trees observed within the subject site is provided in Table 3 below and their location shown in Figure 4.

Table 3: Summary of Potential Black Cockatoo Habitat Trees (DBH ≥50 cm) within the Subject Site

Tree species	Total Number of Habitat Trees Recorded	Number of Trees with No Hollows Observed	Number of Trees with Hollows Considered Unsuitable for Nesting Black Cockatoos	Number of Trees with Hollows Considered Possibly Suitable for Nesting Black Cockatoos
Marri	26	23	2	1
Tuart	10	10	0	0
Flooded Gum	1	0	0	1
Dead unidentified Eucalyptus	2	0	2	0
Non-endemic Eucalyptus	16	16	0	0
Total	**55**	**49**	**4**	**2**

The assessment identified a total of 55 trees with a DBH of ≥50 cm within the subject site. The majority (49, ~89.1%) of the trees were not observed to contain hollows of any size. Four (4, ~7.3%) of the trees contained one or more possible hollows considered by the Author not to be suitable for black cockatoos to use for nesting purposes. Two trees (2, ~3.6%) were identified as potentially containing hollows that appeared possibly big enough to allow the entry of a black cockatoo into a suitably sized and orientated branch/trunk though conclusive evidence of actual use by black cockatoos was not seen. It should be noted that these trees are unlikely to fall within the proposed works footprint and therefore will not be directly impacted on.

Additional details on each habitat tree observed can be found in Appendix D.

The subject site falls within the mapped breeding range of Carnaby's cockatoo as depicted in the most current recovery plan produced by DBCA (Figure 2 - DPaW 2013). Bamford (2004) reports a breeding attempt by Carnaby's cockatoo in the Ludlow Tuart Forest in 2003 at a point about 8 km south west of the subject site (Figure 5). A review of other available data revealed several breeding records in Dalyellup and at Hithergreen for Carnaby's cockatoo but none from the vicinity of the subject site (i.e. within 12 km).

The DBCA recovery plan for Baudin's cockatoo and the forest red-tailed black cockatoo (DEC 2008) does not specifically define any known breeding areas for either species. Johnstone and Kirkby (2011) also do not specifically mention breeding areas of either species within the area though both are noted as utilising marri trees (and other tree species) for breeding in the south west.

While there appears to be a paucity of breeding data for the general area this could simply be a consequence of a lack of survey work or a lack of publicly available data. Based on available vegetation mapping it is however estimated that there is approximately 8,195 ha of native vegetation within 12 km the subject site (Figure 5). A significant portion of this vegetation is located within the Tuart Forest National Park (total area 3,030 ha), most of which falls within 12 km of the subject site. Given these facts, there is significant potential for breeding to take place in the wider area (assuming the presence of suitable trees).

The results therefore suggest that the removal of some or all of the identified "habitat trees" from within the subject site is unlikely to have significant direct or indirect impact on breeding black cockatoos and is also unlikely to significantly impact on the total "breeding habitat" resource available in the wider area.

5.2.3.2 Black Cockatoo Foraging Habitat

Following is a list of the main plant species observed within the subject site that are known to be used as a direct food source (i.e. fruits or flowers) by one or more species of black cockatoo:

- Marri - *Corymbia calophylla;*
- Flooded Gum – *Eucalyptus rudis;*
- Tuart – *Eucalyptus gomphocephala* (planted); and
- Bottlebrush - *Callistemon sp. (planted).*

It should be noted that flooded gum, tuart and bottlebrush, while species documented as being fed upon by black cockatoos of at least one species, would not represent a significant proportion of any one birds' diet as these plant species are a high effort, low yield food source. Marri woodland makes up about 1.2 ha of the subject site..

Foraging evidence of two species of black cockatoos within the subject site was observed. This foraging evidence was in the form of chewed marri fruits and was attributed to the forest red-tailed black cockatoo or Baudin's cockatoo depending on the nature of the marks left on discarded fruits.

Based on available vegetation mapping it is estimated that there is approximately 8,195 ha of native vegetation within 12 km the subject site (~17.7% of total area, though it should be noted that a high proportion of the total area within 12 km of the subject site is ocean), much of which is very likely to represent potential black cockatoo foraging habitat of some type. There is also up to 445 ha of pine plantations within 12 km of the subject site (Figure 5). Pines are likely to be a significant foraging resource for Carnaby's cockatoos (and possibly Baudin's cockatoo) in this area.

It is difficult to calculate the actual extent of natural, quality foraging habitat within the subject site given it is largely comprised of patchy fragmented vegetation, but it is unlikely to total more than about 1.2 ha (i.e. area of marri). This area represents less than 0.0014% of the potential foraging habitat (including pines) within 12 km of the subject site.

The results therefore suggest that the potential removal of some or all of the vegetation from the subject site is unlikely to have a significant impact on the availability of foraging resources for black cockatoos in the general area.

5.2.3.3 Black Cockatoo Roosting Habitat

No existing roosting trees (trees used at night by black cockatoos to rest) were positively identified during the survey, which included a single dusk survey (prior to the WRP nocturnal survey).

A review of available data revealed a single documented roost site about 10 km south west of the subject site in or near the Ludlow Tuart Forest (Johnstone and Kirkby 2011). They also show other roost sites further south near Busselton and Tutunup (Figure 5).

While there appears to be a paucity of documented roosting sites for the general area this could simply be a consequence of a lack of survey work or a lack of publicly available data. Based on available vegetation mapping it is however estimated that there is approximately 8,195 ha of native vegetation within 12 km the subject site (Figure 5). A significant portion of this vegetation is located within the Tuart Forest National Park (total area 3,030 ha), most of which falls within 12 km of the subject site. Given this fact, there is significant potential for roosting to take place in the wider area (assuming the presence of suitable trees).

The results suggest that the removal of the relatively small number of trees from the subject site will not have any direct impact on roosting black cockatoos and also will not significantly impact on roosting opportunities available in the area.

5.2.4 Western Ringtail Possum Assessment

5.2.4.1 Daytime Survey

Thirteen WRP dreys were observed during the day surveys (Figure 6). It should be noted that forks in trees, subtle cavities in tree trunks, fallen hollow logs, rabbit burrows and dense ground cover (e.g. sword grass/sedges) are also use by WRPs for daytime refuge and therefore observations of dreys only provide a guide to WRP habitat use/quality as other opportunities for daytime refuge may exist. WRP also build and use a number of dreys within their home range. Dreys also maybe abandoned but remain insitu for long periods of time even when not used or maintained. Because of these facts the number of dreys observed should not be used to determine current areas of occupancy/species abundance.

WRP scats were also observed at several locations. In most areas dense groundcover made searching for scats difficult and time consuming and therefore this method for determining WRP presence was not employed extensively.

5.2.4.2 Night Time Survey

The nocturnal survey observations are shown in Figure 6. Eight WRPs and three common brushtail possums were recorded within a section of the subject site during the first nocturnal survey. Six WRPs and one common brushtail possum were recorded within a section of the subject site during the second nocturnal survey. It should be noted that while different areas were examined during each nocturnal count there was some overlap in the area surveyed (i.e. vegetation around the Administration building) and it is likely that the animals recorded in this specific area on the second night survey are some of the same individuals seen during the first survey. Combining results but excluding likely

recounts would suggest that the subject site is currently being utilised by at least 10 WRPs.

5.2.4.3 Habitat Assessment

Based on the observations made, the majority of the vegetation (natural and planted) within the subject site represents WRP habitat of some type (i.e. refuge, foraging or dispersal). The area of planted vegetation with a dense midstorey component surrounding the artificial lake and gardens surrounding the buildings in the southern half of the subject site would appear to be the best quality area given it is characterised by a coherent canopy structure, provides good drey building opportunities and contains the widest variety of potential food sources.

Based on available vegetation mapping it is estimated that there is approximately 8,195 ha of native vegetation within 12 km the subject site (Figure 5). A significant portion of this vegetation is located within the Tuart Forest National Park (total area 3,030 ha), most of which falls within 12 km of the subject site. While this vegetation has not been specifically assessed for its suitability as WRP habitat a high percentage is very likely to be suitable for WRPs. The Author's own database of WRP records made within the last 15 years from within 12 km of the subject site contains 301 individual observations which supports this conclusion (Note: NatureMap (2018) also shows a small number of additional observations made by others in this area).

These details suggest that the removal of some habitat from the subject site which appears to be currently in use by a relatively small number of WRPs is not likely to substantially impact on the species overall status in the wider area.

5.3 FAUNA INVENTORY – SUMMARY

5.3.1 Vertebrate Fauna

Table 4 summarises the number of vertebrate fauna species potentially occurring within or utilising at times the subject site, based on results from the literature review and observations made during the field assessment. A complete list of vertebrate fauna possibly inhabiting or frequenting the subject site is located in Appendix B.

As previously discussed, despite the omission of some species it should be noted that the list provided is still very likely an over estimation of the fauna species utilising the subject site (either on a regular or infrequent basis) as a result of the precautionary approach adopted for the assessment. At any one time only a subset of the listed potential species are likely to be present within the bounds of the subject site.

Table 4: Summary of Potential Vertebrate Fauna Species (as listed in Appendix B)

Group	Total number of Potential species	Potential number of Specially Protected species	Potential number of Migratory species	Potential number of Priority species	Number of species recorded during field survey
Amphibians	8	0	0	0	2
Reptiles	13	0	0	0	0
Birds	92 (3)	4	0	0	20
Non-Volant Mammals	8 (5)	1	0	1	3 (1)
Volant Mammals (Bats)	8	0	0	0	0
Total	**129 (8)**	**5**	**0**	**1**	**25 (1)**

Brackets = number of introduced species included in total.

5.3.2 Vertebrate Fauna of Conservation Significance

The following vertebrate fauna species of conservation significance were positively identified as utilising the subject site for some purpose during the survey period:

- Forest red-tailed black cockatoo *Calyptorhynchus banksii naso* – Vulnerable (WC Act/EPBC Act)
  Several individuals and foraging evidence attributed to this species were observed during the survey period (i.e. a few chewed marri fruits). A small amount of the native vegetation within the subject site represents quality foraging habitat (i.e. 1.2 ha of marri woodland and a small number of other marri trees). Fifty five larger trees (≥50 cm DBH) can be considered potential breeding habitat, with two trees possibly containing large hollows suitable for use for nesting by this species. Sixteen of the "habitat trees" appeared to be non-endemic eucalypt trees represented by at least two, presumed eastern states, species. It is not known if these tree species have the propensity to develop hollows suitable for black cockatoos. Trees within the subject site do not appear to be used for roosting.

- Baudin's Cockatoo *Calyptorhynchus baudinii* – Endangered (WC Act/EPBC Act)
  Foraging evidence attributed to this species was observed during the survey period (i.e. a few chewed marri fruits). A small amount of the native vegetation within the subject site represents quality foraging habitat (i.e. 1.2 ha of marri woodland and a small number of other marri trees). Fifty five larger trees (>50 cm DBH) can be considered potential breeding habitat, with two trees possibly containing large hollows suitable for use for nesting by this species. Sixteen of the "habitat trees" appeared to be non-endemic eucalypt trees represented by at least

two, presumed eastern states, species. It is not known if these tree species have the propensity to develop hollows suitable for black cockatoos. Trees within the subject site do not appear to be used for roosting.

- WRP *Pseudocheirus occidentalis* – Critically Endangered (WC Act), Vulnerable (EPBC Act)
  The results of the WRP assessment indicate that this species is utilising vegetation within the subject site as habitat. Individuals appear to be favouring areas containing reasonably dense midstorey vegetation largely represented by planted non-endemic plant species.

Based on the habitats present and current documented distributions it is considered possible that several additional species of conservation significance may use the subject site for some purpose at times, though, as no evidence of any was found at the time of the field survey, the status of some in the area remains uncertain.

These species are:

- Carnaby's cockatoo *Calyptorhynchus latirostris* – Endangered (WC Act/EPBC Act)
  No evidence of this species using the subject site was observed but it is known to frequent the general area and so may occur at least occasionally. A small amount of the native vegetation within the subject site represents quality foraging habitat (i.e. ~1.2 ha of marri woodland and a small number of other marri trees). Fifty five larger trees (≥50 cm DBH) can be considered potential breeding habitat, with two trees possibly containing large hollows suitable for use for nesting by this species. Sixteen of the "habitat trees" appeared to be non-endemic eucalypt trees represented by at least two, presumed eastern states, species. It is not known if these tree species have the propensity to develop hollows suitable for black cockatoos. Listed as a potential species based on available information.

- Peregrine falcon *Falco peregrinus* – Schedule 7 (WC Act)
  This species potentially utilises some sections of the subject site as part of a much larger home range though it is only likely to occur very infrequently. There are no suitable nest sites present. Listed as a potential species based on available information.

- Quenda *Isoodon fusciventer* – Priority 4 (DBCA Priority Species)
  No conclusive evidence of this species being present was found during the site survey, but it may occur where ever dense ground cover exists particularly in areas surrounding the artificial lake. Listed as a potential species based on available information.

As listed in Table 5 below, a number of other species of conservation significance, while possibly present in the wider area are not considered as potential species due to known localised extinction (and no subsequent recruitment from adjoining areas), lack of suitable habitat and/or the presence of feral predators.

Twenty six species that potentially frequent or occur in the subject site are noted as Bush Forever Decreaser Species in the Perth Metropolitan Region (six were sighted/identified as having used the within the subject site during the survey). Decreaser species are a significant issue in biodiversity conservation in the Perth section of the coastal plain as there have been marked reductions in range and population levels of many sedentary bird species because of disturbance and land clearing (Dell and Hyder-Griffiths 2002). The continued persistence of these species in other areas outside of the Perth area is therefore of significance.

5.3.3 Invertebrate Fauna of Conservation Significance

Two conservation significant invertebrate species appeared in the DBCA database search (DBCA 2018b), these being Carter's freshwater mussel (*Westralunio carteri*) and the western pygmy trapdoor spider (*Bertmainius opimus)*. None of these species are considered likely to occur primarily due to an obvious or apparent lack of suitable habitat.

6. LIKELIHOOD OF OCCURRENCE AND POTENTIAL IMPACTS

Fauna of conservation significance identified during the literature review as previously being recorded in the general area are listed in Table 5. Each has been assessed and ranked for their likelihood of occurrence within the subject site itself based on information obtained during the fauna assessment.

The exact location and extent of native vegetation clearing within the subject site that may be undertaken has yet to be finalised and therefore it is difficult to quantify impacts. The potential direct and indirect impact on fauna that may occur as a consequence clearing will be dependent on each fauna species habits, population density and the quantity and quality of potential habitat that will be affected.

In general, the most significant potential impacts to fauna of any development include:

- Loss of vegetation/fauna habitat that may be used for foraging, breeding, roosting, or dispersal (includes loss of hollow bearing trees);
- Fragmentation of vegetation/fauna habitat which may restrict the movement of some fauna species;
- Modifications to surface hydrology, siltation of creek lines;
- Changes to fire regimes;
- Pollution (e.g. oil spills);

- Noise/Light/Dust;
- Spread of plant pathogens (e.g. dieback) and weeds;
- Potential increase in the number of predatory introduced species (e.g. cats, foxes);
- Death or injury of fauna during clearing and construction; and
- An increase in fauna road kills subsequent to development.

In this instance impacts are most likely to be related to the loss of small areas of habitat and the potential for some species to be killed or injured during clearing. Based on the maximum extent of clearing likely and the quality of habitats present, likely impacts on species of conservation significance previously recorded in the general area has been assessed, a summary of which is provided in Table 5 below.

Table 5: Likelihood of Occurrence and Potential Impacts – Fauna Species of Conservation Significance

Species	Conservation Status		Habitat Preferences	Habitat Present	Likelihood of Occurrence	Potential Impacts
	WC Act/ DBCA Priority	*EPBC Act*				
Western Pygmy Trapdoor Spider *Bertmainius opimus*	P3	-	Not documented.	Could not be determined.	Unlikely to Occur. Natural habitats highly degraded.	No impact anticipated.
Carter's Freshwater Mussel Westralunio carteri	P1	-	Occurs in greatest abundance in slower flowing streams with stable sediments that are soft enough for burrowing amongst woody debris and exposed tree roots.	No	Would Not Occur.	No impact.
Pouched Lamprey *Geotria australis*	P1	-	This species lives in mud burrows in the upper reaches of coastal streams for the first four years of life until migrating to the sea. Adults migrate up to 60km upstream during spawning.	No	Would Not Occur.	No impact.
Balston's Pygmy Perch *Nannatherina balstoni*	S3	VU	Acidic, tannin stained freshwater pools, streams and lakes within 30km of the coast, typically situated amongst peat flats. Prefers shallow water and is commonly found in association with tall sedge thickets.	No	Would Not Occur. Outside of documented distribution	No impact.
Perth Lined Lerista *Lerista lineata*	P3	-	This small species of skink inhabits white sands under areas of shrubs and heath where it inhabits loose soil and leaf litter particularly in association with banksias.	No	Would Not Occur. Outside of documented distribution	No impact.
Coastal Plains Skink *Ctenotus ora*	P3	-	Sandy substrates with low vegetation (including heath) in open *Eucalyptus/Corymbia* woodland over *Banksia*.	No/Marginal	Unlikely to Occur. Natural habitats highly degraded	No impact anticipated.
Blue-billed Duck *Oxyura australis*	P4	-	Well vegetated freshwater swamps, large dams and lakes, winters on more open water. Occasionally salt lakes and estuaries freshened by floodwaters.	No/Marginal	Unlikely to Occur. Wetland area too small.	No impact anticipated.
Glossy Ibis *Plegadis falcinellus*	S5	Mig	Well vegetated wetlands, wet pastures, rice fields, floodwaters, floodplains, brackish or occasionally saline wetlands, mangroves, mudflats, occasionally dry grasslands.	No/Marginal	Unlikely to Occur. Very uncommon in SW, may occur very occasionally.	No impact anticipated.
Hooded Plover *Charadrius rubricollis*	P4	Ma	Broad sandy ocean beaches and bays, coastal and inland salt lakes.	No	Would Not Occur.	No impact.
Migratory Shorebirds/Wetland Species/Marine Species (various reptiles, birds and mammals)	S5, Various	Ma, Mig, Various	Varies between species but includes open ocean, beaches and permanent/temporary wetlands varying from billabongs, swamps, lakes, floodplains, sewerage farms, saltwork ponds, estuaries, lagoons, mudflats sandbars, pastures, airfields, sports fields and lawns.	No/Marginal for some species	Would Not Occur/Unlikely to Occur.	No impact anticipated.

Species	Conservation Status		Habitat Preferences	Habitat Present	Likelihood of Occurrence	Potential Impacts
	WC Act/ DBCA Priority	*EPBC Act*				
Eastern Osprey *Pandion haliaetus*	S5	Ma, Mig	Coasts, estuaries, bays, inlets, islands, and surrounding waters, coral atolls, reefs, lagoons, rock cliffs and stacks. Ascends larger rivers.	No	Would Not Occur.	No impact.
Peregrine Falcon *Falco peregrinus*	S7	-	Diverse from rainforest to arid shrublands, from coastal heath to alpine Mainly about cliffs along coasts, rivers and ranges and about wooded watercourses and lakes.	Yes	Possibly Occurs.	Loss/modification of a small area of foraging habitat and therefore likely low level of impact to population
Masked Owl (SW population) *Tyto n. novaehollandiae*	P3	-	Roosts and nests in heavy forest, hunts over open woodlands and farmlands.	No/Marginal	Unlikely to Occur but may occur very occasionally.	No impact anticipated.
Australasian Bittern *Botaurus poiciloptilus*	S1	EN	Freshwater wetlands, occasionally estuarine; prefers heavy vegetation such as beds of tall dense *Typha, Baumea* and sedges in freshwater swamps.	No/Marginal	Unlikely to Occur.	No impact anticipated.
Black Bittern *Ixobrychus flavicollis*	P1	-	Freshwater pools, swamps and lagoons, well screened with trees. Shelters in dense waterside vegetation.	No/Marginal	Unlikely to Occur but may occur very occasionally.	No impact anticipated.
Little Bittern *Ixobrychus minutus*	P4	-	Dense vegetation surrounding/within freshwater pools, swamps and lagoons, well screened with trees. Shelters in dense beds of *Typha, Baumea* and tall rushes in freshwater swamps around lakes and along rivers.	No/Marginal	Unlikely to Occur but may occur very occasionally.	No impact anticipated.
Carnaby's Cockatoo *Calyptorhynchus latirostris*	S2	EN	Forests, woodlands, heathlands, farms; feeds on *Banksia*, *Hakea* and Marri.	Yes	Possibly Occurs.	Loss/modification of a small area of habitat. and therefore, likely low level of impact to population
Baudin's Cockatoo *Calyptorhynchus baudinii*	S2	EN	Mainly eucalypt forests where it feeds primarily on the marri seeds.	Yes	Known to Occur.	Loss/modification of a small area of habitat and therefore likely low level of impact to population.
Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*	S3	VU	Eucalypt forests, feeds on marri, jarrah, blackbutt, karri, sheoak and snottygobble.	Yes	Known to Occur.	Loss/modification of a small area of habitat and therefore likely low level of impact to population.
Fork-tailed Swift *Apus pacificus*	S5	Ma, Mig	Low to very high airspace over varied habitat from rainforest to semi desert.	Yes	Unlikely to Occur, Flyover only on very rare occasions.	No impact.
Grey Wagtail *Motacilla cinerea*	S5	Mig, Ma	In Australia, near running water in disused quarries, sandy, rocky streams in escarpments and rainforest, sewerage ponds, ploughed fields and airfields.	No	Would Not Occur.	No impact.

Species	Conservation Status		Habitat Preferences	Habitat Present	Likelihood of Occurrence	Potential Impacts
	WC Act/ DBCA Priority	*EPBC Act*				
Chuditch *Dasyurus geoffroii*	S3	VU	Forest, mallee shrublands, woodland and desert. The densest populations have been found in riparian jarrah forest.	No/Marginal	Unlikely to Occur, Locally extinct.	No impact anticipated.
South-western Brush-tailed Phascogale *Phascogale tapoatafa wambenger*	S6	-	Dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover.	No/Marginal	Unlikely to Occur, Habitat appears unsuitable.	No impact anticipated.
Quenda *Isoodon fusciventer*	P4	-	Dense scrubby, often swampy, vegetation with dense cover.	Yes/Marginal	Possibly Occurs.	Loss/modification of a small area of habitat and therefore likely low level of impact to population. Potential for death/injury of individuals during clearing.
Greater Bilby *Macrotis lagotis*	S3	VU	*Acacia* shrublands, spinifex and hummock grassland. Mitchell grass and stony downs country if cracking clay, also desert sand plains and dune fields sometimes with spinifex hummock grassland and *acacia* shrubland.	No	Would Not Occur. Regionally extinct.	No impact.
Western Ringtail Possum *Pseudocheirus occidentalis*	S1	VU	Coastal peppermint, coastal peppermint-tuart, jarrah-marri associations, sheoak woodland, and eucalypt woodland and mallee.	Yes	Known to Occur.	Loss/modification of a small area of habitat and therefore likely low level of impact to population. Potential for death/injury of individuals during clearing.
Quokka *Setonix brachyurus*	S3	VU	Currently restricted to densely vegetated coastal heaths, swamps, riverine habitats including tea-tree thickets on sandy soils along creek systems.	No	Would Not Occur.	No impact.
Woylie *Bettongia penicillata ogibyi*	S1	EN	Open sclerophyll forest and woodland with a low, dense, understorey of tussock grasses or woody scrub.	No	Would Not Occur, Locally extinct	No impact.
Western Brush Wallaby *Macropus irma*	P4	-	Open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets.	No/Marginal	Would Not Occur.	No impact.
Western False Pipistrelle *Falsistrellus mackenziei*	P4	-	Wet sclerophyll forest dominated by karri and in high rainfall zones of the jarrah and marri forest.	Yes/Marginal	Unlikely to Occur except on rare occasions.	No impact anticipated.
Water Rat *Hydromys chrysogaster*	P4	-	Permanent water, fresh, brackish or marine.	No/Marginal	Unlikely to Occur	No impact anticipated.

See Appendix A for conservation status codes

7. CONCLUSION

The fauna assessment within the subject site was undertaken for the purposes of delineating and characterising the fauna habitats and faunal assemblages present. Targeted searches for black cockatoo and western ringtail possum individuals and their habitat were also carried out.

The assessment has identified relatively small areas of "potential" black cockatoo breeding and foraging habitat within the subject site and the presence of the WRP. A number of additional federal and/or state listed threatened and DBCA priority fauna species may also occur though in most cases their use of the subject site wasn't detected during the survey period.

With respect to native vertebrate fauna, 11 mammal (including eight bat species), 89 bird, 13 reptile and eight frog species have previously been recorded in the general area, some of which have the potential to occur in or utilise sections of the subject site at times, a conclusion largely based on the presence of apparently suitable habitat. Overall fauna habitat quality appears to be relatively low given the areas high level of historical disturbance, its small size and limited connectivity to other bush remnants and as a consequence the fauna assemblage is likely to be depleted, relative to the areas original biodiversity.

Three vertebrate fauna species of conservation significance were positively identified as utilising the subject site for some purpose during the survey period:

- Baudin's cockatoo – Endangered (WA/Federal)
- forest red-tailed black cockatoo – Vulnerable (WA/Federal)
- WRP – Critically Endangered (WA), Vulnerable (Federal).

An additional three species of conservation significance may also utilise the subject site, though, as no evidence of these species presence was identified during the field survey, the status of some in the area remains uncertain:

- Carnaby's cockatoo – Endangered (WA/Federal)
- peregrine falcon – Schedule 7 (WA)
- quenda – Priority 4 (WA).

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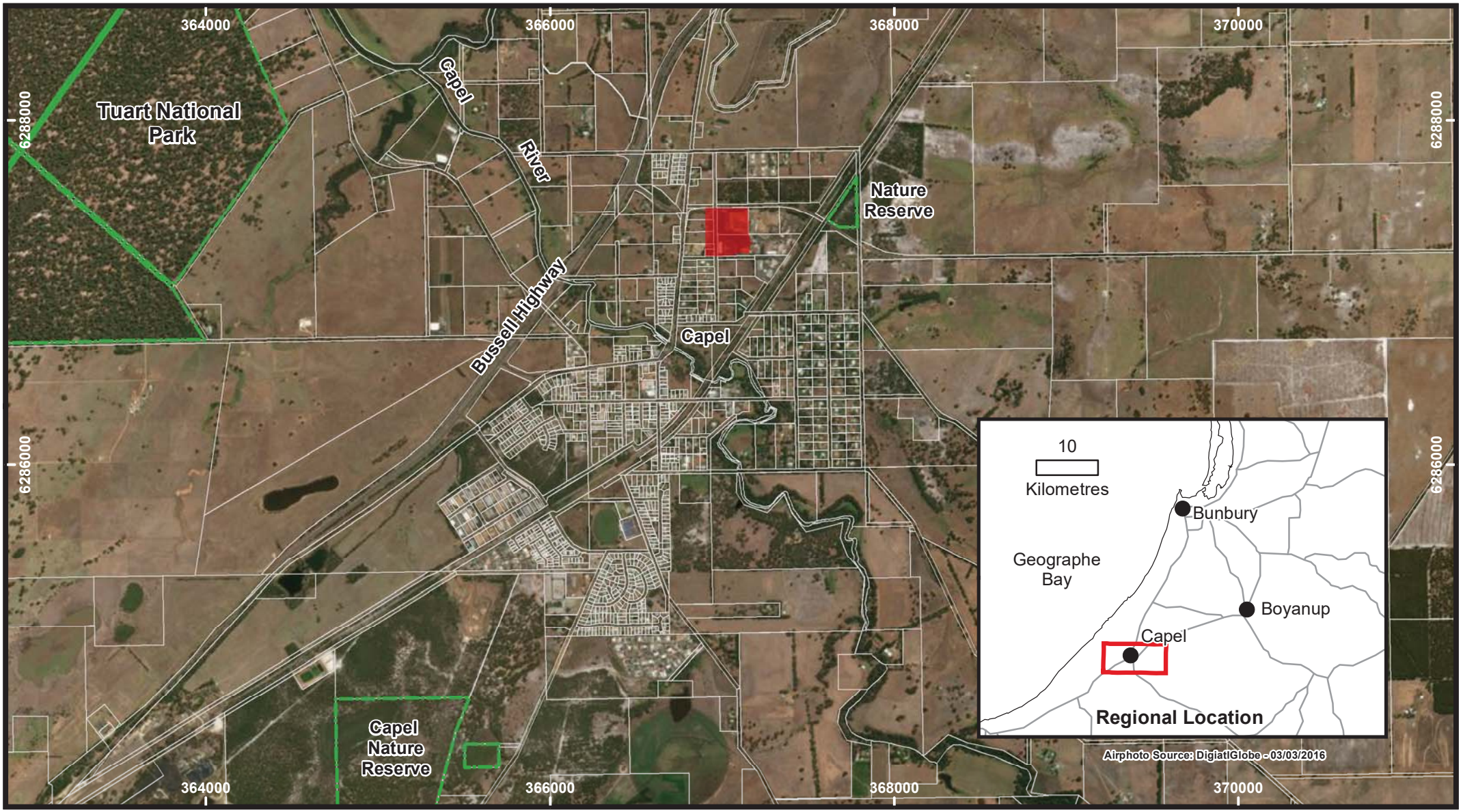
FIGURES



Legend

- Subject Site
- Cadastral Boundaries
- National Park/Nature Reserve

N

0 0.5 1 1.5 2

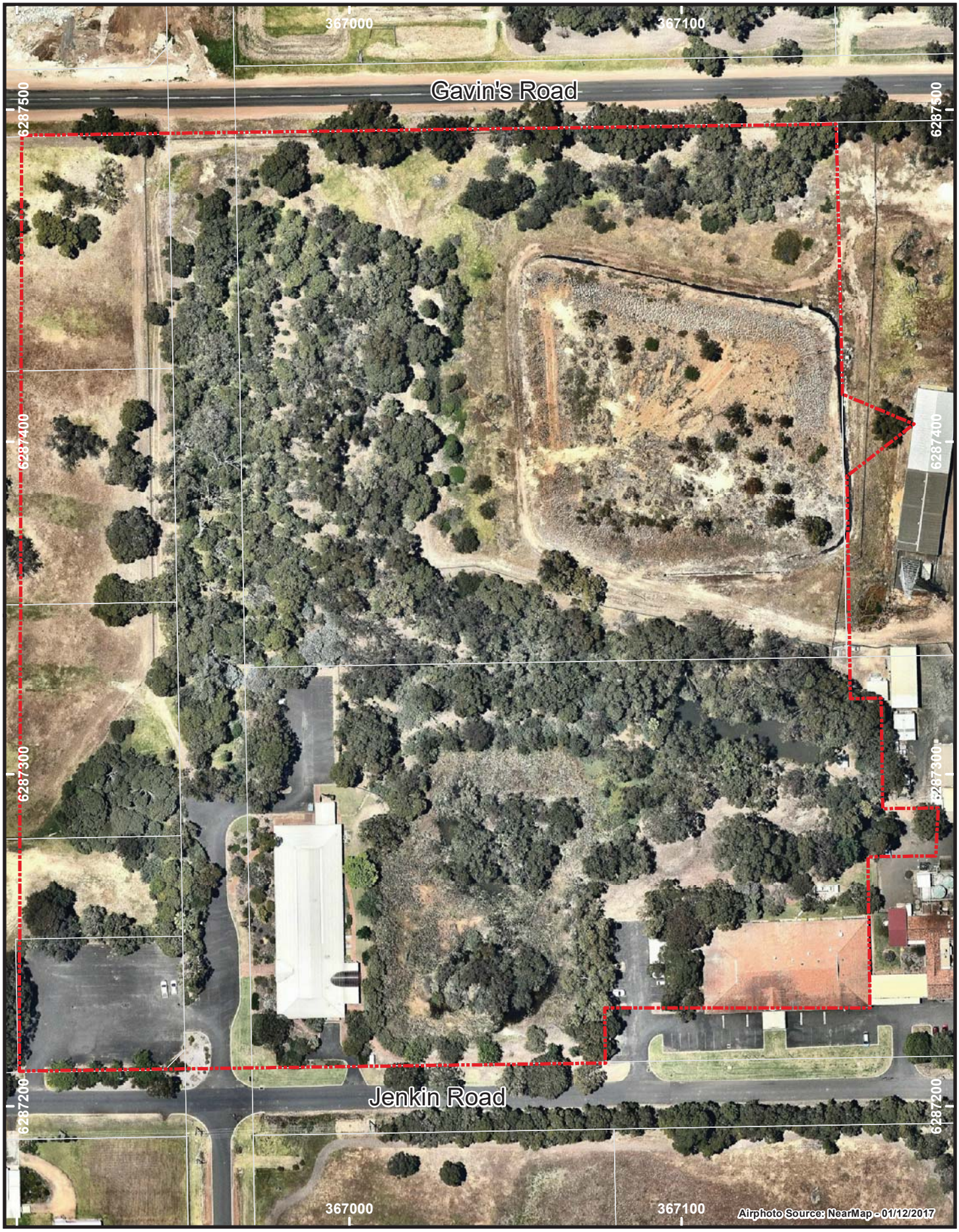
Kilometres

Capel Dry Plant
Iluka Resources Ltd

Subject Site and Surrounds

Drawn: G Harewood
Date: May 2018
Scale: 1:30,000
Projection/Coordinate System: UTM/MGA Zone 50

Figure: 1



Legend

Subject Site

0 20 40 60 80 100

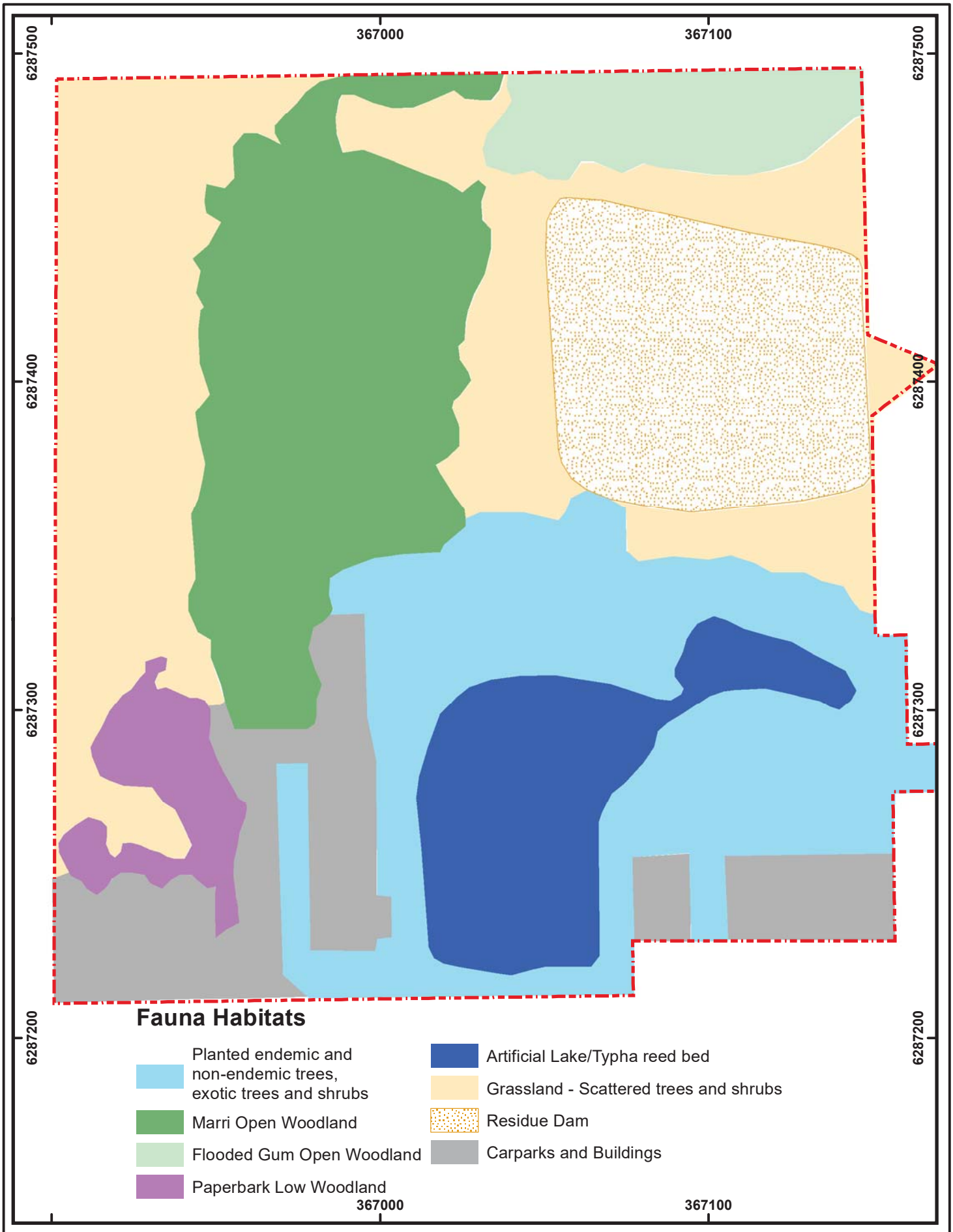
Metres

Fauna Survey

Capel Dry Plant
Iluka Resources Ltd

Subject Site Air Photo

Drawn: G Harewood	
Date: May 2018	
Scale: 1:1,500	
Projection/Coordinate System: UTM/MGA Zone 50	Figure: 2



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Subject Site

N

0 20 40 60 80 100

Metres

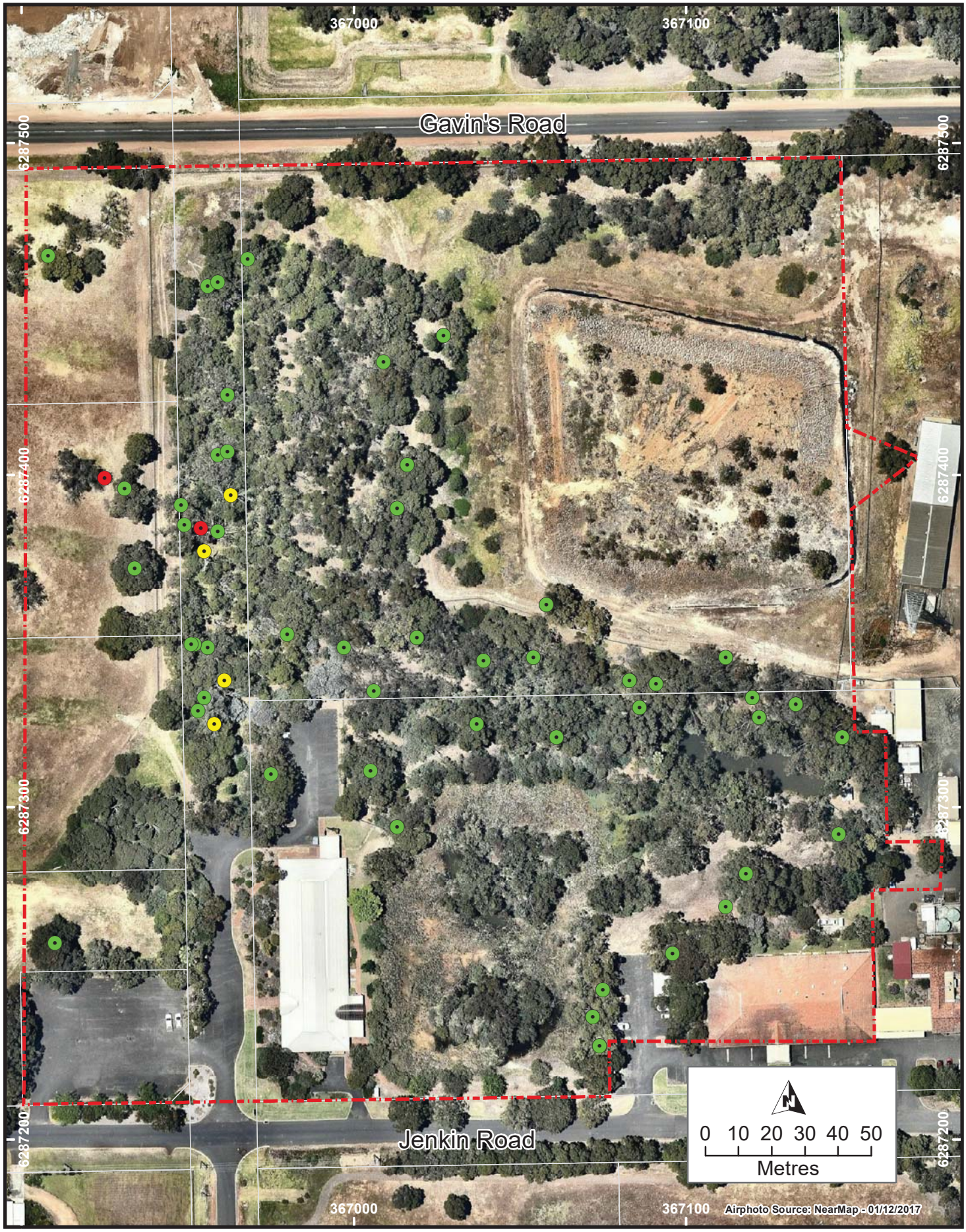
Fauna Survey

Capel Dry Plant
Iluka Resources Ltd

Fauna Habitats

Drawn: G Harewood
Date: May 2018
Scale: 1:1,500
Projection/Coordinate System: UTM/MGA Zone 50

Figure: 3



Legend

- Subject Site
- Habitat Tree - One or more large hollows possibly suitable for black cockatoos
- Habitat Tree - One or more possible small/medium hollows
- Habitat Tree - No hollows seen

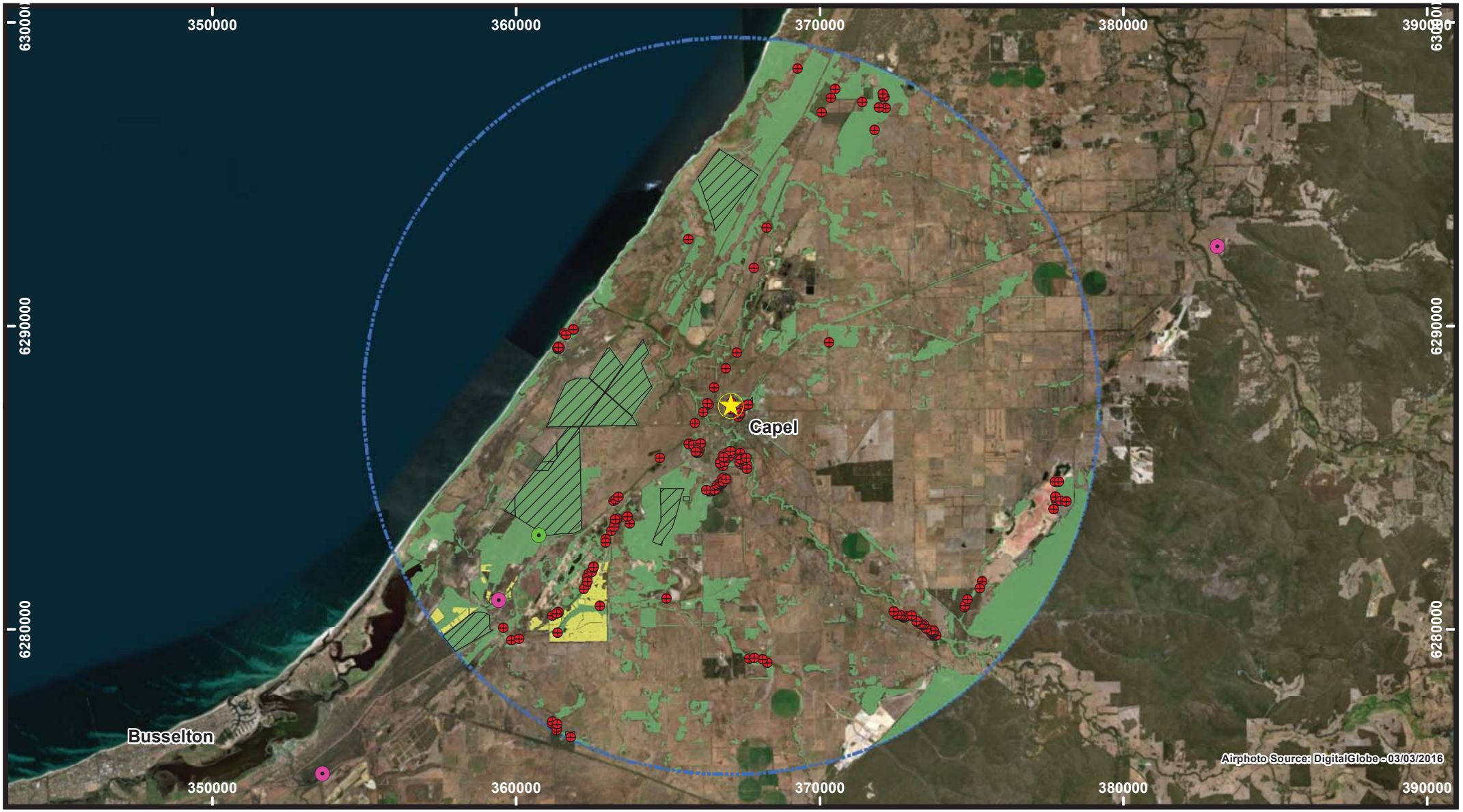
Fauna Survey

Capel Dry Plant
Iluka Resources Ltd

Habitat Trees (DBH≥50cm)

Drawn: G Harewood
Date: May 2018
Scale: 1:1,500
Projection/Coordinate System: UTM/MGA Zone 50

Figure: 4



Legend

- Subject Site
- 12km Buffer
- National Park/Nature Reserve
- Remnant Native Vegetation
- Pine Plantations
- Documented Cockatoo Nest Site
- Documented Cockatoo Roost Site
- WRP Records (G. Harewood)

0 2 4 6 8 10
Kilometres

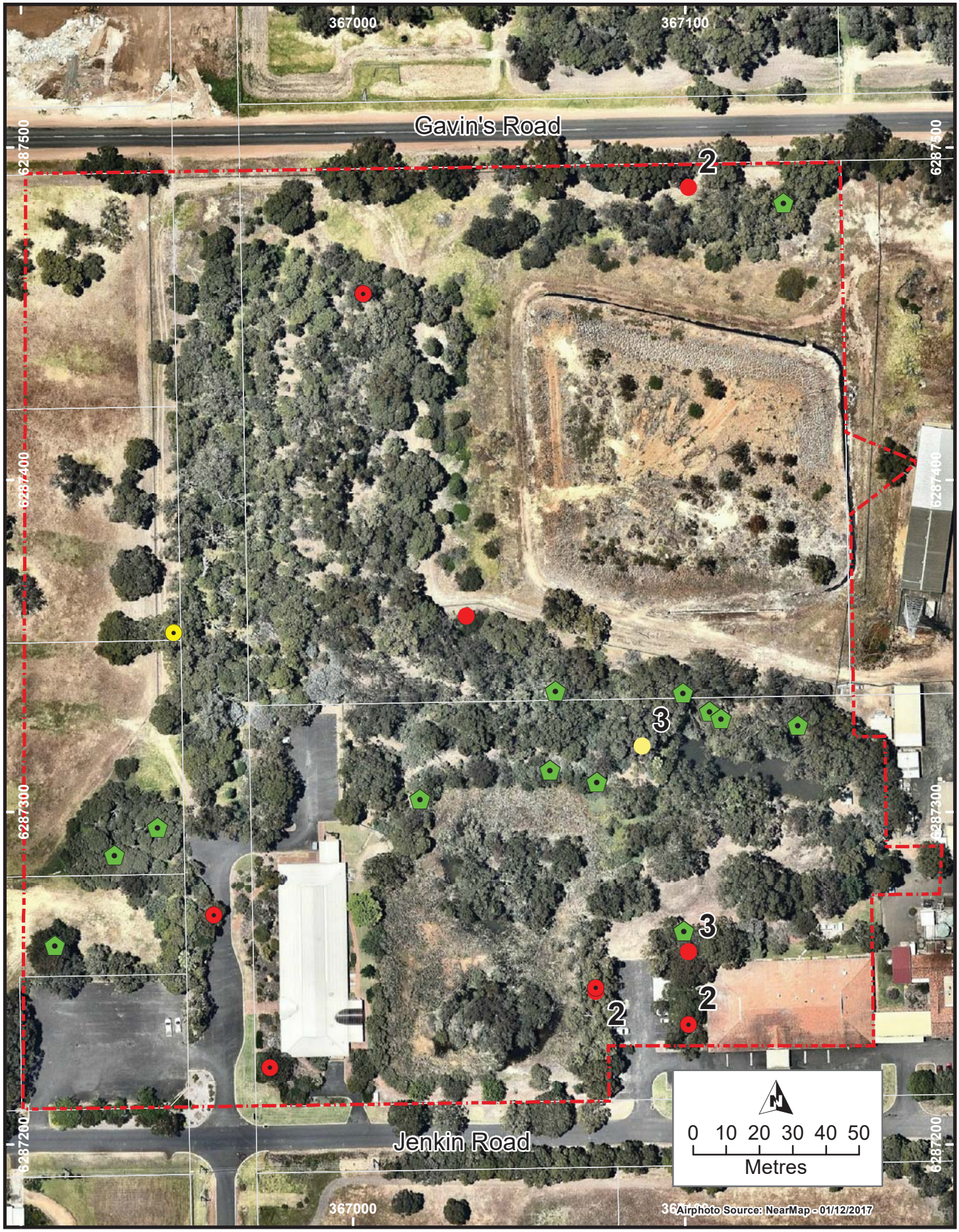
Fauna Survey

Capel Dry Plant
Iluka Resources Ltd

Regional Cockatoo and WRP Records

Drawn: G Harewood
Date: May 2018
Scale: 1:170,000
Projection/Coordinate System: UTM/MGA Zone 50

Figure: 5



Legend

- CDP Combined Survey Area
- WRP Drey

Night 1

- Western Ringtail Possum
- Common Brushtail Possum

Night 2

- Western Ringtail Possum
- Common Brushtail Possum

Fauna Survey

Capel Dry Plant
Iluka Resources Ltd

Combined Possum Observations

Drawn: G Harewood
Date: May 2018
Scale: 1:1,500
Projection/Coordinate System: UTM/MGA Zone 50

Figure: 6

APPENDIX A

CONSERVATION CATEGORIES

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

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

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

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

Wildlife Conservation (Specially Protected Fauna) Notice 2015 Categories

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

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

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

Western Australian DBCA Priority Fauna Categories

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

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

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

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

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

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

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

Categories are summarized below.

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

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

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

APPENDIX B

OBSERVED AND POTENTIAL VERTEBRATE FAUNA LISTING

Observed and Potential Vertebrate Fauna Listing

Capel Dry Plant, Capel - WA

Approx. centroid = 115.5683°E, 33.54503°S
Compiled by Greg Harewood - March 2018
Recorded (Captured/Sighted/Heard/Signs) = X

A = Harewood, G (2018). Fauna Assessment Capel Dry Plant. Unpublished report for Iluka Resources Ltd. May 2018.
B = Harewood, G (2013). Terrestrial Fauna Assessment (Level 1) Yoganup Extended Mineral Sands Project. Unpublished report for Iluka Resources Limited. March 2013.
Harewood, G (2017). Fauna Assessment Lot 3833 (Part) Hyder Road. Unpublished report for Iluka Resources Limited. February 2017.
C = Harewood, G (2014). Phase 1 and 2 Seasonal Fauna Surveys (Level 2) . Yoongarillup Mineral Sands Project. Unpublished report for Doral Mineral Sands Pty Ltd.
D = Biologic (2014). Wonnerup North Vertebrate Fauna Assessment. Unpublished report for Cristal Mining Australia Ltd. April 2014.
E = Biota (2009). Tutunup Fauna Assemblage and Fauna Habitat Seasonal Survey. Unpublished report for Iluka Resources. March 2009.
F = Harewood, G (2008). Fauna Assessment Survey - Lot 187 Stratham. Unpublished report for MBS Environmental. January 2008.
G = Biota (2007a). Yoganup 215 Strand Fauna and Faunal Assemblage Survey. Unpublished report for Iluka Resources. February 2007.
H = Biota (2007b). Tutunup South Fauna Habitat and Fauna Assemblage Seasonal Survey. Unpublished report for Iluka Resources. December 2007.
I = Bamford, M. and A. (2001). Fauna Survey of the Ludlow Mining Lease. Final Report. Unpublished report for Cable Sands (WA) Pty Ltd. November 2001
J = Hart, Simpson and Assoc. (1997). Wonnerup -Tutunup Road - Vertebrate Fauna. Unpublished report for Westralian Sands Ltd.
K = DBCA (2017). NatureMap Database search. “By Circle” 115° 34' 06" E, 33° 32' 42" S (plus 20km buffer). 19/12/2017.

Class / **Family** / *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J	K
Amphibia													
Myobatrachidae Ground or Burrowing Frogs													
Crinia georgiana	Quacking Frog	LC					X		X	X		X	X
Crinia glauerti	Clicking Frog	LC	X	X		X	X		X			X	X
Crinia insignifera	Squelching Froglet	LC			X	X	X	X	X	X	X	X	X
Geocrinia leai	Ticking Frog	LC											X
Heleioporus eyrei	Moaning Frog	LC		X	X	X	X	X	X	X	X	X	X
Limnodynastes dorsalis	Western Banjo Frog	LC			X	X		X		X	X	X	X

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others.

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J	K
Hylidae Tree or Water-Holding Frogs													
Litoria adelaidensis	Slender Tree Frog	LC	X	X		X	X	X	X			X	X
Litoria moorei	Motorbike Frog	LC		X		X		X					X
Reptilia													
Gekkonidae Geckoes													
Christinus marmoratus	Marbled Gecko				X	X	X	X	X	X	X	X	X
Scincidae Skinks													
Acritoscincus trilineatum	Southwestern Cool Skink				X	X	X		X	X		X	
Cryptoblepharus buchananii	Fence Skink			X	X	X	X	X	X	X	X		X
Egernia kingii	King's Skink				X		X	X	X			X	X
Hemiergis gracilipes	Southwestern Mulch Skink								X				X
Hemiergis peronii tridactyla	Three-toed Earless Skink				X	X	X		X		X	X	
Hemiergis quadrilineata	Two-toed Mulch Skink							X					X
Lerista elegans	West Coast Four-toed Lerista				X	X	X	X	X	X	X		X
Menetia greyii	Dwarf Skink				X		X	X	X	X	X	X	X
Morethia lineoocellata	West Coast Pale-flecked Morethia				X		X	X	X	X	X	X	X
Tiliqua rugosa	Bobtail			X	X	X	X	X	X	X	X	X	X

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others.

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J	K
Elapidae Elapid Snakes													
Notechis scutatus	Tiger Snake							X	X			X	X
Pseudonaja affinis	Dugite				X	X		X			X	X	X
Aves													
Phasianidae Quails, Pheasants													
Coturnix pectoralis	Stubble Quail	LC		X	X	X							X
Anatidae Geese, Swans, Ducks													
Anas gracilis	Grey Teal	LC		X		X			X			X	X
Anas superciliosa	Pacific Black Duck	LC	X	X		X	X		X			X	X
Chenonetta jubata	Australian Wood Duck	LC	X	X	X	X	X		X			X	X
Tadorna tadornoides	Australian Shelduck	LC		X	X	X	X				X	X	X
Phalacrocoracidae Cormorants													
Phalacrocorax melanoleucos	Little Pied Cormorant	LC		X									
Phalacrocorax sulcirostris	Little Black Cormorant	LC					X						X

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others.

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J	K
Ardeidae Herons, Egrets, Bitterns													
Ardea alba	Great Egret	CA JA		X									
Ardea novaehollandiae	White-faced Heron	LC		X	X	X	X		X			X	
Ardea pacifica	White-necked Heron	LC		X		X							X
Threskiornithidae Iibises, Spoonbills													
Platalea flavipes	Yellow-billed Spoonbill	LC		X		X							X
Threskiornis molucca	Australian White Ibis	LC		X	X	X						X	
Threskiornis spinicollis	Straw-necked Ibis	LC	X	X	X	X	X		X			X	X
Accipitridae Kites, Goshawks, Eagles, Harriers													
Accipiter cirrocephalus	Collared Sparrowhawk	Bp LC			X						X		X
Accipiter fasciatus	Brown Goshawk	Bp LC		X				X		X	X		X
Aquila audax	Wedge-tailed Eagle	Bp LC			X	X	X	X	X		X	X	X
Aquila morphnoides	Little Eagle	Bp LC		X							X		
Circus approximans	Swamp Harrier	LC		X				X	X				X
Elanus caeruleus	Black-shouldered Kite	LC		X									
Haliastur sphenurus	Whistling Kite	Bp LC		X		X	X	X			X		X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J	K
Falconidae Falcons													
Falco berigora	Brown Falcon	Bp LC		X							X		X
Falco cenchroides	Australian Kestrel	LC		X	X	X		X	X				X
Falco longipennis	Australian Hobby	LC						X	X				X
Falco peregrinus	Peregrine Falcon	S7 Bp LC											X
Rallidae Rails, Crakes, Swamphens, Coots													
Fulica atra	Eurasian Coot	LC		X									X
Gallinula tenebrosa	Dusky Moorhen	Bh LC							X				X
Porphyrio porphyrio	Purple Swamphen	LC		X									X
Charadriidae Lapwings, Plovers, Dotterels													
Vanellus tricolor	Banded Lapwing	LC		X									X
Columbidae Pigeons, Doves													
Columba livia	Domestic Pigeon	Introduced											X
Ocyphaps lophotes	Crested Pigeon	LC		X	X	X	X		X			X	X
Phaps chalcoptera	Common Bronzewing	Bh LC	X	X	X	X	X	X	X	X	X	X	X
Streptopelia senegalensis	Laughing Turtle-Dove	Introduced							X				X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J	K
Psittacidae Parrots													
Cacatua roseicapilla	Galah	LC	X	X				X					X
Cacatua sanguinea	Little Corella	LC		X									X
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo	S3 VU Be	X	X	X		X	X	X	X		X	X
Calyptorhynchus baudinii	Baudin's Black Cockatoo	S2 EN Bp EN A3cde	X	X	X	X	X		X			X	X
Calyptorhynchus latirostris	Carnaby's Black Cockatoo	S2 EN Bp EN A2bcde		X	X	X	X	X	X	X	X	X	X
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	LC			X					X			
Neophema elegans	Elegant Parrot	LC		X	X	X	X		X	X			X
Platycercus icterotis icterotis	Western Rosella (western ssp)	Bp LC					X		X		X		
Platycercus spurius	Red-capped Parrot	LC	X	X	X	X	X	X	X	X	X	X	X
Platycercus zonarius	Australian Ringneck	LC	X	X	X	X	X	X	X	X	X	X	X
Polytelis anthopeplus	Regent Parrot	LC				X		X	X		X	X	X
Cuculidae Parasitic Cuckoos													
Cacomantis flabelliformis	Fan-tailed Cuckoo	LC					X	X			X	X	X
Chrysococcyx basalis	Horsfield's Bronze Cuckoo	LC					X		X				X
Chrysococcyx lucidus	Shining Bronze Cuckoo	LC	X		X		X		X		X	X	X
Cuculus pallidus	Pallid Cuckoo	LC		X			X					X	

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J	K
Strigidae Hawk Owls													
Ninox novaeseelandiae	Boobook Owl	LC		X	X	X	X				X		
Tytonidae Barn Owls													
Tyto alba	Barn Owl	LC		X									X
Podargidae Frogmouths													
Podargus strigoides	Tawny Frogmouth	LC		X			X				X		X
Halcyonidae Tree Kingfishers													
Dacelo novaeguineae	Laughing Kookaburra	Introduced		X	X	X	X	X	X	X	X	X	X
Todiramphus sanctus	Sacred Kingfisher	LC					X				X	X	X
Meropidae Bee-eaters													
Merops ornatus	Rainbow Bee-eater	JA LC		X	X	X	X	X	X	X	X	X	X
Maluridae Fairy Wrens, GrassWrens													
Malurus splendens	Splendid Fairy-wren	Bh LC	X	X	X	X	X	X	X	X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J	K
Acanthizidae Thornbills, Geryones, Fieldwrens & Whitefaces													
Acanthiza apicalis	Broad-tailed Thornbill	Bh LC		X	X		X	X	X	X	X	X	X
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	Bh LC		X	X	X	X	X	X		X	X	X
Gerygone fusca	Western Gerygone	LC	X	X	X	X	X	X	X	X	X	X	X
Sericornis frontalis	White-browed Scrubwren	Bh LC			X	X	X	X	X	X	X		X
Smicrornis brevirostris	Weebill	Bh LC	X	X	X		X	X		X	X		X
Pardalotidae Pardalotes													
Pardalotus punctatus	Spotted Pardalote	LC					X		X		X		X
Pardalotus striatus	Striated Pardalote	LC	X	X	X	X	X	X	X	X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J	K
Meliphagidae Honeyeaters, Chats													
Anthochaera carunculata	Red Wattlebird	LC	X	X	X	X		X	X	X	X	X	X
Anthochaera lunulata	Western Little Wattlebird	Bp LC		X									X
Epthianura albifrons	White-fronted Chat	LC							X				X
Lichenostomus virescens	Singing Honeyeater	LC					X			X			
Lichmera indistincta	Brown Honeyeater	LC	X	X	X	X	X		X	X	X	X	X
Phylidonyris nigra	White-cheeked Honeyeater	Bp LC							X				
Phylidonyris novaehollandiae	New Holland Honeyeater	Bp LC	X	X	X	X	X		X	X		X	X
Petroicidae Australian Robins													
Petroica multicolor	Scarlet Robin	Bh LC		X	X	X	X	X	X	X	X		
Neosittidae Sitellas													
Daphoenositta chrysoptera	Varied Sittella	Bh LC			X		X		X		X		X
Pachycephalidae Crested Shrike-tit, Crested Bellbird, Shrike Thrushes, Whistlers													
Pachycephala pectoralis	Golden Whistler	Bh LC		X	X	X	X	X	X	X	X		
Pachycephala rufiventris	Rufous Whistler	LC	X	X	X		X	X	X		X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J	K
Dicruridae Monarchs, Magpie Lark, Flycatchers, Fantails, Drongo													
Grallina cyanoleuca	Magpie-lark	LC		X	X	X		X	X			X	X
Rhipidura fuliginosa	Grey Fantail	LC	X	X	X	X	X	X	X	X	X	X	
Rhipidura leucophrys	Willie Wagtail	LC	X	X	X	X	X	X	X	X	X	X	X
Campephagidae Cuckoo-shrikes, Trillers													
Coracina novaehollandiae	Black-faced Cuckoo-shrike	LC		X	X	X	X	X	X	X	X	X	X
Lalage tricolor	White-winged Triller	LC		X									X
Artamidae Woodswallows, Butcherbirds, Currawongs													
Artamus cinereus	Black-faced Woodswallow	Bp LC		X				X	X		X	X	X
Artamus cyanopterus	Dusky Woodswallow	Bp LC		X			X		X	X			X
Cracticidae Currawongs, Magpies & Butcherbirds													
Cracticus tibicen	Australian Magpie	LC		X	X	X	X	X	X	X	X	X	X
Cracticus torquatus	Grey Butcherbird	LC	X	X	X	X	X	X	X		X	X	X
Corvidae Ravens, Crows													
Corvus coronoides	Australian Raven	LC		X	X	X	X	X	X	X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J	K
Motacillidae Old World Pipits, Wagtails													
Anthus australis	Australian Pipit	LC		X	X	X	X		X				
Dicaeidae Flowerpeckers													
Dicaeum hirundinaceum	Mistletoebird	LC											X
Hirundinidae Swallows, Martins													
Hirundo ariel	Fairy Martin	LC		X									
Hirundo neoxena	Welcome Swallow	LC		X	X	X		X	X	X		X	X
Hirundo nigricans	Tree Martin	LC	X	X	X	X	X	X	X			X	
Sylviidae Old World Warblers													
Acrocephalus australis	Australian Reed Warbler	LC											X
Cincloramphus cruralis	Brown Songlark	LC			X								
Cincloramphus mathewsi	Rufous Songlark	LC										X	
Megalurus gramineus	Little Grassbird	LC											X
Zosteropidae White-eyes													
Zosterops lateralis	Silvereye	LC	X	X			X	X	X	X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J	K
Mammalia													
Peramelidae Bandicoots													
Isoodon fusciventer	Quenda	P4 LC		X	X		X		X	X	X	X	X
Phalangeridae Brushtail Possums, Cuscuses													
Trichosurus vulpecula	Common Brushtail Possum	LC	X	X	X	X	X	X	X	X	X	X	X
Pseudocheiridae Ringtail Posssums													
Pseudocheirus occidentalis	Western Ringtail Possum	S1 VU CR A2bce+3bce+4bc	X	X		X	X	X			X		X
Molossidae Freetail Bats													
Austronomus australis	White-striped Freetail-bat	LC		X	X	X			X	X	X		
Ozimops kitcheneri	South-western Freetail-bat	LC			X	X							

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J	K
Vespertilionidae Ordinary Bats													
Chalinolobus gouldii	Gould's Wattled Bat	LC			X	X	X	X					
Chalinolobus morio	Chocolate Wattled Bat	LC			X	X	X			X			
Nyctophilus geoffroyi	Lesser Long-eared Bat	LC			X	X	X	X					
Nyctophilus gouldi	Gould's Long-eared Bat	LC				X		X		X	X		
Nyctophilus major	Western Long-eared Bat	LC									X		
Vespadelus regulus	Southern Forest Bat	LC			X	X	X	X	X	X			X
Muridae Rats, Mice													
Mus musculus	House Mouse	Introduced			X	X	X		X		X	X	X
Rattus rattus	Black Rat	Introduced			X	X	X	X			X		X
Canidae Dogs, Foxes													
Vulpes vulpes	Red Fox	Introduced	X	X	X	X	X	X			X	X	X
Felidae Cats													
Felis catus	Cat	Introduced		X		X	X	X			X		
Leporidae Rabbits, Hares													
Oryctolagus cuniculus	Rabbit	Introduced		X	X	X	X	X	X	X	X	X	X

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APPENDIX C

DBCA & EPBC ACT DATABASE SEARCH RESULTS

NatureMap
Mapping Western Australia's biodiversity

NatureMap - Capel Dry Plant

Created By Greg Harewood on 12/03/2018

Kingdom	Animalia
Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Circle'
Centre	115° 34' 06" E,33° 32' 42" S
Buffer	20km
Group By	Species Group

Species Group	Species	Records
Amphibian	11	110
Bird	188	9892
Fish	38	102
Invertebrate	179	792
Mammal	34	1732
Reptile	35	223
TOTAL	**485**	**12851**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Amphibian					
1.	25398	*Crinia georgiana (Quacking Frog)*			
2.	25399	*Crinia glauerti (Clicking Frog)*			
3.	25400	*Crinia insignifera (Squelching Froglet)*			
4.	25401	*Crinia pseudinsignifera (Bleating Froglet)*			
5.	25404	*Geocrinia leai (Ticking Frog)*			
6.	25410	*Heleioporus eyrei (Moaning Frog)*			
7.	25415	*Limnodynastes dorsalis (Western Banjo Frog)*			
8.	25378	*Litoria adelaidensis (Slender Tree Frog)*			
9.	25388	*Litoria moorei (Motorbike Frog)*			
10.	25419	*Metacrinia nichollsi (Forest Toadlet)*			
11.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
Bird					
12.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
13.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
14.	24262	*Acanthiza inornata (Western Thornbill)*			
15.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
16.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
17.	25536	*Accipiter fasciatus (Brown Goshawk)*			
18.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
19.	41323	*Actitis hypoleucos (Common Sandpiper)*		IA	
20.	25544	*Aegotheles cristatus (Australian Owlet-nightjar)*			
21.	24301	*Aegotheles cristatus subsp. cristatus (Australian Owlet-nightjar)*			
22.	24310	*Anas castanea (Chestnut Teal)*			
23.	24312	*Anas gracilis (Grey Teal)*			
24.	24313	*Anas platyrhynchos (Mallard)*			
25.	24315	*Anas rhynchotis (Australasian Shoveler)*			
26.	24316	*Anas superciliosa (Pacific Black Duck)*			
27.	47414	*Anhinga novaehollandiae (Australasian Darter)*			
28.	24561	*Anthochaera carunculata (Red Wattlebird)*			
29.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
30.	24285	*Aquila audax (Wedge-tailed Eagle)*			
31.	25558	*Ardea ibis (Cattle Egret)*		IA	
32.	41324	*Ardea modesta (great egret, white egret)*		IA	
33.	24341	*Ardea pacifica (White-necked Heron)*			
34.	24610	*Ardeotis australis (Australian Bustard)*			
35.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
36.	24353	*Artamus cyanopterus (Dusky Woodswallow)*			
37.	24318	*Aythya australis (Hardhead)*			
38.		*Barnardius zonarius*			
39.	24319	*Biziura lobata (Musk Duck)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
40.	24345	*Botaurus poiciloptilus (Australasian Bittern)*		T	
41.	25714	*Cacatua pastinator (Western Long-billed Corella)*			
42.	25715	*Cacatua roseicapilla (Galah)*			
43.	25716	*Cacatua sanguinea (Little Corella)*			
44.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
45.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
46.	24779	*Calidris acuminata (Sharp-tailed Sandpiper)*		IA	
47.	24784	*Calidris ferruginea (Curlew Sandpiper)*		T	
48.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
49.	25717	*Calyptorhynchus banksii (Red-tailed Black-Cockatoo)*			
50.	24731	*Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black-Cockatoo)*		T	
51.	24733	*Calyptorhynchus baudinii (Baudin's Cockatoo (long-billed black-cockatoo), Baudin's Cockatoo)*		T	
52.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)*		T	
53.	48400	*Calyptorhynchus sp. (white-tailed black cockatoo)*		T	
54.	25575	*Charadrius leschenaultii (Greater Sand Plover)*		IA	
55.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
56.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
57.		*Chroicocephalus novaehollandiae*			
58.	24431	*Chrysococcyx basalis (Horsfield's Bronze Cuckoo)*			
59.	25601	*Chrysococcyx lucidus (Shining Bronze Cuckoo)*			
60.	24432	*Chrysococcyx lucidus subsp. plagosus (Shining Bronze Cuckoo)*			
61.		*Circus aeruginosus*			Y
62.	24288	*Circus approximans (Swamp Harrier)*			
63.	24289	*Circus assimilis (Spotted Harrier)*			
64.	24774	*Cladorhynchus leucocephalus (Banded Stilt)*			
65.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
66.	24399	*Columba livia (Domestic Pigeon)*	Y		
67.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
68.	25592	*Corvus coronoides (Australian Raven)*			
69.	24417	*Corvus coronoides subsp. perplexus (Australian Raven)*			
70.	24671	*Coturnix pectoralis (Stubble Quail)*			
71.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
72.	25595	*Cracticus tibicen (Australian Magpie)*			
73.		*Cracticus torquartus*			
74.	25596	*Cracticus torquatus (Grey Butcherbird)*			
75.	24322	*Cygnus atratus (Black Swan)*			
76.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
77.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
78.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
79.	25618	*Diomedea exulans (Wandering Albatross)*		T	
80.	24470	*Dromaius novaehollandiae (Emu)*			
81.		*Egretta garzetta*			
82.		*Egretta novaehollandiae*			
83.		*Elanus axillaris*			
84.	47937	*Elseyornis melanops (Black-fronted Dotterel)*			
85.		*Eolophus roseicapillus*			
86.	24651	*Eopsaltria australis subsp. griseogularis (Western Yellow Robin)*			
87.	24652	*Eopsaltria georgiana (White-breasted Robin)*			
88.	24567	*Epthianura albifrons (White-fronted Chat)*			
89.	24379	*Erythrogonys cinctus (Red-kneed Dotterel)*			
90.	24368	*Eurostopodus argus (Spotted Nightjar)*			
91.	25621	*Falco berigora (Brown Falcon)*			
92.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
93.	24472	*Falco cenchroides subsp. cenchroides (Australian Kestrel, Nankeen Kestrel)*			
94.	25623	*Falco longipennis (Australian Hobby)*			
95.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
96.	24616	*Falcunculus frontatus subsp. leucogaster (Western Shrike-tit, Crested Shrike-tit)*			
97.	25727	*Fulica atra (Eurasian Coot)*			
98.	25729	*Gallinula tenebrosa (Dusky Moorhen)*			
99.	25730	*Gallirallus philippensis (Buff-banded Rail)*			
100.	42314	*Gavicalis virescens (Singing Honeyeater)*			
101.	25530	*Gerygone fusca (Western Gerygone)*			
102.	24271	*Gerygone fusca subsp. fusca (Western Gerygone)*			
103.	24443	*Grallina cyanoleuca (Magpie-lark)*			
104.	24487	*Haematopus longirostris (Pied Oystercatcher)*			
105.	24293	*Haliaeetus leucogaster (White-bellied Sea-Eagle)*			
106.	24295	*Haliastur sphenurus (Whistling Kite)*			
107.	47965	*Hieraaetus morphnoides (Little Eagle)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
108.	25734	*Himantopus himantopus (Black-winged Stilt)*			
109.	24491	*Hirundo neoxena (Welcome Swallow)*			
110.		*Hydroprogne caspia*			
111.	24347	*Ixobrychus flavicollis subsp. australis (black bittern (southwest), Australian Black Bittern)*		P1	
112.	24367	*Lalage tricolor (White-winged Triller)*			
113.	25638	*Larus pacificus (Pacific Gull)*			
114.	25661	*Lichmera indistincta (Brown Honeyeater)*			
115.	25741	*Limosa limosa (Black-tailed Godwit)*		IA	
116.		*Lophoictinia isura*			
117.	24690	*Macronectes giganteus (Southern Giant Petrel)*		IA	
118.	24326	*Malacorhynchus membranaceus (Pink-eared Duck)*			
119.	25650	*Malurus elegans (Red-winged Fairy-wren)*			
120.	25654	*Malurus splendens (Splendid Fairy-wren)*			
121.	24552	*Malurus splendens subsp. splendens (Splendid Fairy-wren)*			
122.	25758	*Megalurus gramineus (Little Grassbird)*			
123.	24598	*Merops ornatus (Rainbow Bee-eater)*		IA	
124.		*Microcarbo melanoleucos*			
125.	25610	*Myiagra inquieta (Restless Flycatcher)*			
126.	24738	*Neophema elegans (Elegant Parrot)*			
127.	24739	*Neophema petrophila (Rock Parrot)*			
128.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
129.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
130.	24328	*Oxyura australis (Blue-billed Duck)*		P4	
131.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
132.		*Pachycephala sp.*			Y
133.	24692	*Pachyptila belcheri (Slender-billed Prion)*			
134.	24693	*Pachyptila desolata (Antarctic Prion)*			
135.		*Pandion cristatus*			
136.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
137.	24626	*Pardalotus punctatus subsp. xanthopyge (Yellow-rumped Pardalote)*			
138.	25682	*Pardalotus striatus (Striated Pardalote)*			
139.	24630	*Pardalotus striatus subsp. westraliensis (Striated Pardalote)*			
140.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
141.	48061	*Petrochelidon nigricans (Tree Martin)*			
142.	48066	*Petroica boodang (Scarlet Robin)*			
143.	25697	*Phalacrocorax carbo (Great Cormorant)*			
144.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
145.	25699	*Phalacrocorax varius (Pied Cormorant)*			
146.	24668	*Phalacrocorax varius subsp. hypoleucos (Pied Cormorant)*			
147.	24409	*Phaps chalcoptera (Common Bronzewing)*			
148.	48071	*Phylidonyris niger (White-cheeked Honeyeater)*			
149.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
150.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
151.	24842	*Platalea regia (Royal Spoonbill)*			
152.	25720	*Platycercus icterotis (Western Rosella)*			
153.	24745	*Platycercus icterotis subsp. icterotis (Western Rosella)*			
154.	24747	*Platycercus spurius (Red-capped Parrot)*			
155.	25721	*Platycercus zonarius (Australian Ringneck, Ring-necked Parrot)*			
156.	24750	*Platycercus zonarius subsp. semitorquatus (Twenty-eight Parrot)*			
157.	24843	*Plegadis falcinellus (Glossy Ibis)*		IA	
158.	24382	*Pluvialis fulva (Pacific Golden Plover)*		IA	
159.	24383	*Pluvialis squatarola (Grey Plover)*		IA	
160.	25703	*Podargus strigoides (Tawny Frogmouth)*			
161.	24679	*Podargus strigoides subsp. brachypterus (Tawny Frogmouth)*			
162.	25704	*Podiceps cristatus (Great Crested Grebe)*			
163.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
164.	25722	*Polytelis anthopeplus (Regent Parrot)*			
165.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
166.	24767	*Porphyrio porphyrio subsp. bellus (Purple Swamphen)*			
167.	24769	*Porzana fluminea (Australian Spotted Crake)*			
168.	25732	*Porzana pusilla (Baillon's Crake)*			
169.	24771	*Porzana tabuensis (Spotless Crake)*			
170.	24703	*Pterodroma lessonii (White-headed Petrel)*			
171.	25710	*Pterodroma macroptera (Great-winged Petrel)*			
172.		*Purpureicephalus spurius*			
173.	24776	*Recurvirostra novaehollandiae (Red-necked Avocet)*			
174.	48096	*Rhipidura albiscapa (Grey Fantail)*			
175.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
176.	25534	*Sericornis frontalis (White-browed Scrubwren)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
177.	24279	*Sericornis frontalis subsp. maculatus (White-browed Scrubwren)*			
178.	30948	*Smicrornis brevirostris (Weebill)*			
179.	24645	*Stagonopleura oculata (Red-eared Firetail)*			
180.	24329	*Stictonetta naevosa (Freckled Duck)*			
181.	25655	*Stipiturus malachurus (Southern Emu-wren)*			
182.	25597	*Strepera versicolor (Grey Currawong)*			
183.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
184.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
185.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
186.	34134	*Thalassarche carteri (Indian Yellow-nosed Albatross)*		T	
187.		*Thalasseus bergii*			
188.	48135	*Thinornis rubricollis (Hooded Plover, Hooded Dotterel)*		P4	
189.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
190.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
191.	24806	*Tringa glareola (Wood Sandpiper)*		IA	
192.	24808	*Tringa nebularia (Common Greenshank, greenshank)*		IA	
193.	24809	*Tringa stagnatilis (Marsh Sandpiper, little greenshank)*		IA	
194.	48147	*Turnix varius (Painted Button-quail)*			
195.	24852	*Tyto alba subsp. delicatula (Barn Owl)*			
196.	24855	*Tyto novaehollandiae subsp. novaehollandiae (Masked Owl (southwest))*		P3	
197.	25577	*Vanellus miles (Masked Lapwing)*			
198.	24386	*Vanellus tricolor (Banded Lapwing)*			
199.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			

Fish

200.		*? ?*			
201.		*Acanthaluteres brownii*			
202.		*Acanthaluteres spilomelanurus*			
203.		*Acanthaluteres vittiger*			
204.		*Apogon rueppellii*			
205.		*Aseraggodes haackeanus*			
206.		*Atherinosoma sp.*			
207.		*Bostockia porosa*			
208.		*Brachaluteres jacksonianus*			
209.		*Cantheschenia longipinnis*			
210.		*Carassius auratus*			
211.		*Cochleoceps viridis*			
212.		*Coryphaena hippurus*			
213.		*Cristiceps australis*			
214.		*Dotalabrus aurantiacus*			
215.		*Echeneis naucrates*			
216.		*Edelia vittata*			
217.		*Eubalichthys cyanoura*			
218.	34028	*Galaxias occidentalis (Western Minnow)*			
219.		*Gambusia affinis*			
220.		*Gambusia holbrooki*			
221.	34030	*Geotria australis (Pouched Lamprey)*		P1	
222.		*Gymnapistes marmoratus*			
223.		*Haletta semifasciata*			
224.		*Heteroclinus adelaidae*			
225.		*Heteroclinus sp.*			
226.		*Meuschenia freycineti*			
227.		*Meuschenia galii*			
228.		*Nannoperca vittata*			
229.		*Perca fluviatilis*			
230.		*Posidonichthys hutchinsi*			
231.		*Pseudogobius olorum*			
232.		*Scobinichthys granulatus*			
233.		*Siphamia cephalotes*			
234.		*Siphonognathus radiatus*			
235.		*Stigmatopora argus*			
236.		*Thunnus maccoyii*			
237.		*Vanacampus poecilolaemus*			

Invertebrate

238.		*Acariformes sp.*			
239.		*Acarina sp.*			
240.		*Aeshnidae sp.*			
241.		*Aganippe rhaphiduca*			
242.		*Akamptogonus novarae*			
243.		*Allothereua maculata*			

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244.		*Amblyomma albolimbatum*			
245.		*Aname mainae*			
246.		*Aname tepperi*			
247.		*Ancylidae sp.*			
248.		*Anisops sp.*			
249.		*Antichiropus nanus*			
250.		*Antiporus femoralis*			
251.		*Antiporus sp.*			
252.		*Arachnura higginsi*			
253.		*Araneus cyphoxis*			
254.		*Araneus eburneiventris*			
255.		*Araneus recherchensis*			
256.		*Araneus senicaudatus*			
257.		*Argiope protensa*			
258.		*Argiope trifasciata*			
259.		*Arkys alticephala*			
260.		*Arkys walckenaeri*			
261.		*Arrenuridae sp.*			
262.		*Artoria flavimana*			
263.		*Artoriopsis expolita*			
264.		*Athericidae sp.*			
265.		*Aturidae sp.*			
266.		*Austracantha minax*			
267.		*Austrochthonius strigosus*			Y
268.		*Backobourkia brounii*			
269.		*Badumna insignis*			
270.		*Baetidae sp.*			
271.		*Baiami volucripes*			
272.		*Berosus discolor*			
273.		*Berosus munitipennis*			
274.	47873	*Bertmainius opimus (western pygmy trapdoor spider)*		P3	
275.		*Botryocladius freemani*			
276.		*Caenidae sp.*			
277.		*Ceinidae sp.*			
278.		*Celaenia excavata*			
279.		*Ceratopogonidae sp.*			
280.		*Cercophonius sulcatus*			
281.		*Cherax destructor*			
282.		*Cherax preissii*			
283.		*Cherax quinquecarinatus*			
284.		*Chironominae sp.*			
285.		*Chironomus aff. alternans (V24) (CB)*			
286.		*Chironomus tepperi*			
287.		*Chrysomelidae sp.*			
288.		*Clynotis severus*			
289.		*Coenagrionidae sp.*			
290.		*Copepoda sp.*			
291.		*Corduliidae sp.*			
292.		*Corixidae sp.*			
293.		*Cormocephalus hartmeyeri*			
294.		*Corynoneura sp. (V49) (SAP)*			
295.		*Cricotopus 'parbicinctus'*			
296.		*Cryptoerithus quobba*			
297.		*Culex (Culex) australicus*			
298.		*Culicidae sp.*			
299.		*Cyclosa trilobata*			
300.		*Cyrtophora parnasia*			
301.		*Dicrotendipes sp. A (V47) (SAP)*			
302.		*Dingosa serrata*			
303.		*Dugesiidae sp.*			
304.		*Dytiscidae sp.*			
305.		*Ecnomidae sp.*			
306.		*Eriophora biapicata*			
307.		*Eriophora pustulosa*			
308.		*Gelastocoridae sp.*			
309.		*Geogarypus taylori*			
310.		*Gomphidae sp.*			
311.		*Gripopterygidae sp.*			
312.		*Gyrinidae sp.*			
313.		*Harrisius sp.*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
314.		*Harrisius sp. B (SFM)*			
315.		*Helochares tenuistriatus*			
316.		*Helpis minitabunda*			
317.		*Hemicorduliidae sp.*			
318.		*Henicops dentatus*			
319.		*Heurodes turritus*			
320.		*Hydraenidae sp.*			
321.		*Hydrobiosidae sp.*			
322.		*Hydrophilidae sp.*			
323.		*Hydroptilidae sp.*			
324.		*Hyriidae sp.*			
325.		*Insulodrilus bifidus*			
326.		*Isopeda leishmanni*			
327.		*Isopedella cana*			
328.		*Isopedella castanea*			
329.		*Kiefferulus intertinctus*			
330.		*Lampona cylindrata*			
331.		*Lampona punctigera*			
332.		*Lancetes lanceolatus*			
333.		*Latrodectus hasseltii*			
334.		*Leptoceridae sp.*			
335.		*Leptoperla australica*			
336.		*Leptophlebiid genus S sp. AV1*			
337.		*Leptophlebiidae sp.*			
338.		*Lestidae sp.*			
339.		*Libellulidae sp.*			
340.		*Limbodessus inornatus*			
341.		*Limnophyes vestitus (V41)*			
342.		*Limnoxenus zelandicus*			
343.		*Maratus pavonis*			
344.		*Megapodagrionidae sp.*			
345.		*Micronecta robusta*			
346.		*Microvelia sp.*			
347.		*Missulena granulosa*			
348.		*Missulena occatoria*			
349.		*Mituliodon tarantulinus*			
350.		*Mitzoruga insularis*			
351.		*Nephila edulis*			
352.		*Newmanoperla exigua*			
353.		*Nicodamus mainae*			
354.		*Notonectidae sp.*			
355.		*Nousia sp. AV16*			
356.		*Nunciella aspera*			
357.		*Ocrisiona parmeliae*			
358.		*Oligochaeta sp.*			
359.		*Ommatoiulus moreletii*			
360.		*Opisthopora sp.*			
361.		*Oratemnus curtus*			
362.		*Orthocladiinae sp.*			
363.		*Ostracoda (unident.)*			
364.		*Palaemonidae sp.*			
365.		*Paracymus sp.*			
366.		*Paracymus spenceri*			
367.		*Parakiefferiella variegatus*			
368.		*Paralimnophyes pullulus (V42)*			
369.		*Paramelitidae sp.*			
370.		*Paramerina levidensis*			
371.		*Parastacidae sp.*			
372.		*Pentaneurini genus V20*			
373.		*Perthiidae sp.*			
374.		*Philopotamidae sp.*			
375.		*Pholcus phalangioides*			
376.		*Phreatoicidae sp.*			
377.		*Phreodrilidae sp.*			
378.		*Planorbidae sp.*			
379.		*Platorish gelorup*			
380.		*Platynectes decempuntatus var polygrammus*			
381.		*Platynectes sp.*			
382.		*Polypedilum nr. convexum (SAP)*			
383.		*Polypedilum watsoni*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
384.		*Protoneuridae sp.*			
385.		*Pyralidae sp.*			
386.		*Raveniella peckorum*			
387.		*Rhantus sp.*			
388.		*Rhantus suturalis*			
389.		*Richardsonianidae sp.*			
390.		*Riethia v5*			
391.		*Scirtidae sp.*			
392.		*Simuliidae sp.*			
393.		*Staphylinidae sp.*			
394.		*Sternopriscus browni*			
395.		*Sternopriscus sp.*			
396.		*Synthemistidae sp.*			
397.		*Tabanidae sp.*			
398.		*Tamopsis distinguenda*			
399.		*Tamopsis perthensis*			
400.		*Tanypodinae sp.*			
401.		*Tanytarsus nr K5*			
402.		*Tanytarsus palmatus*			
403.		*Tanytarsus sp.*			
404.		*Tasmanicosa leuckartii*			
405.		*Telephlebiidae sp.*			
406.		*Temnocephalidea sp.*			
407.		*Tetragnatha demissa*			
408.		*Tipulidae sp.*			
409.		*Triplectides sp. AV21 (SFM)*			
410.		*Trombidioidea sp.*			
411.		*Urodacus novaehollandiae*			
412.		*Uvarus pictipes*			
413.		*Venator immansueta*			
414.		*Venatrix pullastra*			
415.	34113	*Westralunio carteri (Carter's Freshwater Mussel)*		T	
416.		*Zachria flavicoma*			
Mammal					
417.	24209	*Arctocephalus tropicalis (Subantarctic fur-seal)*		T	
418.	24162	*Bettongia penicillata subsp. ogilbyi (Woylie, Brush-tailed Bettong)*		T	
419.	24251	*Bos taurus (European Cattle)*	Y		
420.	24072	*Caperea marginata (Pygmy Right Whale)*			
421.	24086	*Cercartetus concinnus (Western Pygmy-possum, Mundarda)*			
422.	24092	*Dasyurus geoffroii (Chuditch, Western Quoll)*		T	
423.	24043	*Eubalaena australis (Southern Right Whale)*		T	
424.	24189	*Falsistrellus mackenziei (Western False Pipistrelle, Western Falsistrelle)*		P4	
425.	24056	*Grampus griseus (Risso's Dolphin)*			
426.	24215	*Hydromys chrysogaster (Water-rat, Rakali)*		P4	
427.	25478	*Isoodon obesulus (Southern Brown Bandicoot)*		P4	
428.	24153	*Isoodon obesulus subsp. fusciventer (Quenda, Southern Brown Bandicoot)*		P4	
429.	24132	*Macropus fuliginosus (Western Grey Kangaroo)*			
430.	24133	*Macropus irma (Western Brush Wallaby)*		P4	
431.	24168	*Macrotis lagotis (Bilby, Dalgyte)*		T	
432.	24051	*Megaptera novaeangliae (Humpback Whale)*		S	
433.	24076	*Mesoplodon bowdoini (Andrew's Beaked Whale)*			
434.	24078	*Mesoplodon grayi (Gray's Beaked Whale)*			
435.	24213	*Mirounga leonina (Southern Elephant Seal)*			
436.	24223	*Mus musculus (House Mouse)*	Y		
437.	24085	*Oryctolagus cuniculus (Rabbit)*	Y		
438.	25508	*Phascogale tapoatafa (Brush-tailed Phascogale)*			
439.	48070	*Phascogale tapoatafa subsp. wambenger (South-western Brush-tailed Phascogale, Wambenger)*		T	
440.	24166	*Pseudocheirus occidentalis (Western Ringtail Possum, ngwayir)*		T	
441.	24240	*Pseudomys occidentalis (Western Mouse)*		P4	
442.	24245	*Rattus rattus (Black Rat)*	Y		
443.	24145	*Setonix brachyurus (Quokka)*		T	
444.	24167	*Tarsipes rostratus (Honey Possum, Noolbenger)*			
445.	25521	*Trichosurus vulpecula (Common Brushtail Possum)*			
446.	24158	*Trichosurus vulpecula subsp. vulpecula (Common Brushtail Possum)*			
447.	30954	*Tursiops aduncus (Indo-Pacific Bottlenose Dolphin)*			
448.	24069	*Tursiops truncatus (Bottlenose Dolphin)*			
449.	24206	*Vespadelus regulus (Southern Forest Bat)*			
450.	24040	*Vulpes vulpes (Red Fox)*	Y		

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Reptile					
451.	42368	*Acritoscincus trilineatus (Western Three-lined Skink)*			
452.	44629	*Anilios australis*			
453.	24990	*Aprasia pulchella (Granite Worm-lizard)*			
454.	25335	*Caretta caretta (Loggerhead Turtle)*		T	
455.	25336	*Chelonia mydas (Green Turtle)*		T	
456.	24980	*Christinus marmoratus (Marbled Gecko)*			
457.	30893	*Cryptoblepharus buchananii*			
458.	25020	*Cryptoblepharus plagiocephalus*			
459.	25047	*Ctenotus impar*			
460.	25049	*Ctenotus labillardieri*			
461.	25096	*Egernia kingii (King's Skink)*			
462.	25100	*Egernia napoleonis*			
463.	25250	*Elapognathus coronatus (Crowned Snake)*			
464.	30919	*Hemiergis gracilipes*			
465.	25475	*Hemiergis peronii*			
466.	25118	*Hemiergis peronii subsp. tridactyla*			
467.	25119	*Hemiergis quadrilineata*			
468.	43384	*Hydrophis platurus (Yellow-bellied Seasnake)*			
469.	25131	*Lerista distinguenda*			
470.	25133	*Lerista elegans*			
471.	25147	*Lerista lineata (Perth Slider, Lined Skink)*		P3	
472.	25005	*Lialis burtonis*			
473.	42413	*Lissolepis luctuosa (Western Swamp Skink)*			
474.	25184	*Menetia greyii*			
475.	25240	*Morelia spilota subsp. imbricata (Carpet Python)*			
476.	25191	*Morethia lineoocellata*			
477.	25252	*Notechis scutatus (Tiger Snake)*			
478.	25255	*Parasuta nigriceps*			
479.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
480.	25511	*Pseudonaja affinis (Dugite)*			
481.	25259	*Pseudonaja affinis subsp. affinis (Dugite)*			
482.	25519	*Tiliqua rugosa*			
483.	25207	*Tiliqua rugosa subsp. rugosa*			
484.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
485.	25225	*Varanus rosenbergi (Heath Monitor)*			

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

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

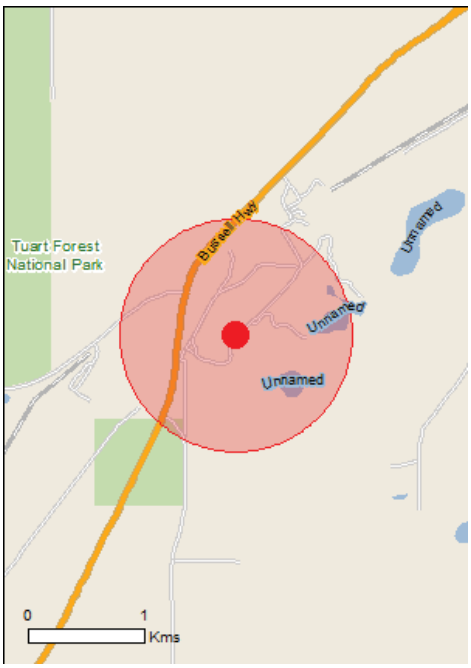
EPBC Act Protected Matters Report

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.

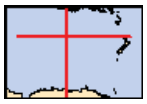
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

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

Report created: 12/03/18 13:23:01



Coordinates
Buffer: 1.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	25
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	15
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	21
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Vasse-wonnerup system	Within 10km of Ramsar

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
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Clay Pans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat likely to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Breeding known to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	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
Fish		
Nannatherina balstoni Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Plants		

Name	Status	Type of Presence
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Banksia nivea subsp. uliginosa Swamp Honeypot [82766]	Endangered	Species or species habitat likely to occur within area
Banksia squarrosa subsp. argillacea Whicher Range Dryandra [82769]	Vulnerable	Species or species habitat may occur within area
Brachyscias verecundus Ironstone Brachyscias [81321]	Critically Endangered	Species or species habitat may occur within area
Caladenia busselliana Bussell's Spider-orchid [24369]	Endangered	Species or species habitat likely to occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat may occur within area
Chamelaucium sp. S coastal plain (R.D.Royce 4872) Royce's Waxflower [87814]	Vulnerable	Species or species habitat likely to occur within area
Darwinia whicherensis Abba Bell [83193]	Endangered	Species or species habitat may occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat known to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat may occur within area
Gastrolobium papilio Butterfly-leaved Gastrolobium [78415]	Endangered	Species or species habitat may occur within area
Lambertia echinata subsp. occidentalis Western Prickly Honeysuckle [64528]	Endangered	Species or species habitat may occur within area
Petrophile latericola Laterite Petrophile [64532]	Endangered	Species or species habitat may occur within area
Verticordia densiflora var. pedunculata Long-stalked Featherflower [55689]	Endangered	Species or species habitat likely to occur within area
Verticordia plumosa var. vassensis Vasse Featherflower [55804]	Endangered	Species or species habitat may occur within area

Listed Migratory Species

[Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
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 likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
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 likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

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

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to 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]		Breeding known 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 likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to 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 known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
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 likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
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

Name	Status	Type of Presence
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		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
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur

Name	Status	Type of Presence 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

-33.57899 115.52887

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.

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APPENDIX D

BLACK COCKATOO HABITAT TREE DETAILS

Habitat Trees
DBH >50cm
Datum - GDA94
Entrance Size Ranges - Small = >5cm, Medium = 5, 10cm, Large = >10cm

Waypoint Number	Zone	mE	mN	Tree Species	Tree Height (m)	Number of Hollows	Estimated Hollow Entrance Sizes	Occupancy	Chew Marks	Potential Cockatoo Nest Hollow	Comments
wpt002	50H	367005	6287311	Tuart	20+	0		No Signs	No Signs	No	Planted
wpt003	50H	367013	6287294	Marri	15-20	0		No Signs	No Signs	No	
wpt005	50H	367037	6287325	Unknown Euc	20+	0		No Signs	No Signs	No	Planted
wpt007	50H	367061	6287321	Unknown Euc	15-20	0		No Signs	No Signs	No	Planted
wpt009	50H	367086	6287330	Tuart	20+	0		No Signs	No Signs	No	Planted
wpt010	50H	367083	6287338	Unknown Euc	20+	0		No Signs	No Signs	No	Planted
wpt011	50H	367091	6287337	Tuart	20+	0		No Signs	No Signs	No	Planted
wpt013	50H	367112	6287345	Tuart	20+	0		No Signs	No Signs	No	Planted
wpt014	50H	367120	6287333	Tuart	20+	0		No Signs	No Signs	No	Planted
wpt015	50H	367122	6287327	Unknown Euc	20+	0		No Signs	No Signs	No	Planted
wpt019	50H	367147	6287321	Unknown Euc	20+	0		No Signs	No Signs	No	Planted
wpt020	50H	367133	6287331	Tuart	20+	0		No Signs	No Signs	No	Planted
wpt021	50H	367054	6287345	Unknown Euc	20+	0		No Signs	No Signs	No	Planted
wpt022	50H	367019	6287351	Marri	15-20	0		No Signs	No Signs	No	
wpt023	50H	366997	6287348	Tuart	15-20	0		No Signs	No Signs	No	Planted
wpt024	50H	367006	6287335	Tuart	15-20	0		No Signs	No Signs	No	Planted
wpt025	50H	367039	6287344	Tuart	20+	0		No Signs	No Signs	No	Planted
wpt027	50H	367058	6287361	Unknown Euc	20+	0		No Signs	No Signs	No	Planted
wpt029	50H	367027	6287442	Marri	20+	0		No Signs	No Signs	No	
wpt030	50H	367009	6287434	Marri	20+	0		No Signs	No Signs	No	
wpt031	50H	367016	6287403	Marri	20+	0		No Signs	No Signs	No	
wpt032	50H	367013	6287390	Marri	20+	0		No Signs	No Signs	No	
wpt033	50H	367075	6287245	Unknown Euc	15-20	0		No Signs	No Signs	No	Planted
wpt034	50H	367072	6287237	Unknown Euc	15-20	0		No Signs	No Signs	No	Planted
wpt035	50H	367074	6287228	Unknown Euc	15-20	0		No Signs	No Signs	No	Planted

Waypoint Number	Zone	mE	mN	Tree Species	Tree Height (m)	Number of Hollows	Estimated Hollow Entrance Sizes	Occupancy	Chew Marks	Potential Cockatoo Nest Hollow	Comments
wpt101	50H	367096	6287256	Unknown Euc	20+	0		No Signs	No Signs	No	Planted
wpt103	50H	367112	6287270	Unknown Euc	20+	0		No Signs	No Signs	No	Planted
wpt104	50H	367118	6287280	Tuart	20+	0		No Signs	No Signs	No	Planted
wpt105	50H	367146	6287292	Unknown Euc	20+	0		No Signs	No Signs	No	Planted
wpt106	50H	366961	6287338	Dead Marri	15-20	2+	Small-Medium	No Signs	No Signs	No	Depth of hollows unknown
wpt107	50H	366956	6287348	Marri	20+	0		No Signs	No Signs	No	
wpt108	50H	366952	6287349	Marri	20+	0		No Signs	No Signs	No	
wpt109	50H	366951	6287349	Marri	20+	0		No Signs	No Signs	No	
wpt110	50H	366955	6287377	Dead Marri	20+	2+	Small-Medium	No Signs	No Signs	No	Roost site for Ibis
wpt111	50H	366954	6287384	Dead Marri	20+	2+	Small-Large (cockatoo)	No Signs	No Signs	Yes	Depth of hollows unknown
wpt112	50H	366959	6287383	Dead Marri	15-20	0		No Signs	No Signs	No	
wpt113	50H	366949	6287385	Marri	15-20	0		No Signs	No Signs	No	
wpt114	50H	366948	6287391	Marri	15-20	0		No Signs	No Signs	No	
wpt115	50H	366963	6287394	Dead Unknown	20+	2+	Small	No Signs	No Signs	No	Depth of hollows unknown
wpt116	50H	366959	6287406	Marri	20+	0		No Signs	No Signs	No	
wpt117	50H	366962	6287407	Marri	20+	0		No Signs	No Signs	No	
wpt118	50H	366962	6287424	Marri	15-20	0		No Signs	No Signs	No	
wpt119	50H	366956	6287457	Marri	20+	0		No Signs	No Signs	No	
wpt120	50H	366959	6287458	Marri	15-20	0		No Signs	No Signs	No	
wpt121	50H	366968	6287465	Marri	15-20	0		No Signs	No Signs	No	
wpt122	50H	366980	6287352	Marri	15-20	0		No Signs	No Signs	No	
wpt123	50H	366953	6287329	Marri	15-20	0		No Signs	No Signs	No	
wpt124	50H	366955	6287333	Marri	20+	0		No Signs	No Signs	No	
wpt125	50H	366958	6287325	Dead Unknown	10-15	2+	Small-Medium	No Signs	No Signs	No	Possible drey in hollow
wpt126	50H	366975	6287310	Unknown Euc	20+	0		No Signs	No Signs	No	Planted
wpt127	50H	366910	6287259	Unknown Euc	20+	0		No Signs	No Signs	No	Planted
wpt131	50H	366934	6287372	Marri	15-20	0		No Signs	No Signs	No	
wpt132	50H	366931	6287396	Marri	15-20	0		No Signs	No Signs	No	

Waypoint Number	Zone	mE	mN	Tree Species	Tree Height (m)	Number of Hollows	Estimated Hollow Entrance Sizes	Occupancy	Chew Marks	Potential Cockatoo Nest Hollow	Comments
wpt133	50H	366925	6287399	Flooded Gum	10-15	2+	Small-Large (cockatoo)	No Signs	No Signs	Yes	Depth of hollows unknown
wpt134	50H	366908	6287466	Unknown Euc	20+	0		No Signs	No Signs	No	Planted

DISCLAIMER

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

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

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

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

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

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