

Fauna Assessment



Miscellaneous Lots Farrall Road/Orchard Avenue Midvale

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Version 1

On behalf of:

Emerge Associates
Suite 4, 26 Railway Road
SUBIACO WA 6008
T: 08 9380 4988

Prepared by:

Greg Harewood
Zoologist
A.B.N. 95 536 627 336
PO Box 755
BUNBURY WA 6231
M: 0402 141 197
T/F: (08) 9725 0982
E: gharewood@iinet.net.au

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Acronyms/Abbreviations:

BA: Birdlife Australia (Formerly RAOU, Birds Australia).

°C: Degrees Celsius.

CALM: Department of Conservation and Land Management (now DPaW), WA Government.

CAMBA: China Australia Migratory Bird Agreement 1998.

CBD: Central Business District.

DEC: Department of Environment and Conservation (now DPaW), WA Government.

DEH: Department of Environment and Heritage (now DotE), Australian Government.

DEP: Department of Environment Protection (now DER), WA Government.

DER: Department of Environment Regulation (formerly DEC, DoE), WA Government.

DEWHA: Department of the Environment, Water, Heritage and the Arts (now DotE), Australian Government

DMP: Department of Mines and Petroleum (formerly DoIR), WA Government.

DoE: Department of Environment (now DER/DPaW), WA Government.

DotE: Department of the Environment (formerly SEWPaC, DWEHA, DEH), Australian Government.

DoIR: Department of Industry and Resources (now DMP), WA Government.

DPaW: Department of Parks and Wildlife (formerly DEC, CALM, DoE), WA Government.

EP Act: *Environmental Protection Act 1986*, WA Government.

EPA: Environmental Protection Authority, WA Government.

EPBC Act: *Environment Protection and Biodiversity Conservation Act 1999*, Australian Government.

ha: Hectare (10,000 square metres).

IBRA: Interim Biogeographic Regionalisation for Australia.

IUCN: International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union.

JAMBA: Japan Australia Migratory Bird Agreement 1981.

km: Kilometre.

m: Metre.

mm: Millimetre.

P: Priority - DPaW fauna conservation ranking.

RAOU: Royal Australia Ornithologist Union.

ROKAMBA: Republic of Korea-Australia Migratory Bird Agreement 2007.

S: Schedule - Western Australian *Wildlife Conservation Act (1950)* Threatened Fauna Category.

SEWPaC: Department of Sustainability, Environment, Water, Population and Communities (now DotE, formerly DEH, DEWHA), Australian Government

SSC: Species Survival Commission, International.

WA: Western Australia.

WAM: Western Australian Museum, WA Government.

WC Act: *Wildlife Conservation Act 1950*, WA Government.

SUMMARY

This report details the results of a fauna assessment of an area of land within the suburb of Midvale. The subject site is made up of 12 individual lots (Lot 3, 50, 102, 301, 303-305, 353-356 and 427) and has a total area of approximately 89 ha most of which is cleared of native vegetation. Lot 102 contains Bush Forever Site 309 (Farrall Road Bushland – Stratton) (Figure 1 & 2).

It is understood that the proponents are currently undertaking planning to support future development within sections of the subject site. A range of investigations, including this fauna survey, have been undertaken in order to fully understand the suite of environmental values across the area.

The scope of works was to conduct a level 1 fauna survey as defined by the Environmental Protection Authority (EPA 2004). Because some listed threatened species (i.e. several species of black cockatoo) 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 desktop study and single day and dusk reconnaissance survey.

Descriptions of the broadly defined fauna habitats, mainly based on the remaining vegetation units onsite as mapped by Emerge Associates (2013) are given below, with the extent of each identified unit being shown in Figure 3.

- Cleared (grassland with scattered trees/shrubs, roads, tracks).
Area = ~ 77.2 ha;
- Paperbark Low Woodland/Forest with emergent eucalypts (flooded gum/marri)(Incudes Bush Forever Site 309).
Area = ~ 5.3 ha;
- Flooded Gum Open Woodland.
Area = ~ 1.6 ha;
- Planted trees and shrubs around constructed lakes. Various species - endemic and non-endemic.
Area = ~ 1.1 ha;
- Marri, Blackbutt, Banksia Open Woodland.
Area = ~ 1.0 ha;
- Marri Open Woodland.
Area = ~ 0.7 ha;
- Tall Shrubland.
Area = ~ 0.7 ha;
- Constructed Lakes. Open water with small areas of *Typha* and sedges.
Area = ~ 1.6 ha;

- Woodbridge Creek.
Length = ~150 m; and
- Blackadder Creek.
Length = ~750 m.

Overall fauna habitat values at the site have been severely compromised by the total or partial clearing of native vegetation. Most areas lack any natural attributes and are now only utilised by generally common and widespread fauna species with non-specific requirements which allow them to persist in highly disturbed habitats.

The various groves of remnant vegetation (including Bush Forever Site 309) have the best value as fauna habitat though most areas are also degraded and lack native groundcover/shrubs and microhabitats such as hollow logs, presumably a consequence of partial clearing, historical livestock grazing, logging and frequent fires. This has also seen the biodiversity values of these areas of the site diminish from their original natural state.

Despite the area's history of disturbance the site does however still provide suitable habitat for a range of species, some of which are of conservation significance.

Opportunistic fauna observations are listed in Appendix B. A total of 33 native fauna species were observed (or positively identified from foraging evidence, scats, tracks, skeletons or calls) within the study area during the single day time survey. Seven introduced species were also confirmed as being present.

Evidence of one listed threatened black cockatoo species was observed (Carnaby's black-cockatoo – small flock (4) and foraging evidence (chewed marri and coastal blackbutt fruits)). No evidence of any migratory or DPaW priority fauna species using the area was found.

The habitat tree assessment identified thirty trees within the subject site with a DBH of >50cm (Figure 3). Only seven trees contained hollows, all of which were assessed as being unsuitable for black cockatoos to use for nesting purposes (due to small size, orientation and/or height above ground level). Additional details on each habitat tree observed can be found in Appendix D.

Foraging evidence left by black cockatoos in the form of chewed marri and coastal blackbutt fruits was observed at several locations. This evidence was attributed to the Carnaby's black-cockatoo (based on marks left on the fruit body and/or preferred foraging species).

Areas of the site containing marri, jarrah and banksia represent foraging habitat for black cockatoos but the extent of these plant species is limited to a few small groves and some scattered trees. The actual extent of foraging habitat is difficult to calculate given the sparse nature of some of the vegetation but would amount to no more than 1.7 ha.

No existing roosting trees (trees used at night by black cockatoos to rest) were positively identified during the survey (including a dusk survey).

With respect to native vertebrate fauna, 10 mammals (includes eight bat species), 107 bird, 17 reptile, nine frog and two fish species have previously been recorded in the general area, some of which have the potential to occur in or utilise sections of the study area at times.

Of the 145 native animals that are listed as potentially occurring in the area, four are considered to be endangered/vulnerable or in need of special protection under State and/or Federal law, these being the three species of black cockatoo and the peregrine falcon. In addition, three migratory species (great egret, cattle egret and the rainbow bee-eater) and one DPaW priority species (southern brown bandicoot) may also utilise the area at times.

With respect to vertebrate fauna in general, no substantial impacts are anticipated as a consequence of development at the site. In cases where some impact is anticipated, the degree of the impact is only expected to be low and relates to the loss of small areas of habitat, but as most species are common and widespread no overall change in their conservation status is anticipated, despite a possible localised reduction in habitat extent.

It is considered unlikely that impacts on black cockatoos that may occur as a result of development at any scale within each individual landholding would result in a “significant impact” as defined by the Federal DotE (DotE 2013) and therefore no constraints on development in regard to this matter are, at this stage, anticipated.

1. INTRODUCTION

This report details the results of a fauna assessment of an area of land within the suburb of Midvale. The subject site is situated about 18 kilometres east of the Perth central business district in south west Western Australia and is centred at approximately 31.87564 °S and 116.03242 °E (Figure 1).

The subject site is made up of 12 individual lots (Lot 3, 50, 102, 301, 303-305, 353-356 and 427) and has a total area of approximately 89 ha most of which is cleared of native vegetation. Lot 102 contains Bush Forever Site 309 (*Farrall Road Bushland – Stratton*) (Figure 2).

2. DEVELOPMENT PROPOSAL

It is understood that the proponents are currently undertaking planning to support future development within sections of the subject site. A range of investigations, including this fauna survey, have been undertaken in order to fully understand the suite of environmental values across the area. The findings of this fauna survey and other investigations will be used to inform and support the development, with the primary aim of minimising potential environmental impacts as much as reasonable and practicable.

It is also anticipated that the information presented will be used by regulatory authorities to assess the potential impact of the proposal on fauna and fauna habitats as part of any required approval process.

3. SCOPE OF WORKS

The scope of works was to conduct a level 1 fauna survey as defined by the EPA (EPA 2004). Because some listed threatened species (i.e. several species of black cockatoo) are known to occur in the general area, the scope of the survey work was expanded to include a targeted assessment of the site's significance to these species.

The fauna assessment has therefore included:

1. Level 1 Fauna Survey (to EPA standard);
2. Black Cockatoo Habitat Assessment ("habitat trees" = DBH >50cm, existing and potential nest hollows, foraging and roosting habitat); and

3. Report summarising methods, results and discussion on likely constraints on development within the defined study area.

This survey report has been prepared for use in the EPA's (Environmental Protection Authority's) Environmental Impact Assessment (EIA) process (if required) and is considered suitable for this purpose.

The scope of work has been restricted to a general fauna survey (Level 1 assessment) and a targeted black cockatoo habitat survey (Level 2 assessment). It is anticipated that this level of survey will provide sufficient information to allow decisions on potential impacts and management to be made.

A significant amount of detailed fauna survey work has been done in the general vicinity of the project area previously (see Section 4.1.2). Information from these studies provides a very good indication of what species, in particular species of conservation significance, are present or are likely to be present within or near the study area. It is considered unlikely that additional detailed Level 2 surveys within the study area would provide information that would alter any decision making processes required to allow an informed assessment of the impact of the proposal to be made.

Note: For the purposes of this report the term black cockatoo is in reference to Baudin's black-cockatoo *Calyptorhynchus baudinii*, Carnaby's black-cockatoo *Calyptorhynchus latirostris* and the forest red-tailed black-cockatoo *Calyptorhynchus banksii naso*.

4. METHODS

4.1 POTENTIAL FAUNA INVENTORY - DESKTOP STUDY

4.1.1 Database Searches

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

- DPaW's NatureMap Database Search (combined data from DPaW, Western Australian Museum, Birds Australia and consultants reports) (DPaW 2014b); and
- Protected matters search tool (Department of the Environment – DotE 2014).

It should be noted that these lists are based on observations from a broader area than the study site and therefore may include species that would only ever occur as vagrants in the actual study area due to a lack of suitable habitat or the presence of only marginal habitat. The databases also often included very old records and in some cases the species in question have become locally or regionally extinct.

Information from these sources should therefore be taken as indicative only and local knowledge and information needs also to be taken into consideration when determining what actual species may be present within the specific area being investigated.

4.1.2 Previous Fauna Surveys in the Area

Fauna surveys, assessments and reviews have been undertaken in nearby areas in the past, though not all are publically available and could not be referenced. The most significant of those available 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:

- ATA (1994). A Report of a Fauna Survey of Perth Airport. Report 93/78. Unpublished report for the Federal Airports Corporation.
- ATA Environmental (2006). Vertebrate Fauna Assessment Brookdale Redevelopment Area. Unpublished report for the Armadale Redevelopment Authority.
- Dell, J. (pers.comm) (1994). Results of Western Australia Museum Surveys, December 1986 to April 1990.
- ENV Australia (2005). Southern River Precinct 3 - Environmental Review. Unpublished report for the City of Gosnells.
- Harvey, M. S., Dell, J. How, R. A., & Waldock, J. M. (1987). Ground Fauna of Bushland Remnants on the Ridge Hill Shelf and Pinjarra Plain Landforms, Perth. Report to the Australian Heritage Commission. NEP Grant N95/49. 56 pp.
- How, R.A (1995). Objection Assessment of Fauna Values for Perth Airport. Unpublished report for the Australian Heritage Commission.
- How, R.A, Harvey, M.S., Dell J., & Waldock, J.M. (1996). Ground Fauna of Urban Bushland Remnants in Perth. Report to the Australian Heritage Commission. NEP Grant N93/04. 103 pp.
- Turpin, J. and Bamford, M. (2009). Keane Road Strategic Link Armadale, Fauna Assessment. Unpublished report for EnviroWorks Consulting.

As with the databases searches some reports refer to species that would not occur in the study area 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 for the study area. 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.

4.1.3 Existing Publications

The following represent the main publications used to identify and refine the potential fauna species list for the study area:

- Anstis, M. (2013). Tadpoles and Frogs of Australia. New Holland Publishers, Sydney.
- Barrett, G., Silcocks, A., Barry, S., Cunningham, R. and Poulter, R. (2003). The New Atlas of Australian Birds. Royal Australasian Ornithologists Union, Victoria.
- Bush, B., Maryan, B., Browne-Cooper, R. & Robinson, D. (2007). Reptiles and Frogs in the Bush: Southwestern Australia. UWA Press, Nedlands.
- Bush, B., Maryan, B., Browne-Cooper, R. & Robinson, D. (2010). Field Guide to Reptiles and Frogs of the Perth Region. UWA Press, Nedlands.
- Churchill, S. (2008). Australian Bats. Second Edition, Allen & Unwin.
- Cogger, H.G. (2014). Reptiles and Amphibians of Australia. 7th Edition. CSIRO Publishing.
- Johnstone, R.E. and Storr, G.M. (1998). Handbook of Western Australian Birds: Volume 1 – Non-passerines (Emu to Dollarbird). Western Australian Museum, Perth Western Australia.
- Johnstone, R.E. and Storr, G.M. (2004). Handbook of Western Australian Birds: Volume 2 – Passerines (Blue-winged Pitta to Goldfinch). Western Australian Museum, Perth Western Australia.
- Menkhorst, P. and Knight, F. (2011). A Field Guide to the Mammals of Australia. Oxford University Press, Melbourne.
- Morgan, D.L., Beatty, S.J., Klunzinger, M.W, Allen, M.G. and Burnham, Q.E (2011). Field Guide to the Freshwater Fishes, Crayfishes and Mussels of South Western Australia. Published by SERCUL.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (1983). Lizards of Western Australia II: Dragons and Monitors. WA Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (1990). Lizards of Western Australia III: Geckos and Pygopods. WA Museum, Perth.

- Storr, G.M., Smith, L.A. and Johnstone R.E. (1999). Lizards of Western Australia I: Skinks. Revised Edition, WA Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (2002). Snakes of Western Australia. Revised Edition, WA Museum, Perth.
- Tyler M.J. & Doughty P. (2009). Field Guide to Frogs of Western Australia, Fourth Edition, WA Museum, Perth.
- Van Dyck, S., Gynther, I. & Baker, A. Eds (2013). Field Companion to The Mammals of Australia. Queensland Museum.
- Wilson, S. and Swan, G. (2013). A Complete Guide to Reptiles of Australia. Reed, New Holland, Sydney.

4.1.4 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 Department of the Environment (DotE);
- *Wildlife Conservation Act 1950 (WC Act)*. Administered by the Western Australian Department of Parks and Wildlife (DPaW) (Govt. of WA 2014);
- 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 the
- DPaW Priority Fauna list. A non-statutory list maintained by the DPaW for management purposes (DPaW 2014a).

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);
- 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).

(Note - Species listed under JAMBA are also protected under Schedule 3 of the *WC Act*.)

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

The conservation status of all vertebrate fauna species listed as occurring or possibly occurring in the vicinity of the study area 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 are 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 bird species have been listed as of significance on the Swan Coastal portion of the Perth Metropolitan Region (Bush Forever - Government of Western Australia 1998 and 2000). The bird species are often referred to as Bush Forever Decreaser Species. 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 population's on the Swan Coastal Plain. (code Bp)
- Extinct in the Perth region (code Be)

The presence of Bush Forever species should be 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.

4.1.5 Invertebrate Fauna of Conservation Significance

It can be difficult to identify what may be significant invertebrate species (e.g. Short Range Endemics - SREs) as there are uncertainties in determining the range-restrictions of many species due to lack of surveys, lack of taxonomic resolutions within target taxa and problems in identifying certain life stages. Where invertebrates are collected during surveys, a high percentage are likely to be unknown, or for known species there can be limited knowledge or information on their distribution (Harvey 2002).

For this project, the assessment for conservation significant invertebrates has been limited to those listed by the DPaW and *EPBC Act* database searches (which rely on distribution records and known habitat preferences). No assessment of the potential for SREs to be present has been made.

4.1.6 Likelihood of Occurrence – Vertebrate Fauna of Conservation Significance

Vertebrate fauna of conservation significance identified during the desktop survey as previously being recorded in the general area were assessed and ranked for their likelihood of occurrence within the survey area itself. The rankings and criteria used were:

- Unlikely: Survey area is outside of the currently documented distribution for the species in question or the species is generally accepted as being locally extinct (supported by a lack of recent records), 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 survey area itself would not support a population or part population of the species.
 - Locally Extinct: Populations no longer occur within a small part of the species natural range, in this case within 10 or 20km of the study area. 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 Perth section of the Swan Coastal Plain, Populations do however persist outside of this area.
- Possible: Survey area 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 survey area. In some cases, while a species may be classified as possibly being present at times, 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 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, 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.

4.1.7 Taxonomy and Nomenclature

Taxonomy and nomenclature for fauna species used in this report is generally taken from the DPaW's WA Fauna Census Database which is assumed to follow Aplin and Smith (2001) for amphibians and reptiles, How *et al.* (2001) for mammals and Johnstone (2001) for birds.

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 (2013), Van Dyck & Strahan (2013), Christidis and Boles (2008), Bush *et al.* (2010), Bush *et al.* (2002), Tyler *et al.* (2000), and Glauret (1961). Not all common names are generally accepted.

4.2 SITE SURVEYS

A daytime reconnaissance survey of the site was carried out on the 15 October, 2014. All survey work was carried out by Greg Harewood (B.Sc. Zoology).

4.2.1 Fauna Habitat Assessment

The vegetation communities, soils and landforms identified during the site reconnaissance survey have been used as the basis for a classification of broad fauna habitats types.

The main aim of the habitat assessment was to determine if it was likely that any species of conservation significance would be utilising the areas that maybe impacted on as a consequence of development at the site. The habitat information obtained was also used to aid in finalising the overall potential fauna list.

As part of the desktop 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 study area were assessed and specific elements identified, if present, to determine the likelihood of listed threatened species utilising the area and its significance to them.

4.2.2 Opportunistic Fauna Observations

Opportunistic observations of fauna species were made during all field survey work which involved a series of transects across the site during the day 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.

4.2.3 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 Department of the Environment (DotE) (SEWPaC 2012) which states that surveys for Carnaby's, Baudin's and forest red-tailed 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 DotE (SEWPaC 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.

Breeding Habitat Assessment: The black cockatoo breeding habitat assessment involved the identification of all suitable breeding trees species (native, endemic species only) within the study area that had a Diameter at Breast Height (DBH) of over 50cm. The DBH of each tree was estimated using a pre-made 50 cm “caliper”.

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 for easy future reference.

Target tree species will include tuart, marri and jarrah or any other *Corymbia/Eucalyptus* species of a suitable size that may have been 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.

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 cockatoo for the purpose of nesting/breeding. Hollows that had an entrance greater than about 12cm in diameter and would allow the entry of a black cockatoo into a suitably orientated and sized branch/trunk, will be 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). Trees with possible nest hollows were also scratched and raked with a large stick/pole in attempt to flush any sitting birds from hollows and calls of chicks were listened for (though it should be noted that the survey may have been conducted outside of the main breeding season of one or more of the three species of black cockatoo).

A review of available literature was carried out to determine the location/extent of any known/likely black cockatoo breeding habitat areas in the vicinity of the study area.

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

A review of available literature was also carried out to determine the location/extent of any known/likely black cockatoo foraging habitat areas in the vicinity of the study area.

Night Roosting Habitat Assessment: Direct and indirect evidence of black cockatoos roosting within trees on site was noted if observed (e.g. branch clippings, droppings or moulted feathers). A single dusk survey was also carried out and involved observing and listening for flocks of black cockatoos congregating in roost trees over a period of about one hour either side of sunset on the 15 October, 2014.

A review of available literature was also carried out to determine the location/extent of any known/likely black cockatoo roosting habitat areas in the vicinity of the study area.

5. 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 merely indicative of the environmental condition of the 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 study area based on there being suitable habitat (quality and extent) within the study area 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 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 study area. As a consequence of this limitation the potential fauna list produced is most likely an overestimation of those species that actually utilise the study area for some purpose. Some species may be present in the general area but may only use the study area 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 study area (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 study area.

During the black cockatoo habitat survey trees with hollows were searched for. 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.

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 metres, though it should be noted that in some circumstance the accuracy can increase or decrease beyond this range.

6. RESULTS

6.1 POTENTIAL FAUNA INVENTORY - DESKTOP STUDY

A list of fauna species considered most likely to occur in the study area has compiled from information obtained during the desktop study and is presented in Appendix B. This listing was refined after information gathered during the site reconnaissance survey was assessed. The results of some previous fauna surveys carried out in the general area are summarised in this species listing as are the DPaW NatureMap database search results. The raw database search results from NatureMap (DPaW 2014b) and the Protected Matters Search Tool (DotE 2014) are contained within Appendix C.




The list of potential fauna takes into consideration that firstly the species in question is not known to be locally extinct and secondly that suitable habitat for each species, as identified during the habitat assessment, is present within the study area, though compiling an accurate list has limitations (see Section 5 above) and therefore as discussed the listing is likely to be an overestimation of the fauna species actually present onsite at any one time.





6.2 SITE SURVEYS




6.2.1 Fauna Habitat Assessment

Descriptions and examples images of the main fauna habitats present within the study area are provided in Table 1. The location of the identified units is shown in Figure 3.

Table 1: Main Fauna Habitats within the Study Area

No.	Fauna Habitat Description	Example Image
1	<p>Cleared (grassland with scattered trees/shrubs, roads, tracks).</p> <p>Area = ~ 77.2 ha</p>	
2	<p>Paperbark Low Woodland/Forest with emergent eucalypts (flooded gum/marri).</p> <p>(Includes Bush Forever Site 309).</p> <p>Area = ~ 5.3 ha</p>	
3	<p>Flooded Gum Open Woodland.</p> <p>Area = ~ 1.6 ha</p>	

No.	Fauna Habitat Description	Example Image
4	<p>Planted trees and shrubs around lakes. Various species - endemic and non-endemic.</p> <p>Area = ~ 1.1 ha</p>	
5	<p>Marri, Blackbutt, Banksia Open Woodland</p> <p>Area = ~ 1.0 ha</p>	
6	<p>Marri Open Woodland.</p> <p>Area = ~ 0.7 ha</p>	
7	<p>Tall Shrubland.</p> <p>Area = ~ 0.7 ha</p>	

No.	Fauna Habitat Description	Example Image
8	<p>Constructed Lakes. Open water with small areas of <i>Typha</i> and sedges</p> <p>Area = ~ 1.6 ha</p>	
9	<p>Woodbridge Creek</p> <p>Length = ~150 m</p>	
10	<p>Blackadder Creek</p> <p>Length = ~750 m</p>	

Overall fauna habitat values at the site have been severely compromised by the total or partial clearing of native vegetation. Most areas lack any natural attributes and are now only utilised by generally common and widespread fauna species with non-specific requirements which allow them to persist in highly disturbed habitats.

The various groves of remnant vegetation (including Bush Forever Site 309) have the best value as fauna habitat though most areas are also degraded and lack native groundcover/shrubs and microhabitats such as hollow logs, presumably a consequence of partial clearing, historical livestock grazing, logging and frequent fires. This has also seen the biodiversity values of these areas of the site diminish from their original natural state.

Despite the area's history of disturbance the site does however still provide suitable habitat for a range of species, some of which are of conservation significance.

6.2.2 Opportunistic Fauna Observations

Opportunistic fauna observations are listed in Appendix B. A total of 33 native fauna species were observed (or positively identified from foraging evidence, scats, tracks, skeletons or calls) within the study area during the single day time survey. Seven introduced species were also confirmed as being present.

Evidence of one listed threatened black cockatoo species was observed (Carnaby's black-cockatoo – small flock (4) and foraging evidence (chewed marri and coastal blackbutt fruits)). No evidence of any migratory or DPaW priority fauna species using the area was found.

6.2.3 Black Cockatoo Habitat Assessment

6.2.3.1 Black Cockatoo Breeding Habitat

Trees considered potentially suitable for black cockatoos to use as nesting habitat (using DotE criteria - SEWPaC 2012, but ultimately subject to a suitable hollow being present or developing and a range of other factors) which were found within the study area comprised the following species:

- Marri – *Corymbia calophylla*;
- Flooded Gum – *Eucalyptus rudis*;
- Coastal Blackbutt – *Eucalyptus todtiana*; and
- Jarrah - *Eucalyptus marginata*.

It should be noted that both flooded gum and coastal blackbutt are rarely used by black cockatoos for nesting purposes and also relative to marri, jarrah also rarely develops suitable hollows.

A summary of the potential black cockatoo habitat trees observed within the survey area is provided in Table 2 below and their location shown in Figure 3.

Table 2: Summary of Potential Black Cockatoo Habitat Trees (DBH >50cm) within the Study Area

Total Number of Habitat Trees	Number of Trees with No Hollows Observed	Number of Trees with Hollows Considered <u>Unsuitable</u> for Nesting Black Cockatoos	Number of Trees with Hollows Considered <u>Possibly Suitable</u> for Nesting Black Cockatoos	Tree Species			
				Marri	Flooded Gum	Coastal Blackbutt	Jarrah
30	23	7	0	17	11	1	1

The assessment identified thirty trees within the subject site with a DBH of >50cm. Only seven trees contained hollows, all of which were assessed as being unsuitable for black cockatoos to use for nesting purposes (due to small size, orientation and/or height above ground level). Additional details on each habitat tree observed can be found in Appendix D.

A review of available data showed no previous breeding records in or near the subject site (DoP 2011b).

6.2.3.2 Black Cockatoo Foraging Habitat

Foraging evidence left by black cockatoos in the form of chewed marri and coastal blackbutt fruits was observed at several locations. This evidence was attributed to the Carnaby’s black-cockatoo (based on marks left on the fruit body and/or preferred foraging species).

Areas of the site containing marri, jarrah and banksia represent foraging habitat for black cockatoos but the extent of these plant species is limited to a few small groves and some scattered trees. The actual extent of foraging habitat is difficult to calculate given the sparse nature of some of the vegetation but would amount to no more than 1.7 ha.

The subject site lies in close proximity to the Darling Range and several national parks (e.g. John Forrest and Walyunga) which contain tens of thousands of hectares of potential foraging habitat for black cockatoos.

6.2.3.3 Black Cockatoo Roosting Habitat

No existing roosting trees (trees used at night by black cockatoos to rest) were positively identified during the survey (including a dusk survey).

A roost site is shown as being present outside but near the northern boundary of the study site (DoP 2011b). The recent “Great Cocky Count” (Finn *et al.* 2014) also indicates a roost count undertaken in “Stratton” (site SWASTRR001) but no cockatoos were recorded. A survey the previous year at the same location also did not record any cockatoos (Kabat *et al.* 2013).

6.3 FAUNA INVENTORY – SUMMARY

6.3.1 Vertebrate Fauna

Table 3 summarises the number of vertebrate fauna species potentially occurring within or utilising at times the study area, based on results from the desktop study and observations made during the field assessment. A complete list of vertebrate fauna possibly inhabiting or frequenting the study area is located in Appendix B.

Table 3: 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 observed during field survey
Fish	6 ⁴	0	0	0	4 ⁴
Amphibians	9	0	0	0	2
Reptiles	17	0	0	0	2
Birds	113 ⁶	4	3	0	31 ²
Non-Volant Mammals	8 ⁶	0	0	1	1
Volant Mammals (Bats)	8	0	0	0	0
Total	161¹⁶	4	3	1	40⁶

Superscript = number of introduced species included in total.

Not all species listed as potentially occurring within the study area in existing databases and publications (i.e. *EPBC Act* Threatened Fauna and Migratory species lists, DPaW’s NatureMap database, various reports and publications) are shown in the expected listing in Appendix B. Some species have been excluded from this list based largely on the lack of suitable habitat at the study site and in the general area or known local extinction even if suitable habitat is present.

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 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 study area.

As most of the subject site is cleared the majority represents unsuitable habitat for many of the potential species listed. Most, if present, would be confined to the small areas of remnant bushland and even in these areas only a subset of the species listed are likely to be present at any one time.

6.3.2 Vertebrate Fauna of Conservation Significance

A review of the *EPBC Act* threatened fauna list, DPaW's Threatened Fauna Database and Priority List, unpublished reports and scientific publications identified a number of specially protected, priority or migratory vertebrate fauna species as potentially occurring in the general vicinity of the study area. Of these species, most that have no potential whatsoever to utilise the study area for any purpose have been omitted from the potential list for the site (Appendix B), principally due to lack of suitable habitat on-site (including extent and/or quality) or known local extinction.

In summary, three vertebrate fauna species of conservation significance were positively identified as utilising the study area for some purpose during the survey period, these being:

- *Calyptorhynchus latirostris* Carnaby's Black-Cockatoo – S1 (*WC Act*), Endangered (*EPBC Act*)

A small flock of Carnaby's black-cockatoo was observed during the field survey flying overhead and foraging evidence attributed to this species was also found (chewed marri and coastal blackbutt fruits). Larger trees (>50cm DBH) can be considered potential breeding habitat though the probability of any ever being used for this purpose can be considered to be very low. Foraging habitat present but limited in extent. No evidence of roosting found.

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

These species are:

- *Ardea alba* Great Egret – S3 (*WC Act*), Migratory (*EPBC Act*)

The constructed lakes, creek lines and other seasonally inundate areas onsite represent suitable habitat for this species. Unlikely to breed onsite.

- *Ardea ibis* Cattle Egret – S3 (*WC Act*), Migratory (*EPBC Act*)
The constructed lakes, creek lines and other seasonally inundate areas onsite represent suitable habitat for this species. Unlikely to breed onsite.
- *Merops ornatus* Rainbow Bee-eater – S3 (*WC Act*), Migratory (*EPBC Act*)
This species is a common seasonal visitor to south west and during summer months a small number of individuals of this species may possibly forage and roost onsite. Some areas may be suitable for breeding where soil conditions permit.
- *Calyptorhynchus banksii naso* Forest Red-tailed Black-Cockatoo – S1 (*WC Act*), Vulnerable (*EPBC Act*)
May occur on occasions though no evidence of recent use found. Larger trees (>50cm DBH) can be considered potential breeding habitat though the probability of any ever being used for this purpose can be considered to be very low. Foraging habitat present but limited in extent. No evidence of roosting found.
- *Calyptorhynchus baudinii* Baudin`s Black-Cockatoo - S1 (*WC Act*), Vulnerable (*EPBC Act*)
This species is only rarely recorded in this section of the coastal plain but it may occur on occasions. Larger trees (>50cm DBH) can be considered potential breeding habitat though the probability of any ever being used for this purpose can be considered to be very low. Foraging habitat present but limited in extent. No evidence of roosting found.
- *Falco peregrinus* Peregrine Falcon - S4 (*WC Act*)
Uncommon but study site may form part of larger home range. No potential nest sites observed.
- *Isodon obesulus fusciventer* Southern Brown Bandicoot – P5 (DPaW Priority Species)
Possibly present in the areas containing dense groundcover including thick grasslands in cleared areas.

Habitat for some of these species on-site, while considered possibly suitable, may be marginal in extent/quality and species listed may only visit the area for short periods, or as rare/uncommon vagrants/transients.

A number of other species of conservation significance, while possibly present in the wider area (e.g. forested areas of the nearby Darling Range), are not listed 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. Details on conservation significant species and reasons for the omission of some from the potential listing are provided in Appendix E and Table 4.

Thirty one bird (31) species that potentially frequent or occur in the study area are noted as Bush Forever Decreaser Species in the Perth Metropolitan Region (five were sighted/identified as having used the study area 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 as a consequence of disturbance and land clearing (Dell & Hyder-Griffiths 2002).

6.3.3 Invertebrate Fauna of Conservation Significance

Three species of conservation significant invertebrate species appeared in the DPaW or *EPBC Act* database searches (DPaW 2014b, DotE 2014), these being an unnamed scorpionfly (*Austromerope poultoni*), the graceful sun moth (*Synemon gratiosa*) and Carter's freshwater mussel (*Westralunio carteri*).

None of these species is considered likely to persist within the study area due to a total absence of suitable habitat and/or because the site is outside of their currently documented range. Additional information on both species can be found in Appendix E.

7. FAUNA VALUES

7.1 CONSERVATION SIGNIFICANCE OF THE STUDY AREA

The conservation significance of the study area has been determined by applying site specific criteria such as:

- Fauna species and/or habitat present that is poorly represented in the general vicinity of the study area;
- Fauna habitat within the study area supporting species of conservation or other significance; and
- Fauna habitat in better condition than other similar locations in the general vicinity of the study area.

Natural areas within the south west of Western Australia have been significantly altered since European settlement in the 1830's and a variety of environmental factors, in particular habitat fragmentation and fire, will continue to threaten many species of fauna with local extinction. As the local development of land progresses the significance of any remnant vegetation increases.

The regional and local conservation significance of one of the larger areas of remnant vegetation within the subject site has already been recognised in the past and given Bush Forever status (Bush Forever Site 309 – see Figure 2).

The majority of the rest of the study site is cleared and as a consequence the diversity of fauna species has been significantly reduced from its original natural levels. Habitat degradation as a result of partial clearing, altered fire regimes and the presence of introduced predators is also likely to have had a significant effect on species diversity in the smaller bush remnants that remain in the largely cleared areas. Because of these factors most of the site has very little conservation significance to fauna in general.

7.2 VALUE OF THE STUDY AREA AS AN ECOLOGICAL LINKAGE/WILDLIFE CORRIDOR

Linkage with adjacent bushland areas is a natural attribute of high priority in the assessment of any sites significance. Within Bush Forever Volume 1 document (Figure 6 - Government of Western Australia 2000a), the subject site is not shown to be part of or contributing to any specifically identified “Greenway” corridor/ecological linkage, a consequence of the fact that the vast majority of the site has been totally cleared of native vegetation.

8. POTENTIAL IMPACTS AND DEVELOPMENT CONSIDERATIONS

8.1 POTENTIAL IMPACTS OF DEVELOPMENT

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);
- Death or injury of fauna during clearing and construction; and

- An increase in fauna road kills subsequent to development.

The exact extent of development within the site is not known at this stage however the possible impacts on specific species of conservation significance previously recorded in the general area is provided in the table below. Additional information on those species listed is provided in Appendix E.

Table 4: Likelihood of Occurrence and Possible Impacts – Fauna Species of Conservation Significance (continues on following pages).

Common Name	Genus & Species	Conservation Status (See Appendix A for codes)	Habitat Present	Likelihood of Occurrence	Possible Impacts
Unnamed scorpionfly	<i>Austromerope poultoni</i>	P2	No	Unlikely	No impact.
Graceful Sun Moth	<i>Synemon gratiosa</i>	P4	No	Unlikely	No impact.
Carter's Freshwater Mussel	<i>Westralunio carteri</i>	S1	No	Unlikely	No impact.
Pouched Lamprey	<i>Geotria australis</i>	P1	No	Unlikely	No impact.
Western Swamp Tortoise	<i>Pseudemydura umbrina</i>	S1 CR	No	Unlikely	No impact.
Darling Range Heath Ctenotus	<i>Ctenotus delli</i>	P4	No	Unlikely	No impact.
Black-striped Snake	<i>Neelaps calonotos</i>	P3	No	Unlikely	No impact.
Southern Carpet Python	<i>Morelia spilota imbricata</i>	S4	No	Unlikely	No impact.
Malleefowl	<i>Leipoa ocellata</i>	S1 VU Mig	No	Unlikely - species locally extinct.	No Impact.
Migratory Shorebirds/Wetland Species	Various	Mig, Various	No/Very Marginal	Unlikely	No impact.
Great Egret	<i>Ardea alba</i>	S3 Mig	Yes/Marginal	Possible	Loss/modification of very small areas of marginal man-made habitat. No significant impact likely.
Cattle Egret	<i>Ardea ibis</i>	S3 Mig	Yes/Marginal	Possible	Loss/modification of very small areas of marginal man-made habitat. No significant impact likely.
Australasian Bittern	<i>Botaurus poiciloptilus</i>	S1 EN	No/Marginal	Unlikely	No impact.
Black Bittern	<i>Ixobrychus flavicollis</i>	P1	No/Marginal	Unlikely	No impact.
Little Bittern	<i>Ixobrychus minutus</i>	P4	No/Marginal	Unlikely	No impact.
Painted Snipe	<i>Rostratula benghalensis</i>	S1 S3 Mig EN	No/Marginal	Unlikely	No impact.
Glossy Ibis	<i>Plegadis falcinellus</i>	Mig	No/Very Marginal	Unlikely	No impact.

Common Name	Genus & Species	Conservation Status (See Appendix A for codes)	Habitat Present	Likelihood of Occurrence	Possible Impacts
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	S3 Mig	No	Unlikely	No impact.
Osprey	<i>Pandion haliaetus</i>	Mig	No	Unlikely	No impact.
Peregrine Falcon	<i>Falco peregrinus</i>	S4	Yes	Possible but only rarely.	Loss/modification of very small areas of natural habitat. No significant impact likely.
Muir's Corella	<i>Cacatua pastinator pastinator</i>	S4 VU	No	Unlikely	No Impact.
Major Mitchell's Cockatoo	<i>Cacatua leadbeateri</i>	S4	No	Unlikely.	No Impact.
Carnaby's Black Cockatoo	<i>Calyptorhynchus latirostris</i>	S1 EN	Yes	Known to occur.	Loss/modification of small areas of natural habitat.
Baudin's Black Cockatoo	<i>Calyptorhynchus baudinii</i>	S1 VU	Yes	Possible.	Loss/modification of small areas of natural habitat.
Forest Red-tailed Black Cockatoo	<i>Calyptorhynchus banksii naso</i>	S1 VU	Yes	Possible.	Loss/modification of small areas of natural habitat.
Fork-tailed Swift	<i>Apus pacificus</i>	S3 Mig	Yes	Unlikely, Flyover only.	No impact.
Rainbow Bee-eater	<i>Merops ornatus</i>	S3 Mig	Yes	Known to occur.	Loss/modification of small areas of man-made and natural habitat. No significant impact likely.
Chuditch	<i>Dasyurus geoffroii</i>	S1 VU	No	Unlikely	No impact.
Southern Brush-tailed Phascogale	<i>Phascogale tapoatafa ssp</i>	S1	No/Very Marginal	Unlikely	No impact.
Western Ringtail Possum	<i>Pseudocheirus occidentalis</i>	S1 VU	No	Unlikely - species locally extinct.	No Impact.
Southern Brown Bandicoot	<i>Isoodon obesulus fusciventer</i>	P5	Yes	Possible	Loss/modification of small areas of natural habitat. No significant impact likely.
Bilby	<i>Macrotis lagotis</i>	S1 VU	No	Unlikely - species locally extinct.	No Impact.
Woylie	<i>Bettongia penicillata ogiby</i>	S1	No	Unlikely - species locally extinct.	No Impact.
Western Brush Wallaby	<i>Macropus irma</i>	P4	No/Marginal	Unlikely	No impact.
Western False Pipistrelle	<i>Falsistrellus mackenziei</i>	P4	No/Marginal	Unlikely - species locally extinct.	No impact.
Water Rat	<i>Hydromys chrysogaster</i>	P4	No	Unlikely	No impact.

8.2 CONSIDERATIONS FOR PLANNING AND DEVELOPMENT

With respect to vertebrate fauna in general, no substantial impacts are anticipated as a consequence of development at the site. In cases where some impact is anticipated, the degree of the impact is only expected to be low and relates to the loss of small areas of habitat, but as most species are common and widespread no overall change in their conservation status is anticipated, despite a possible localised reduction in habitat extent. There are substantial areas of similar habitat in nearby areas including some national parks and most if, not all species likely to utilise the subject site will persist in these locations despite development of the site.

The assessment does indicate that any considerations required during ongoing development planning may possibly be limited to the presence of habitat used or potentially used by some threatened fauna species in particular those listed under the *EPBC Act*, namely the three species of black cockatoo. However, as the proposed development area is made of numerous individual lots with different landowners undertaking “actions” as separate entities, possible impacts in each area are likely to be assessed individually.

With this in mind it is considered unlikely that impacts on black cockatoos that may occur as a result of development at any scale within each individual landholding would result in a “significant impact” as defined by the Federal DotE (DotE 2013).

This conclusion is primarily based on the fact that most of the individual Lots are totally cleared or almost totally cleared of vegetation and therefore don't contain significant areas of potential cockatoo habitat. Where some habitat is present it is limited in extent. For example the foraging habitat present in the more coherent vegetated areas (primarily marri, blackbutt, *banksia* open woodland/marri open woodland – in total ~1.7 ha at most) is only likely to provide sufficient food to support about one or two cockatoos per year based on studies carried out in areas containing similar habitat (Valentine and Stock 2008, Bamford 2011).

The study area is also not located in a documented cockatoo breeding area, and while some trees present are classified as “potential breeding habitat” using DotE criteria (SEWPaC 2012) the probability of any one tree actually developing hollows that would then be used by black cockatoos for breeding can be considered to be extremely low. The area is also unlikely to be considered of specific importance for the recovery of black cockatoos in the long term. For example the population growth of the Carnaby's black-cockatoo is primarily limited by factors associated with breeding, and consequently priority areas for the recovery of the species are currently focused on known breeding sites (Cale 2003).

So, while the retention of areas of vegetation should be considered during the planning process, based on the assessment above it is not likely to represent a constraint to development in any one lot.

9. CONCLUSION

The fauna assessment within the subject site was undertaken for the purposes of categorising the fauna assemblages and identifying fauna habitats present. A targeted assessment of black cockatoo habitat within the area was also carried out.

With respect to native vertebrate fauna, 10 mammals (includes eight bat species), 107 bird, 17 reptile, nine frog and two fish species have previously been recorded in the general area, some of which have the potential to occur in or utilise sections of the study area at times.

Of the 145 native animals that are listed as potentially occurring in the area, four are considered to be endangered/vulnerable or in need of special protection under State and/or Federal law, these being the three species of black cockatoo and the peregrine falcon. In addition, three migratory species (great egret, cattle egret and the rainbow bee-eater) and one DPaW priority species (southern brown bandicoot) may also utilise the area at times.

With respect to vertebrate fauna in general, no substantial impacts are anticipated as a consequence of development at the site. In cases where some impact is anticipated, the degree of the impact is only expected to be low and relates to the loss of small areas of habitat, but as most species are common and widespread no overall change in their conservation status is anticipated, despite a possible localised reduction in habitat extent.

It is considered unlikely that impacts on black cockatoos that may occur as a result of development at any scale within each individual landholding would result in a “significant impact” as defined by the Federal DotE (DotE 2013) and therefore no constraints on development in regard to this matter are, at this stage, anticipated.

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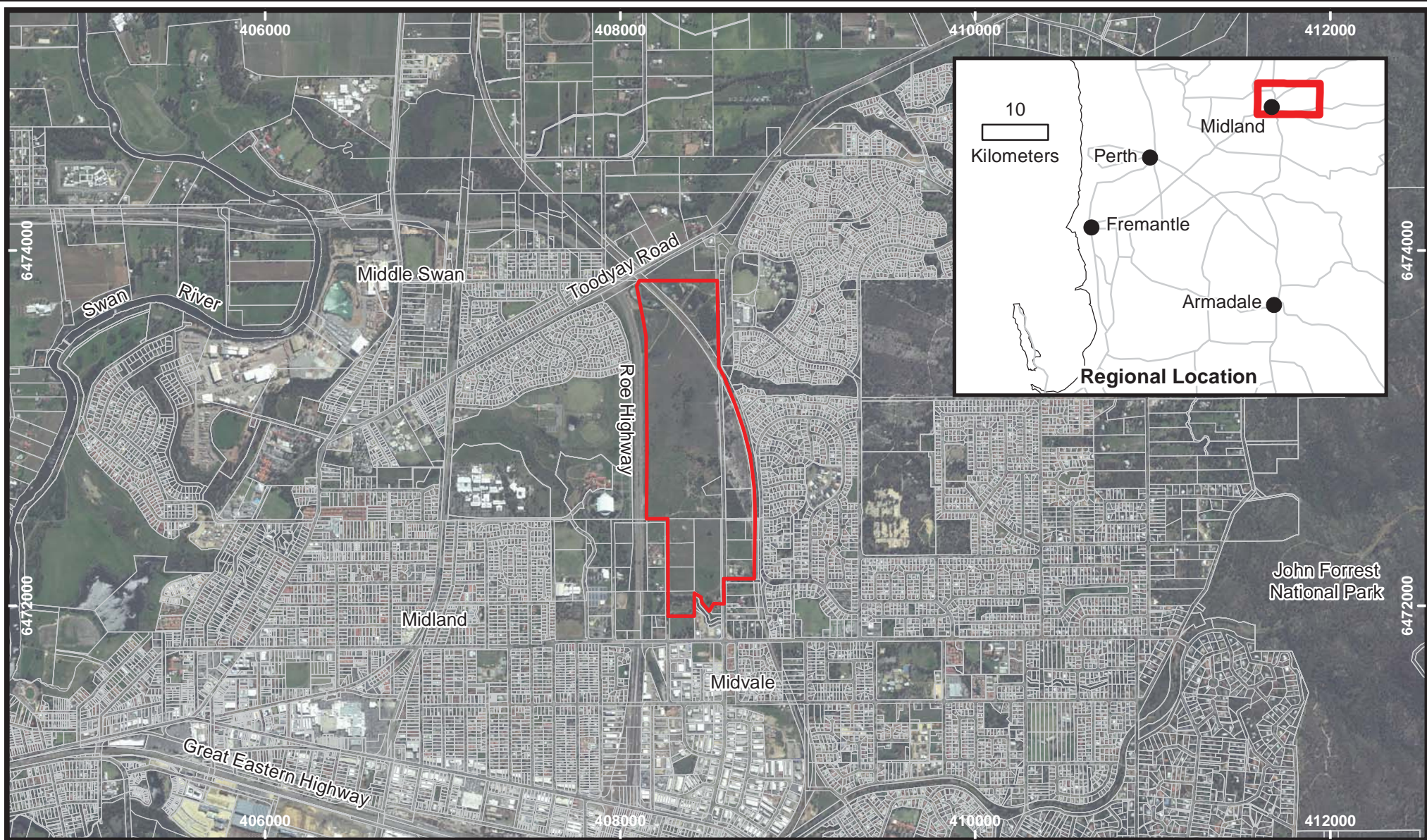
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FIGURES



Legend

 Study Area

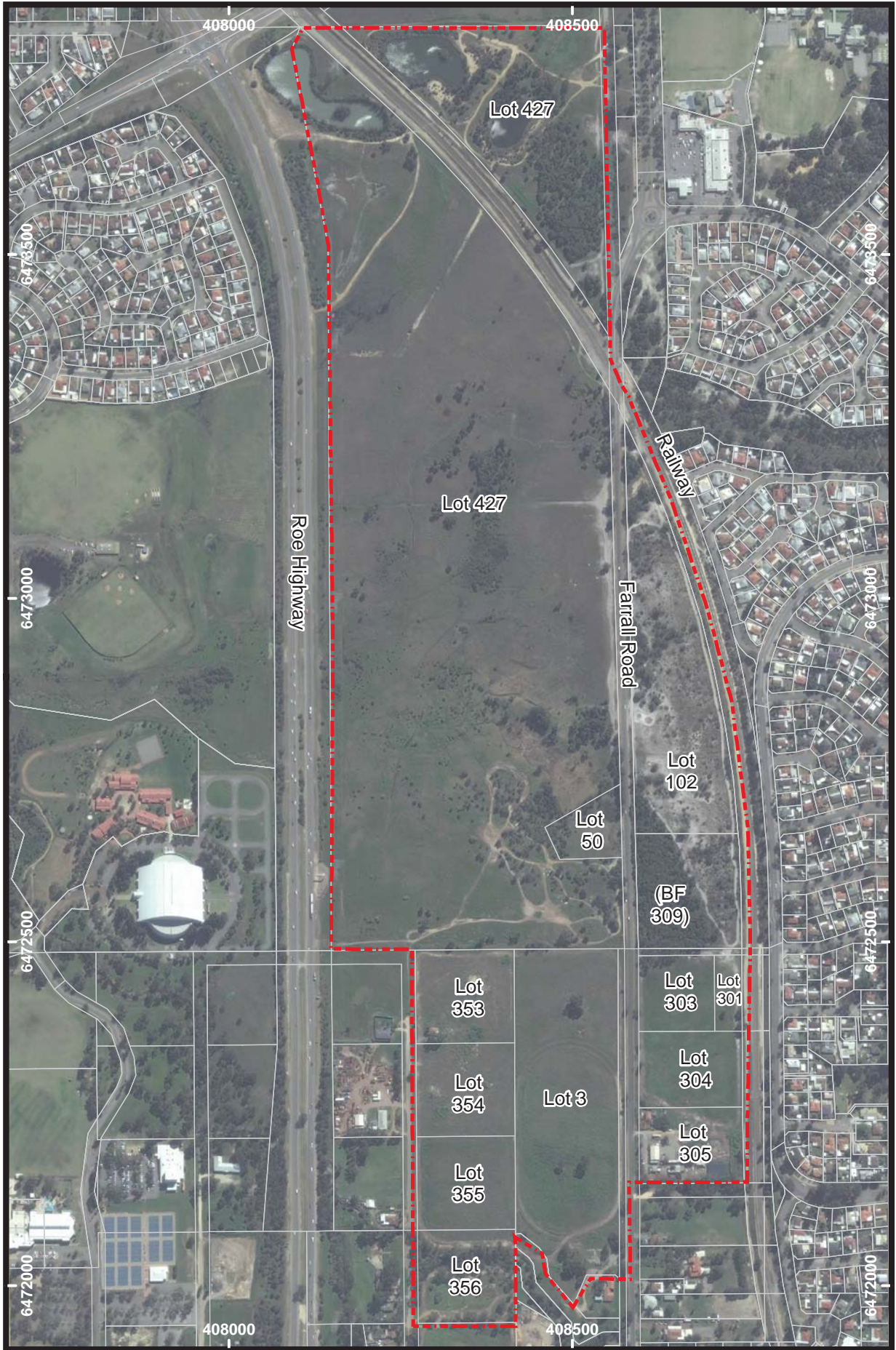


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 Kilometres
 MGA Zone 50




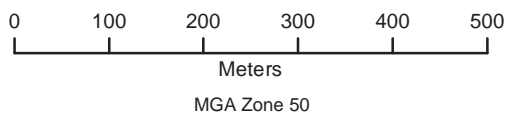
FAUNA SURVEY
 DRAWN: G Harewood
 DATE : Dec 2014
 SCALE: 1:30,000

Miscellaneous Lots
 Farrall Road/Orchard Avenue
 Midvale
**Study Area
 and
 Surrounds**



Legend

 Study Area

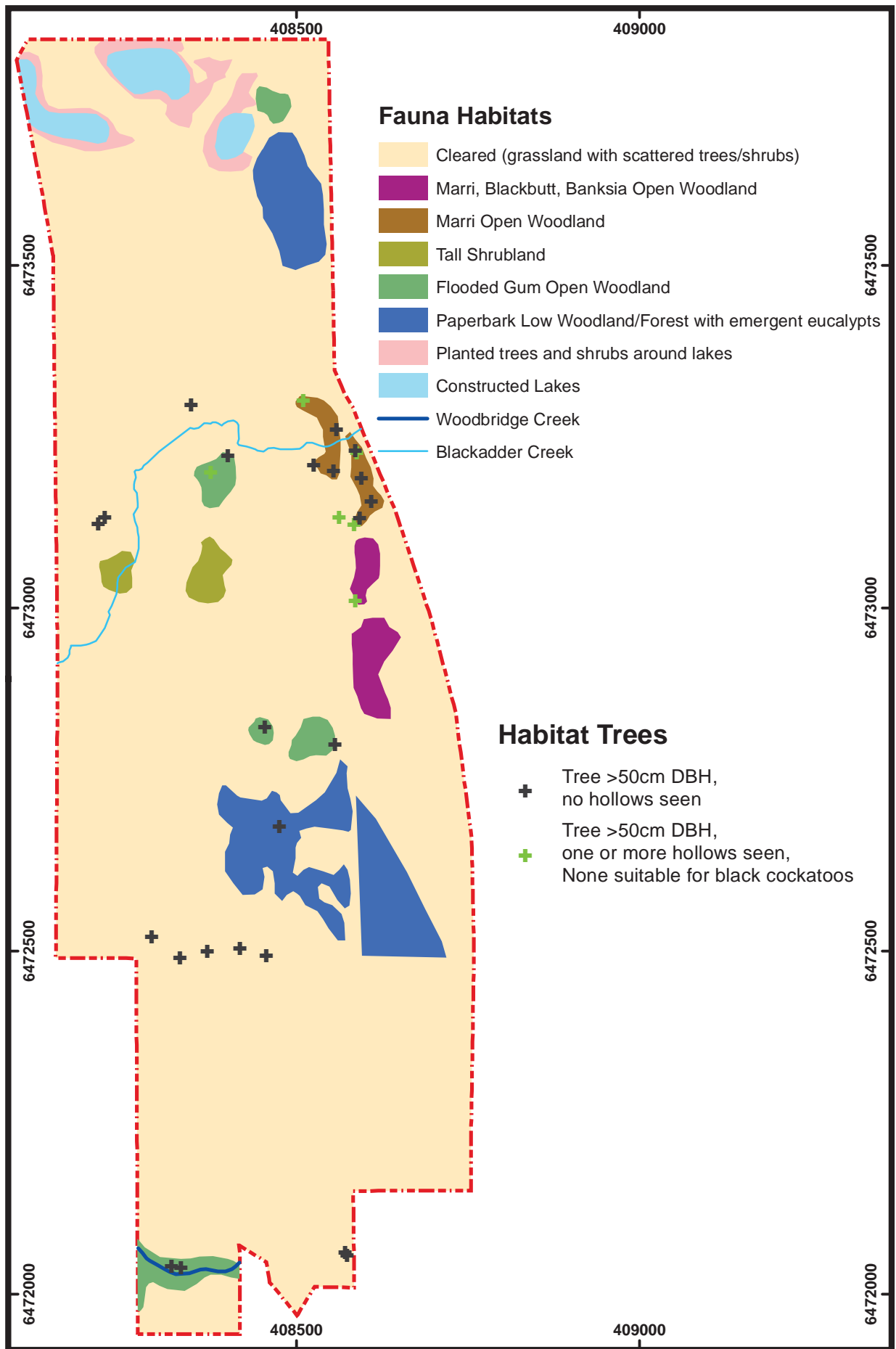


FAUNA SURVEY
 DRAWN: G Harewood
 DATE: Dec 2014
 SCALE: 1:8,000

Miscellaneous Lots
 Farrall Rd/Orchard Ave
 Midvale

**Study Area
 Air Photo**

Figure: 2



Fauna Habitats

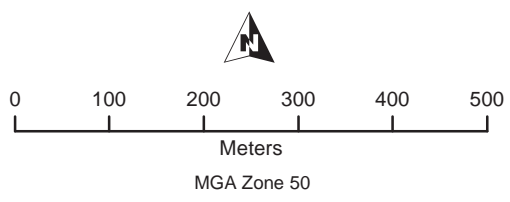
- Cleared (grassland with scattered trees/shrubs)
- Marri, Blackbutt, Banksia Open Woodland
- Marri Open Woodland
- Tall Shrubland
- Flooded Gum Open Woodland
- Paperbark Low Woodland/Forest with emergent eucalypts
- Planted trees and shrubs around lakes
- Constructed Lakes
- Woodbridge Creek
- Blackadder Creek

Habitat Trees

- Tree >50cm DBH, no hollows seen
- Tree >50cm DBH, one or more hollows seen, None suitable for black cockatoos

Legend

Study Area



DRAWN: G Harewood
DATE: Dec 2014
SCALE: 1:8,000

**Miscellaneous Lots
Farrall Rd/Orchard Ave
Midvale
Fauna Habitats and
Habitat Trees
(DBH >50cm)**

APPENDIX A

CONSERVATION CATEGORIES

EPBC Act (1999) Threatened Fauna 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 asterisk are matters of national environmental significance under the *EPBC Act*.

Western Australian Wildlife Conservation Act (1950) Threatened Fauna Categories

Category	Code	Description
Schedule 1	S1	<p>Threatened Fauna (Fauna that is rare or is likely to become extinct). Taxa that have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.</p> <p>Threatened fauna (Schedule 1) are further ranked by the DPaW according to their level of threat using IUCN Red List criteria:</p> <p>CR: Critically Endangered - considered to be facing an extremely high risk of extinction in the wild.</p> <p>EN: Endangered - considered to be facing a very high risk of extinction in the wild.</p> <p>VU: Vulnerable - considered to be facing a high risk of extinction in the wild.</p>
Schedule 2	S2	Fauna that is presumed to be extinct. Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such.
Schedule 3	S3	Migratory birds protected under an international agreement. 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), relating to the protection of migratory birds.
Schedule 4	S4	Other specially protected fauna. Fauna that is in need of special protection, otherwise than for the reasons mentioned in the above schedules.

A list of the current rankings can be downloaded from the Parks and Wildlife Threatened Species and Communities webpage at

<http://dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/>

Western Australian DPaW Priority Fauna Categories

Category	Code	Description
Priority 1	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	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	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	P4	<p>(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.</p> <p>(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.</p> <p>(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>
Priority 5	P5	Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

*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, variety or forma).

IUCN Red List Threatened Species Categories

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

FAUNA OBSERVED OR POTENTIALLY PRESENT

Fauna Observed or Potentially Present

Miscellaneous Lots - Farrall Road/Orchard Avenue, Midvale W.A.

Compiled by Greg Harewood - December 2014
 Recorded (Sighted/Heard/Signs/Captured) = X
 Approximate centroid = 31.87564°S 116.03242°E

- A = Harewood, G. (2014). Fauna Assessmnt - Miscellaneous Lots Farrall Road/Orchard Avenue, Midvale. Unpublished report for Emerge Associates.
 B = Turpin, J. and Bamford, M. (2009). Keane Road Strategic Link Armadale, Fauna Assessment. Unpublished report for the EnviroWorks Consulting.
 C = ATA Environmental (2006). Vertebrate Fauna Assessment Brookdale Redevelopment Area. Unpublished report for the Armadale Redevelopment Authority.
 D = ENV Australia (2005). Southern River Precinct 3 - Environmental Review. Unpublished report for the City of Gosnells.
 E = ATA (1994). A Report of a Fauna Survey of Perth Airport. Report 93/78. Unpublished report for the Federal Airports Corporation.
 How, R.A (1995). Objection Assessment of Fauna Values for Perth Airport. Unpublished report for the Australian Heritage Commission.
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 Robson and Chester (1989). Report on the Aquatic Fauna of Munday Swamp as an Indicator of Environmental Quality. Murdoch University.
 Storey, A.W. et al (1993). Wetlands on the Swan Coastal Plain Volume 7. Waterbird Usage of Wetlands of the Swan Coastal Plain. EPA and Water Authority of WA.
 F = DPaW (2014). NatureMap Database search. "By Circle" 116°01' 55" E, 31°52' 32" S – Study area (plus 10 km buffer). 30 December 2014.

Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F
			Osteichthyes					
Cyprinidae Cyprinids								
<i>Carassius auratus</i>	Goldfish	Introduced	X					X
<i>Cyprinus carpio</i>	Common Carp (Koi)	Introduced	X					
Osteichthyes								
Galaxiidae								
<i>Galaxias occidentalis</i>	Western Minnow						X	X

WC Act Status - S1 to S4, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DEC Priority Status - P1 to P5, 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
			Nannopercidae					
<i>Edell vittata</i>	Western Pygmy Perch						X	
Poeciliidae Livebearers								
<i>Gambusia holbrooki</i>	Mosquito Fish	Introduced	X				X	
Poeciliidae Livebearers								
<i>Poecilia reticulata</i>	Guppy	Introduced	X					

Amphibia

Myobatrachidae

Ground or Burrowing Frogs

<i>Crinia georgiana</i>	Quacking Frog	LC			X			X
<i>Crinia glauerti</i>	Clicking Frog	LC	X		X	X	X	X
<i>Crinia insignifera</i>	Squelching Froglet	LC		X	X	X	X	X
<i>Geocrinia leai</i>	Ticking Frog	LC						X
<i>Heleioporus eyrei</i>	Moaning Frog	LC			X	X	X	X
<i>Limnodynastes dorsalis</i>	Western Banjo Frog	LC		X	X	X	X	X
<i>Pseudophryne guentheri</i>	Crawling Toadlet	LC					X	X

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Hylidae Tree or Water-Holding Frogs								
<i>Litoria adelaidensis</i>	Slender Tree Frog	LC		X	X	X	X	X
<i>Litoria moorei</i>	Motorbike Frog	LC	X		X	X		X
Reptilia								
Cheluidae Side-necked Freshwater Turtles								
<i>Chelodina oblonga</i>	Oblong Turtle	LC				X	X	
Gekkonidae Geckoes								
<i>Christinus marmoratus</i>	Marbled Gecko				X			X
Pygopodidae Legless Lizards								
<i>Lialis burtonis</i>	Burton's Legless Lizard				X	X	X	X
Agamidae Dragon Lizards								
<i>Pogona minor</i>	Western Bearded Dragon					X	X	X
Varanidae Monitor's or Goanna's								
<i>Varanus gouldii</i>	Gould's Sand Monitor			X	X	X	X	X

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			Scincidae Skinks					
<i>Acritoscincus trilineatum</i>	Southwestern Cool Skink				X	X	X	
<i>Cryptoblepharus buchananii</i>	Fence Skink		X		X	X	X	X
<i>Ctenotus fallens</i>	West Coast Ctenotus						X	X
<i>Egernia kingii</i>	King's Skink							X
<i>Hemiergis quadrilineata</i>	Two-toed Mulch Skink						X	X
<i>Lerista elegans</i>	West Coast Four-toed Lerista				X	X	X	X
<i>Menetia greyii</i>	Dwarf Skink				X	X	X	X
<i>Morethia lineocellata</i>	West Coast Pale-flecked Morethia				X			X
<i>Morethia obscura</i>	Shrubland Pale-flecked Morethia				X			X
<i>Tiliqua rugosa</i>	Bobtail		X	X	X	X	X	X
Elapidae Elapid Snakes								
<i>Notechis scutatus</i>	Tiger Snake				X	X		X
<i>Pseudonaja affinis</i>	Dugite				X	X	X	X

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Aves								
Phasianidae Quails, Pheasants								
<i>Coturnix pectoralis</i>	Stubble Quail	LC				X		
<i>Coturnix ypsilophora</i>	Brown Quail	LC			X			
Anatidae Geese, Swans, Ducks								
<i>Anas castanea</i>	Chestnut Teal	LC						X
<i>Anas gracilis</i>	Grey Teal	LC	X		X	X	X	X
<i>Anas platyrhynchos</i>	Mallard	Introduced				X		X
<i>Anas rhynchotis</i>	Australasian Shoveler	Bh LC	X				X	X
<i>Anas superciliosa</i>	Pacific Black Duck	LC	X	X	X	X	X	X
<i>Aythya australis</i>	Hardhead	Bh LC	X					X
<i>Biziura lobata</i>	Musk Duck	Bh LC					X	X
<i>Chenonetta jubata</i>	Australian Wood Duck	LC	X	X	X	X	X	X
<i>Cygnus atratus</i>	Black Swan	LC					X	X
<i>Tadorna tadornoides</i>	Australian Shelduck	LC	X	X	X	X	X	X
Podicipedidae Grebes								
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe	LC					X	X

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Phalacrocoracidae								
Cormorants								
<i>Phalacrocorax melanoleucos</i>	Little Pied Cormorant	LC					X	
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant	LC					X	X
Pelecanidae								
Pelicans								
<i>Pelecanus conspicillatus</i>	Australian Pelican	LC					X	X
Ardeidae								
Hérons, Egrets, Bitterns								
<i>Ardea alba</i>	Great Egret	S3 Mig CA JA					X	
<i>Ardea garzetta</i>	Little Egret	LC						
<i>Ardea ibis</i>	Cattle Egret	S3 Mig CA JA						X
<i>Ardea novaehollandiae</i>	White-faced Heron	LC	X		X	X	X	X
<i>Ardea pacifica</i>	White-necked Heron	LC	X		X	X		X
Threskiornithidae								
Ibises, Spoonbills								
<i>Platalea flavipes</i>	Yellow-billed Spoonbill	LC	X			X	X	X
<i>Threskiornis molucca</i>	Australian White Ibis	LC	X		X	X	X	X
<i>Threskiornis spinicollis</i>	Straw-necked Ibis	LC	X	X		X	X	X

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			Accipitridae Kites, Goshawks, Eagles, Harriers					
<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk	Bp LC					X	X
<i>Accipiter fasciatus</i>	Brown Goshawk	Bp LC				X	X	X
<i>Aquila audax</i>	Wedge-tailed Eagle	Bp LC				X	X	X
<i>Aquila morphnoides</i>	Little Eagle	Bp LC					X	
<i>Circus approximans</i>	Swamp Harrier	LC						X
<i>Circus assimilis</i>	Spotted Harrier	LC						
<i>Elanus caeruleus</i>	Black-shouldered Kite	LC				X	X	X
<i>Haliastur sphenurus</i>	Whistling Kite	Bp LC			X			X
<i>Hamirostra isura</i>	Square-tailed Kite	Bp LC						
Falconidae Falcons								
<i>Falco berigora</i>	Brown Falcon	Bp LC			X		X	X
<i>Falco cenchroides</i>	Australian Kestrel	LC		X	X	X	X	X
<i>Falco longipennis</i>	Australian Hobby	LC						X
<i>Falco peregrinus</i>	Peregrine Falcon	S4 Bp LC						X

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			Rallidae Rails, Crakes, Swamphens, Coots					
<i>Fulica atra</i>	Eurasian Coot	LC	X				X	X
<i>Gallinula tenebrosa</i>	Dusky Moorhen	Bh LC	X				X	X
<i>Gallinula ventralis</i>	Black-tailed Native-hen	LC						X
<i>Gallirallus philippensis</i>	Buff-banded Rail	LC						X
<i>Porphyrio porphyrio</i>	Purple Swamphen	LC	X				X	X
<i>Porzana fluminea</i>	Australian Spotted Crake	LC						X
<i>Porzana pusilla</i>	Baillon's Crake	LC						X
<i>Porzana tabuensis</i>	Spotless Crake	LC						X
Charadriidae Lapwings, Plovers, Dotterels								
<i>Charadrius melanops</i>	Black-fronted Dotterel	LC					X	
Columbidae Pigeons, Doves								
<i>Columba livia</i>	Domestic Pigeon	Introduced				X		X
<i>Ocyphaps lophotes</i>	Crested Pigeon	LC		X	X	X	X	X
<i>Phaps chalcoptera</i>	Common Bronzewing	Bh LC		X	X	X	X	X
<i>Streptopelia chinensis</i>	Spotted Turtle-Dove	Introduced			X	X	X	X
<i>Streptopelia senegalensis</i>	Laughing Turtle-Dove	Introduced	X	X	X	X	X	X

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			Psittacidae Parrots					
<i>Cacatua roseicapilla</i>	Galah	LC		X	X	X	X	X
<i>Cacatua sanguinea</i>	Little Corella	LC				X		X
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black-Cockatoo	S1 VU Be VU A2c+3c+4c			X	X		X
<i>Calyptorhynchus baudinii</i>	Baudin's Black-Cockatoo	S1 VU Bp VU C2a(ii)						X
<i>Calyptorhynchus latirostris</i>	Carnaby's Black-Cockatoo	S1 EN Bp EN A2bcde+3bc	X		X	X	X	X
<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet	LC						X
<i>Neophema elegans</i>	Elegant Parrot	LC			X		X	X
<i>Platycercus spurius</i>	Red-capped Parrot	LC		X	X	X	X	X
<i>Platycercus zonarius semitorquatus</i>	Australian Ringneck Parrot	LC		X	X	X	X	
<i>Polytelis anthopeplus</i>	Regent Parrot	LC			X			X
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	Introduced	X	X	X	X		X
Cuculidae Parasitic Cuckoos								
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo	LC			X			X
<i>Chrysococcyx basalis</i>	Horsfield's Bronze Cuckoo	LC	X	X	X	X	X	X
<i>Chrysococcyx lucidus</i>	Shining Bronze Cuckoo	LC		X	X	X	X	X
<i>Cuculus pallidus</i>	Pallid Cuckoo	LC		X			X	

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			Strigidae Hawk Owls					
<i>Ninox novaeseelandiae</i>	Boobook Owl	LC			X			X
Tytonidae Barn Owls								
<i>Tyto alba</i>	Barn Owl	LC			X			X
Podargidae Frogmouths								
<i>Podargus strigoides</i>	Tawny Frogmouth	LC			X			X
Caprimulgidae Nightjars								
<i>Eurostopodus argus</i>	Spotted Nightjar	LC						
Aegothelidae Owlet-nightjars								
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar	LC						X
Halcyonidae Tree Kingfishers								
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	Introduced			X	X	X	X
<i>Todiramphus sanctus</i>	Sacred Kingfisher	LC			X	X	X	X
Meropidae Bee-eaters								
<i>Merops ornatus</i>	Rainbow Bee-eater	S3 Mig JA LC			X	X	X	X

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			Maluridae Fairy Wrens, GrassWrens					
<i>Malurus splendens</i>	Splendid Fairy-wren	Bh LC		X	X	X	X	X
Acanthizidae Thornbills, Geryones, Fieldwrens & Whitefaces								
<i>Acanthiza apicalis</i>	Broad-tailed Thornbill	Bh LC		X	X	X	X	X
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	Bh LC		X	X	X	X	X
<i>Acanthiza inornata</i>	Western Thornbill	Bh LC						X
<i>Gerygone fusca</i>	Western Gerygone	LC	X	X	X	X	X	X
<i>Sericornis frontalis</i>	White-browed Scrubwren	Bh LC		X	X	X		X
<i>Smicrornis brevirostris</i>	Weebill	Bh LC	X	X	X			X
Pardalotidae Pardalotes								
<i>Pardalotus punctatus</i>	Spotted Pardalote	LC					X	X
<i>Pardalotus striatus</i>	Striated Pardalote	LC	X		X	X	X	X

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Meliphagidae								
Honeyeaters, Chats								
<i>Acanthorhynchus superciliosus</i>	Western Spinebill	LC		X		X	X	X
<i>Anthochaera carunculata</i>	Red Wattlebird	LC		X	X	X	X	X
<i>Anthochaera lunulata</i>	Western Little Wattlebird	Bp LC		X	X	X	X	X
<i>Epthianura albifrons</i>	White-fronted Chat	LC					X	X
<i>Lichenostomus virescens</i>	Singing Honeyeater	LC	X	X	X	X	X	
<i>Lichmera indistincta</i>	Brown Honeyeater	LC	X	X	X	X	X	X
<i>Manorina flavigula</i>	Yellow-throated Miner	LC						X
<i>Phylidonyris melanops</i>	Tawny-crowned Honeyeater	Bp LC		X			X	
<i>Phylidonyris nigra</i>	White-cheeked Honeyeater	Bp LC		X		X	X	
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	Bp LC		X		X	X	X
Petroicidae								
Australian Robins								
<i>Petroica goodenovii</i>	Red-capped Robin	LC		X		X	X	X
<i>Petroica multicolor</i>	Scarlet Robin	Bh LC			X			X

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Pachycephalidae								
Crested Shrike-tit, Crested Bellbird, Shrike Thrushes, Whistlers								
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	Bh LC		X	X	X		X
<i>Pachycephala pectoralis</i>	Golden Whistler	Bh LC		X			X	X
<i>Pachycephala rufiventris</i>	Rufous Whistler	LC	X	X	X	X	X	X
Dicruridae								
Monarchs, Magpie Lark, Flycatchers, Fantails, Drongo								
<i>Grallina cyanoleuca</i>	Magpie-lark	LC	X	X	X	X	X	X
<i>Rhipidura fuliginosa</i>	Grey Fantail	LC		X	X	X	X	X
<i>Rhipidura leucophrys</i>	Willie Wagtail	LC	X	X	X	X	X	X
Campephagidae								
Cuckoo-shrikes, Trillers								
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	LC	X	X	X	X	X	X
<i>Lalage tricolor</i>	White-winged Triller	LC			X	X	X	X
Artamidae								
Woodswallows, Butcherbirds, Currawongs								
<i>Artamus cinereus</i>	Black-faced Woodswallow	Bp LC				X	X	X
<i>Artamus cyanopterus</i>	Dusky Woodswallow	Bp LC					X	X

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			Cracticidae Currawongs, Magpies & Butcherbirds					
<i>Cracticus tibicen</i>	Australian Magpie	LC	X	X	X	X	X	X
<i>Cracticus torquatus</i>	Grey Butcherbird	LC		X	X	X	X	X
Corvidae Ravens, Crows								
<i>Corvus coronoides</i>	Australian Raven	LC	X	X	X	X	X	X
Motacillidae Old World Pipits, Wagtails								
<i>Anthus australis</i>	Australian Pipit	LC		X	X		X	
Dicaeidae Flowerpeckers								
<i>Dicaeum hirundinaceum</i>	Mistletoebird	LC			X		X	X
Hirundinidae Swallows, Martins								
<i>Hirundo ariel</i>	Fairy Martin	LC					X	X
<i>Hirundo neoxena</i>	Welcome Swallow	LC			X	X	X	X
<i>Hirundo nigricans</i>	Tree Martin	LC		X	X	X	X	X

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			Sylviidae Old World Warblers					
<i>Acrocephalus australis</i>	Australian Reed Warbler	LC	X				X	X
<i>Cincloramphus cruralis</i>	Brown Songlark	LC					X	X
<i>Cincloramphus mathewsi</i>	Rufous Songlark	LC					X	X
Zosteropidae White-eyes								
<i>Zosterops lateralis</i>	Silvereye	LC	X	X	X	X	X	X
Mammalia								
Peramelidae Bandicoots								
<i>Isoodon obesulus fusciventer</i>	Southern Brown Bandicoot	P5 LC		X	X	X	X	
Phalangeridae Brush-tail Possums, Cuscuses								
<i>Trichosurus vulpecula</i>	Common Brush-tail Possum	LC			X			X
Molossidae Freetail Bats								
<i>Mormopterus planiceps</i>	Southern Freetail-bat	LC						X
<i>Tadarida australis</i>	White-striped Freetail-bat	LC						X

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			Vespertilionidae Ordinary Bats					
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	LC			X			X
<i>Chalinolobus morio</i>	Chocolate Wattled Bat	LC						X
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	LC			X			X
<i>Nyctophilus gouldi</i>	Gould's Long-eared Bat	LC						
<i>Nyctophilus major</i>	Western Long-eared Bat	LC						
<i>Vespadelus regulus</i>	Southern Forest Bat	LC						X
Muridae Rats, Mice								
<i>Mus musculus</i>	House Mouse	Introduced			X	X	X	X
<i>Rattus rattus</i>	Black Rat	Introduced			X		X	X
Canidae Dogs, Foxes								
<i>Canis lupus familiaris</i>	Dog	Introduced		X	X			
<i>Vulpes vulpes</i>	Red Fox	Introduced		X	X	X	X	
Felidae Cats								
<i>Felis catus</i>	Cat	Introduced		X	X	X		X

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Leporidae Rabbits, Hares								
<i>Oryctolagus cuniculus</i>	Rabbit	Introduced	X	X	X	X	X	X

WC Act Status - S1 to S4, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DEC Priority Status - P1 to P5, 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.

APPENDIX C

DPaW & EPBC DATABASE SEARCH RESULTS

NatureMap Species Report

Created By Greg Harewood on 30/12/2014

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 116°01' 54" E,31°52' 32" S
Buffer 10km
Group By Species Group

Species Group	Species	Records
Amphibian	15	862
Bird	212	20099
Fish	22	29
Invertebrate	135	820
Mammal	33	300
Reptile	69	812
TOTAL	486	22922

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Amphibian				
1.	25398 <i>Crinia georgiana</i> (Quacking Frog)			
2.	25399 <i>Crinia glauerti</i> (Clicking Frog)			
3.	25400 <i>Crinia insignifera</i> (Squelching Froglet)			
4.	25401 <i>Crinia pseudinsignifera</i> (Bleating Froglet)			
5.	25404 <i>Geocrinia leai</i> (Ticking Frog)			
6.	25408 <i>Heleioporus albopunctatus</i> (Western Spotted Frog)			
7.	25409 <i>Heleioporus barycragus</i> (Hooting Frog)			
8.	25410 <i>Heleioporus eyrei</i> (Moaning Frog)			
9.	25412 <i>Heleioporus psammophilus</i> (Sand Frog)			
10.	25415 <i>Limnodynastes dorsalis</i> (Western Banjo Frog)			
11.	25378 <i>Litoria adelaidensis</i> (Slender Tree Frog)			
12.	25388 <i>Litoria moorei</i> (Motorbike Frog)			
13.	25420 <i>Myobatrachus gouldii</i> (Turtle Frog)			
14.	25426 <i>Neobatrachus pelobatoides</i> (Humming Frog)			
15.	25433 <i>Pseudophryne guentheri</i> (Crawling Toadlet)			
Bird				
16.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
17.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
18.	24262 <i>Acanthiza inornata</i> (Western Thornbill)			
19.	24560 <i>Acanthorhynchus superciliosus</i> (Western Spinebill)			
20.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
21.	24281 <i>Accipiter cirrocephalus</i> subsp. <i>cirrocephalus</i> (Collared Sparrowhawk)			
22.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
23.	24283 <i>Accipiter fasciatus</i> subsp. <i>didimus</i> (Brown Goshawk)			
24.	24282 <i>Accipiter fasciatus</i> subsp. <i>fasciatus</i> (Brown Goshawk)			
25.	25751 <i>Acridotheres tristis</i> (Common Myna)	Y		Y
26.	25755 <i>Acrocephalus australis</i> (Australian Reed Warbler)			
27.	41323 <i>Actitis hypoleucos</i> (Common Sandpiper)		IA	
28.	25544 <i>Aegotheles cristatus</i> (Australian Owllet-nightjar)			
29.	24310 <i>Anas castanea</i> (Chestnut Teal)			
30.	24312 <i>Anas gracilis</i> (Grey Teal)			
31.	24313 <i>Anas platyrhynchos</i> (Mallard)			
32.	24315 <i>Anas rhynchotis</i> (Australasian Shoveler)			
33.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
34.	25553 <i>Anhinga melanogaster</i> (Darter)			
35.	24332 <i>Anhinga melanogaster</i> subsp. <i>novaehollandiae</i> (Darter)			
36.	24506 <i>Anous tenuirostris</i> subsp. <i>melanops</i> (Australian Lesser Noddy)		T	
37.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
38.	24562 <i>Anthochaera lunulata</i> (Western Little Wattlebird)			
39.	25554 <i>Apus pacificus</i> (Fork-tailed Swift)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
			IA	
40.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
41.	25558 <i>Ardea ibis</i> (Cattle Egret)		IA	
42.	41324 <i>Ardea modesta</i> (Eastern Great Egret)		IA	
43.	24340 <i>Ardea novaehollandiae</i> (White-faced Heron)			
44.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
45.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
46.	24353 <i>Artamus cyanopterus</i> (Dusky Woodswallow)			
47.	24356 <i>Artamus personatus</i> (Masked Woodswallow)			
48.	24318 <i>Aythya australis</i> (Hardhead)			
49.	24319 <i>Biziura lobata</i> (Musk Duck)			
50.	24345 <i>Botaurus poiciloptilus</i> (Australasian Bittern)		T	
51.	24359 <i>Burhinus grallarius</i> (Bush Stone-curlew)		P4	
52.	25713 <i>Cacatua galerita</i> (Sulphur-crested Cockatoo)			
53.	24721 <i>Cacatua galerita</i> subsp. <i>galerita</i> (Sulphur-crested Cockatoo)	Y		
54.	24722 <i>Cacatua leadbeateri</i> (Major Mitchell's Cockatoo)		S	
55.	25714 <i>Cacatua pastinator</i> (Western Long-billed Corella)			
56.	24723 <i>Cacatua pastinator</i> subsp. <i>butleri</i> (Butler's Corella)			
57.	24724 <i>Cacatua pastinator</i> subsp. <i>pastinator</i> (Muir's Corella, Muir's Corella (Western Corella SW WA))		S	
58.	25715 <i>Cacatua roseicapilla</i> (Galah)			
59.	25716 <i>Cacatua sanguinea</i> (Little Corella)			
60.	24727 <i>Cacatua sanguinea</i> subsp. <i>westralensis</i> (Little Corella)			
61.	-14077 <i>Cacatua sulphurea</i> subsp. <i>galerita</i>			Y
62.	24729 <i>Cacatua tenuirostris</i> (Eastern Long-billed Corella)	Y		
63.	25598 <i>Cacomantis flabelliformis</i> (Fan-tailed Cuckoo)			
64.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			
65.	25717 <i>Calyptorhynchus banksii</i> (Red-tailed Black-Cockatoo)			
66.	24731 <i>Calyptorhynchus banksii</i> subsp. <i>naso</i> (Forest Red-tailed Black-Cockatoo)		T	
67.	24733 <i>Calyptorhynchus baudinii</i> (Baudin's Cockatoo (long-billed black-cockatoo), Baudin's Cockatoo)		T	
68.	24734 <i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)		T	
69.	25625 <i>Carduelis carduelis</i> (Goldfinch, European Goldfinch)	Y		
70.	24480 <i>Carduelis carduelis</i> subsp. <i>britannica</i> (Goldfinch)	Y		
71.	24377 <i>Charadrius ruficapillus</i> (Red-capped Plover)			
72.	24321 <i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
73.	24431 <i>Chrysococcyx basalis</i> (Horsfield's Bronze Cuckoo)			
74.	25601 <i>Chrysococcyx lucidus</i> (Shining Bronze Cuckoo)			
75.	24432 <i>Chrysococcyx lucidus</i> subsp. <i>plagosus</i> (Shining Bronze Cuckoo)			
76.	24833 <i>Cincloramphus cruralis</i> (Brown Songlark)			
77.	24834 <i>Cincloramphus mathewsi</i> (Rufous Songlark)			
78.	24288 <i>Circus approximans</i> (Swamp Harrier)			
79.	24774 <i>Cladorhynchus leucocephalus</i> (Banded Stilt)			
80.	24396 <i>Climacteris rufa</i> (Rufous Treecreeper)			
81.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
82.	24399 <i>Columba livia</i> (Domestic Pigeon)	Y		
83.	24361 <i>Coracina maxima</i> (Ground Cuckoo-shrike)			
84.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
85.	24416 <i>Corvus bennetti</i> (Little Crow)			
86.	25592 <i>Corvus coronoides</i> (Australian Raven)			
87.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
88.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
89.	24422 <i>Cracticus tibicen</i> subsp. <i>dorsalis</i> (White-backed Magpie)			
90.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
91.	-14045 <i>Cyanorhamphus auriceps</i>			Y
92.	24322 <i>Cygnus atratus</i> (Black Swan)			
93.	30901 <i>Dacelo novaeguineae</i> (Laughing Kookaburra)	Y		
94.	30902 <i>Dacelo novaeguineae</i> subsp. <i>novaeguineae</i> (Laughing Kookaburra)	Y		
95.	25673 <i>Daphoenositta chrysoptera</i> (Varied Sittella)			
96.	24606 <i>Daphoenositta chrysoptera</i> subsp. <i>pileata</i> (Varied Sittella, Black-capped Sittella)			
97.	24325 <i>Dendrocygna eytoni</i> (Plumed Whistling Duck)			
98.	25607 <i>Dicaeum hirundinaceum</i> (Mistletoebird)			
99.	24470 <i>Dromaius novaehollandiae</i> (Emu)			
100.	24290 <i>Elanus caeruleus</i> subsp. <i>axillaris</i> (Australian Black-shouldered Kite)			
101.	25692 <i>Eopsaltria australis</i> (Yellow Robin)			
102.	24652 <i>Eopsaltria georgiana</i> (White-breasted Robin)			
103.	24567 <i>Epthianura albifrons</i> (White-fronted Chat)			
104.	24379 <i>Erythronyctis cinctus</i> (Red-kneed Dotterel)			
105.	25621 <i>Falco berigora</i> (Brown Falcon)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
106.	24471 <i>Falco berigora</i> subsp. <i>berigora</i> (Brown Falcon)			
107.	25622 <i>Falco cenchroides</i> (Australian Kestrel)			
108.	24472 <i>Falco cenchroides</i> subsp. <i>cenchroides</i> (Australian Kestrel)			
109.	25623 <i>Falco longipennis</i> (Australian Hobby)			
110.	24474 <i>Falco longipennis</i> subsp. <i>longipennis</i> (Australian Hobby)			
111.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
112.	24475 <i>Falco peregrinus</i> subsp. <i>macropus</i> (Australian Peregrine Falcon)		S	
113.	25727 <i>Fulica atra</i> (Eurasian Coot)			
114.	25729 <i>Gallinula tenebrosa</i> (Dusky Moorhen)			
115.	24764 <i>Gallinula ventralis</i> (Black-tailed Native-hen)			
116.	25730 <i>Gallirallus philippensis</i> (Buff-banded Rail)			
117.	24401 <i>Geopelia cuneata</i> (Diamond Dove)			
118.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
119.	24735 <i>Glossopsitta porphyrocephala</i> (Purple-crowned Lorikeet)			
120.	-14212 <i>Gracula religiosa</i>			
121.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
122.	24295 <i>Haliastur sphenurus</i> (Whistling Kite)			
123.	24689 <i>Halobaena caerulea</i> (Blue Petrel)			
124.	25734 <i>Himantopus himantopus</i> (Black-winged Stilt)			
125.	24489 <i>Hirundo ariel</i> (Fairy Martin)			
126.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
127.	25629 <i>Hirundo nigricans</i> (Tree Martin)			
128.	24492 <i>Hirundo nigricans</i> subsp. <i>nigricans</i> (Tree Martin)			
129.	24347 <i>Ixobrychus flavicollis</i> subsp. <i>australis</i> (Australian Black Bittern)		P3	
130.	24348 <i>Ixobrychus minutus</i> subsp. <i>dubius</i> (Australian Little Bittern)		P4	
131.	24367 <i>Lalage tricolor</i> (White-winged Triller)			
132.	25659 <i>Lichenostomus leucotis</i> (White-eared Honeyeater)			
133.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
134.	24582 <i>Lichmera indistincta</i> subsp. <i>indistincta</i> (Brown Honeyeater)			
135.	24326 <i>Malacorhynchus membranaceus</i> (Pink-eared Duck)			
136.	25650 <i>Malurus elegans</i> (Red-winged Fairy-wren)			
137.	25652 <i>Malurus leucopterus</i> (White-winged Fairy-wren)			
138.	24551 <i>Malurus pulcherrimus</i> (Blue-breasted Fairy-wren)			
139.	25654 <i>Malurus splendens</i> (Splendid Fairy-wren)			
140.	24552 <i>Malurus splendens</i> subsp. <i>splendens</i> (Splendid Fairy-wren)			
141.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			
142.	25758 <i>Megalurus gramineus</i> (Little Grassbird)			
143.	25663 <i>Melithreptus brevirostris</i> (Brown-headed Honeyeater)			
144.	24598 <i>Merops ornatus</i> (Rainbow Bee-eater)		IA	
145.	25693 <i>Microeca fascinans</i> (Jacky Winter)			
146.	25542 <i>Milvus migrans</i> (Black Kite)			
147.	25610 <i>Myiagra inquieta</i> (Restless Flycatcher)			
148.	25686 <i>Neochmia temporalis</i> (Red-browed Finch)	Y		
149.	24738 <i>Neophema elegans</i> (Elegant Parrot)			
150.	-14094 <i>Neophema pulchella</i>			
151.	25747 <i>Ninox connivens</i> (Barking Owl)			
152.	25748 <i>Ninox novaeseelandiae</i> (Boobook Owl)			
153.	24820 <i>Ninox novaeseelandiae</i> subsp. <i>boobook</i> (Boobook Owl)			
154.	25564 <i>Nycticorax caledonicus</i> (Rufous Night Heron)			
155.	24350 <i>Nycticorax caledonicus</i> subsp. <i>hilli</i> (Rufous Night Heron)			
156.	24742 <i>Nymphicus hollandicus</i> (Cockatiel)			
157.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
158.	24328 <i>Oxyura australis</i> (Blue-billed Duck)			
159.	25679 <i>Pachycephala pectoralis</i> (Golden Whistler)			
160.	24623 <i>Pachycephala pectoralis</i> subsp. <i>fuliginosa</i> (Golden Whistler)			
161.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
162.	24624 <i>Pachycephala rufiventris</i> subsp. <i>rufiventris</i> (Rufous Whistler)			
163.	24693 <i>Pachyptila desolata</i> (Antarctic Prion)			
164.	25681 <i>Pardalotus punctatus</i> (Spotted Pardalote)			
165.	24625 <i>Pardalotus punctatus</i> subsp. <i>punctatus</i> (Spotted Pardalote)			
166.	24626 <i>Pardalotus punctatus</i> subsp. <i>xanthopyge</i> (Yellow-rumped Pardalote)			
167.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
168.	24630 <i>Pardalotus striatus</i> subsp. <i>westraliensis</i> (Striated Pardalote)			
169.	25687 <i>Passer domesticus</i> (House Sparrow)	Y		
170.	24648 <i>Pelecanus conspicillatus</i> (Australian Pelican)			
171.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
172.	25695 <i>Petroica multicolor</i> (Scarlet Robin)			
173.	24660 <i>Petroica multicolor</i> subsp. <i>campbelli</i> (Scarlet Robin)			
174.	25697 <i>Phalacrocorax carbo</i> (Great Cormorant)			
175.	24667 <i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
176.	25699 <i>Phalacrocorax varius</i> (Pied Cormorant)			
177.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
178.	25587 <i>Phaps elegans</i> (Brush Bronzewing)			
179.	24596 <i>Phylidonyris novaehollandiae</i> (New Holland Honeyeater)			
180.	24841 <i>Platalea flavipes</i> (Yellow-billed Spoonbill)			
181.	-14135 <i>Platycercus elegans</i>			
182.	25720 <i>Platycercus icterotis</i> (Western Rosella)			
183.	24747 <i>Platycercus spurius</i> (Red-capped Parrot)			
184.	25721 <i>Platycercus zonarius</i> (Australian Ringneck, Ring-necked Parrot)			
185.	24843 <i>Plegadis falcinellus</i> (Glossy Ibis)		IA	
186.	25703 <i>Podargus strigoides</i> (Tawny Frogmouth)			
187.	24679 <i>Podargus strigoides</i> subsp. <i>brachypterus</i> (Tawny Frogmouth)			
188.	25704 <i>Podiceps cristatus</i> (Great Crested Grebe)			
189.	24680 <i>Podiceps cristatus</i> subsp. <i>australis</i> (Great Crested Grebe)			
190.	24681 <i>Poliiocephalus poliocephalus</i> (Hoary-headed Grebe)			
191.	25722 <i>Polytelis anthopeplus</i> (Regent Parrot)			
192.	24683 <i>Pomatostomus superciliosus</i> (White-browed Babbler)			
193.	25731 <i>Porphyrio porphyrio</i> (Purple Swamphen)			
194.	24767 <i>Porphyrio porphyrio</i> subsp. <i>bellus</i> (Purple Swamphen)			
195.	24769 <i>Porzana fluminea</i> (Australian Spotted Crake)			
196.	25732 <i>Porzana pusilla</i> (Baillon's Crake)			
197.	24770 <i>Porzana pusilla</i> subsp. <i>palustris</i> (Baillon's Crake)			
198.	24771 <i>Porzana tabuensis</i> (Spotless Crake)			
199.	24776 <i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			
200.	25613 <i>Rhipidura fuliginosa</i> (Grey Fantail)			
201.	24452 <i>Rhipidura fuliginosa</i> subsp. <i>preissi</i> (Grey Fantail)			
202.	25614 <i>Rhipidura leucophys</i> (Willie Wagtail)			
203.	25534 <i>Sericornis frontalis</i> (White-browed Scrubwren)			
204.	30948 <i>Smicromis brevirostris</i> (Weebill)			
205.	24645 <i>Stagonopleura oculata</i> (Red-eared Firetail)			
206.	24525 <i>Sterna fuscata</i> subsp. <i>nubilosa</i> (Sooty Tern)			
207.	25597 <i>Strepera versicolor</i> (Grey Currawong)			
208.	25589 <i>Streptopelia chinensis</i> (Spotted Turtle-Dove)	Y		
209.	30951 <i>Streptopelia chinensis</i> subsp. <i>tigrina</i> (Spotted Turtle-Dove)	Y		
210.	25590 <i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
211.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
212.	24682 <i>Tachybaptus novaehollandiae</i> subsp. <i>novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
213.	24331 <i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
214.	24844 <i>Threskiornis molucca</i> (Australian White Ibis)			
215.	24845 <i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
216.	25549 <i>Todiramphus sanctus</i> (Sacred Kingfisher)			
217.	24309 <i>Todiramphus sanctus</i> subsp. <i>sanctus</i> (Sacred Kingfisher)			
218.	-13887 <i>Trichoglossus chlorolepidotus</i>			
219.	25723 <i>Trichoglossus haematodus</i> (Rainbow Lorikeet)			
220.	24755 <i>Trichoglossus haematodus</i> subsp. <i>moluccanus</i> (Rainbow Lorikeet)	Y		
221.	24754 <i>Trichoglossus haematodus</i> subsp. <i>rubritorquis</i> (Red-collared Lorikeet)			
222.	24806 <i>Tringa glareola</i> (Wood Sandpiper)		IA	
223.	24849 <i>Turnix varia</i> subsp. <i>varia</i> (Painted Button-quail)			
224.	24851 <i>Turnix velox</i> (Little Button-quail)			
225.	24852 <i>Tyto alba</i> subsp. <i>delicatula</i> (Barn Owl)			
226.	25765 <i>Zosterops lateralis</i> (Grey-breasted White-eye, Silvereye)			
227.	24856 <i>Zosterops lateralis</i> subsp. <i>gouldi</i> (Grey-breasted White-eye)			
Fish				
228.	-15700 <i>Acanthaluteres brownii</i>			
229.	-16128 <i>Acentrogobius bifrenatus</i>			
230.	-15728 <i>Aldrichetta forsteri</i>			
231.	-14507 <i>Amniataba caudavittata</i>			
232.	-15816 <i>Atherinosoma wallacei</i>			
233.	-14532 <i>Carassius auratus</i>			
234.	-16108 <i>Carcharhinus leucas</i>			
235.	-16126 <i>Cnidogobius macrocephalus</i>			
236.	-16588 <i>Engraulis australis</i>			
237.	-14995 <i>Favonigobius sp.</i>			
238.	34028 <i>Galaxias occidentalis</i> (Western Minnow)			
239.	34030 <i>Geotria australis</i> (Pouched Lamprey)		P1	
240.	-15760 <i>Gerres subfasciatus</i>			
241.	-14441 <i>Gonorynchus greyi</i>			
242.	-16590 <i>Monacanthus chinensis</i>			
243.	-15692 <i>Mugil cephalus</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
244.	-14887 <i>Neatypus obliquus</i>			
245.	-15367 <i>Platycephalus indicus</i>			
246.	-16968 <i>Rhabdosargus sarba</i>			
247.	-17939 <i>Scobinichthys granulatus</i>			
248.	-18123 <i>Tridentiger trigonocephalus</i>			
249.	-14257 <i>Urocampus carinirostris</i>			
Invertebrate				
250.	-12246 <i>Acroaspis olorina</i>			Y
251.	-12473 <i>Aganippe cupulifex</i>			Y
252.	-12472 <i>Akamptogonus novarae</i>			
253.	-13038 <i>Allothereua maculata</i>			
254.	-12139 <i>Ambicodamus kochi</i>			
255.	-12788 <i>Amblyomma albolimbatum</i>			
256.	-12263 <i>Amblyomma fimbriatum</i>			
257.	-13199 <i>Amblyomma triguttatum</i>			
258.	-13287 <i>Aname mainae</i>			
259.	-12101 <i>Aname tepperi</i>			
260.	-12762 <i>Antichiropus variabilis</i>			
261.	-12543 <i>Araneus cyphoxis</i>			
262.	-13355 <i>Araneus eburneiventris</i>			
263.	-13662 <i>Araneus ginninderranus</i>			
264.	-13866 <i>Araneus senicaudatus</i>			
265.	-1925 <i>Argiope protensa</i>			
266.	-12518 <i>Argiope trifasciata</i>			
267.	-12366 <i>Artoria flavimana</i>			
268.	-12906 <i>Artoria impedita</i>			
269.	-13341 <i>Artoria linnaei</i>			
270.	-12897 <i>Artoriopsis expolita</i>			
271.	-12920 <i>Austracantha minax</i>			
272.	-12457 <i>Australomimetes auriculatus</i>			
273.	-12580 <i>Australomimetes ovidi</i>			
274.	33972 <i>Austromerope poultoni</i> (scorpionfly)		P2	
275.	-12252 <i>Backbourkia brounii</i>			
276.	-12356 <i>Backbourkia heroine</i>			
277.	-12108 <i>Badumna insignis</i>			
278.	-13746 <i>Ballara longipalpus</i>			
279.	-12857 <i>Celaenia excavata</i>			
280.	-1935 <i>Cercophonius granulatus</i>			
281.	-13300 <i>Cercophonius squama</i>			
282.	-13755 <i>Cercophonius sulcatus</i>			
283.	-12371 <i>Ceryerda cursitans</i>			
284.	-13292 <i>Cethegus fugax</i>			
285.	33939 <i>Cherax cainii</i> (Marron)			
286.	-13574 <i>Clynotis severus</i>			
287.	-1911 <i>Cormocephalus aurantiipes</i>			
288.	-12357 <i>Cormocephalus rubriceps</i>			
289.	-1846 <i>Cormocephalus strigosus</i>			
290.	-1868 <i>Cormocephalus turneri</i>			
291.	-12522 <i>Cyclosa trilobata</i>			
292.	-12919 <i>Cyrtophora parnasia</i>			
293.	-13494 <i>Dasyurochirus tapoatafa</i>			Y
294.	-12461 <i>Dingosa serrata</i>			
295.	-12391 <i>Dinocambala ingens</i>			
296.	-12768 <i>Eodelena lapidicola</i>			
297.	-12234 <i>Erigone prominens</i>			
298.	-13748 <i>Eriophora biapicata</i>			
299.	-12785 <i>Eriophora pustulosa</i>			
300.	-12773 <i>Eucyrtops latior</i>			
301.	-13288 <i>Euoplos inornatus</i>			
302.	-12973 <i>Eupograptus kottae</i>			
303.	-12656 <i>Gea theridioides</i>			
304.	-13148 <i>Hemicloea</i> sp.			Y
305.	-13458 <i>Hemicloea sublimbata</i>			
306.	-13505 <i>Heurodes turritus</i>			
307.	-13328 <i>Hoggicosa storri</i>			
308.	-12191 <i>Hogna crispipes</i>			
309.	-12965 <i>Hogna kuyani</i>			
310.	-13405 <i>Holasteron perth</i>			
311.	-13730 <i>Holconia westralia</i>			
312.	-12013 <i>Holocnemus plucheii</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
313.	-13785 <i>Hypoblemum</i> sp.			Y
314.	-12358 <i>Idiommata blackwalli</i>			
315.	-12774 <i>Idiosoma sigillatum</i>			
316.	-1823 <i>Isometroides vesucus</i>			
317.	-13282 <i>Isopeda leishmanni</i>			
318.	-12107 <i>Isopeda magna</i>			
319.	-12770 <i>Isopedella cana</i>			
320.	-12769 <i>Isopedella tindalei</i>			
321.	-12112 <i>Ixodes feicalis</i>			
322.	-13280 <i>Karaops ellenae</i>			
323.	-12436 <i>Lampona brevipes</i>			
324.	-1870 <i>Lampona cylindrata</i>			
325.	-13622 <i>Lampona yanchep</i>			
326.	-12723 <i>Latrodectus hasselti</i>			Y
327.	-13754 <i>Lycosa ariadnae</i>			
328.	-12099 <i>Lycosa godeffroyi</i>			
329.	-13406 <i>Masasteron mas</i>			
330.	-13346 <i>Missulena hoggi</i>			
331.	-13794 <i>Missulena occatoria</i>			
332.	-13296 <i>Mituliodon tarantulinus</i>			
333.	-12763 <i>Myandra bicincta</i>			
334.	-1806 <i>Nicodamus mainae</i>			
335.	-12821 <i>Notiasemus glauerti</i>			
336.	-13873 <i>Novakiella trituberculosa</i>			
337.	-13187 <i>Nunciella aspera</i>			
338.	-13327 <i>Occiperipatoides gilesii</i>			
339.	-1831 <i>Ocrisiana leucocomis</i>			
340.	-13479 <i>Oecobius navus</i>			
341.	-12198 <i>Ommatoiulus moreleti</i>			
342.	-13590 <i>Ommatoiulus moreletii</i>			
343.	-12631 <i>Opopaea</i> sp.			Y
344.	-13190 <i>Orphnaeus brevilabiatus</i>			
345.	-13743 <i>Ostearius melanopygius</i>			
346.	-12409 <i>Oxyopes gracilipes</i>			
347.	-13436 <i>Oxyopes punctatus</i>			
348.	-12592 <i>Paralampona marangaroo</i>			
349.	-12779 <i>Pediana occidentalis</i>			
350.	-12095 <i>Pentasteron securifer</i>			
351.	-13048 <i>Pholcus phalangioides</i>			
352.	-13333 <i>Phryganoporus candidus</i>			
353.	-13194 <i>Pinkfloydia harveii</i>			
354.	-13393 <i>Raveniella cirrata</i>			
355.	-12883 <i>Raveniella peckorum</i>			
356.	-12511 <i>Sandalodes joannae</i>			
357.	-12828 <i>Sandalodes superbus</i>			
358.	-1822 <i>Scolopendra laeta</i>			
359.	-12957 <i>Scytodes thoracica</i>			
360.	-12456 <i>Servaea melaina</i>			
361.	-13250 <i>Servaea spinibarbis</i>			
362.	-12506 <i>Smeringopus natalensis</i>			
363.	-12642 <i>Smeringopus natalensis?</i>			Y
364.	-13045 <i>Steatoda capensis</i>			
365.	-12434 <i>Steatoda grossa</i>			
366.	-13478 <i>Supunna funerea</i>			
367.	33992 <i>Synemon gratiose</i> (Graceful Sunmoth)		P4	
368.	-13446 <i>Synothele durokoppin</i>			
369.	-12862 <i>Synothele michaelsoni</i>			
370.	-12372 <i>Tamopsis darlingtoniana</i>			
371.	-12267 <i>Tamopsis perthensis</i>			
372.	-12469 <i>Tasmanicosa leuckartii</i>			
373.	-12143 <i>Tetragnatha demissa</i>			
374.	-12542 <i>Tetragnatha luteocincta</i>			Y
375.	-13373 <i>Trachycosmus sculptilis</i>			
376.	-13724 <i>Trachyspina mundaring</i>			
377.	-12874 <i>Trichocyclus nullarbor</i>			
378.	-1824 <i>Urodacus armatus</i>			
379.	-13715 <i>Urodacus novaehollandiae</i>			
380.	-13739 <i>Urodacus planimanus</i>			
381.	-12898 <i>Venator immansueta</i>			
382.	34113 <i>Westralunio carteri</i> (Carter's Freshwater Mussel)		P4	

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
383.	-13429 <i>Withius piger</i>			
384.	-13146 <i>unknown unknown</i>			Y
Mammal				
385.	24088 <i>Antechinus flavipes subsp. leucogaster</i> (Yellow-footed Antechinus, Mardo)			
386.	24162 <i>Bettongia penicillata subsp. ogilbyi</i> (Woylie, Brush-tailed Bettong)		T	
387.	25454 <i>Canis lupus</i> (Dog, Dingo)	Y		
388.	30883 <i>Canis lupus subsp. familiaris</i> (Dog)	Y		
389.	24086 <i>Cercartetus concinnus</i> (Western Pygmy-possum, Mundarda)			
390.	24186 <i>Chalinolobus gouldii</i> (Gould's Wattled Bat)			
391.	24187 <i>Chalinolobus morio</i> (Chocolate Wattled Bat)			
392.	24092 <i>Dasyurus geoffroi</i> (Chuditch, Western Quoll)		T	
393.	24258 <i>Equus caballus</i> (Horse)	Y		
394.	24189 <i>Falsistrellus mackenziei</i> (Western False Pipistrelle)		P4	
395.	24041 <i>Felis catus</i> (Cat)	Y		
396.	24215 <i>Hydromys chrysogaster</i> (Water-rat)		P4	
397.	25478 <i>Isoodon obesulus</i> (Southern Brown Bandicoot)		P5	
398.	24153 <i>Isoodon obesulus subsp. fusciventer</i> (Quenda, Southern Brown Bandicoot)		P5	
399.	24132 <i>Macropus fuliginosus</i> (Western Grey Kangaroo)			
400.	24133 <i>Macropus irma</i> (Western Brush Wallaby)		P4	
401.	24135 <i>Macropus robustus subsp. erubescens</i> (Euro, Biggada)			
402.	24168 <i>Macrotis lagotis</i> (Bilby, Dalgyte)		T	
403.	24184 <i>Mormopterus planiceps</i> (Southern Freetail-bat)			
404.	24223 <i>Mus musculus</i> (House Mouse)	Y		
405.	24194 <i>Nyctophilus geoffroyi</i> (Lesser Long-eared Bat)			
406.	24085 <i>Oryctolagus cuniculus</i> (Rabbit)	Y		
407.	34016 <i>Ovis aries</i> (Sheep)			
408.	24099 <i>Phascogale tapoatafa subsp. tapoatafa</i> (Southern Brush-tailed Phascogale, Wambenger)		T	
409.	24166 <i>Pseudocheirus occidentalis</i> (Western Ringtail Possum)		T	
410.	24243 <i>Rattus fuscipes</i> (Western Bush Rat)			
411.	24245 <i>Rattus rattus</i> (Black Rat)	Y		
412.	24207 <i>Tachyglossus aculeatus</i> (Short-beaked Echidna)			
413.	24185 <i>Tadarida australis</i> (White-striped Freetail-bat)			
414.	24167 <i>Tarsipes rostratus</i> (Honey Possum, Noolbenger)			
415.	25521 <i>Trichosurus vulpecula</i> (Common Brushtail Possum)			
416.	24158 <i>Trichosurus vulpecula subsp. vulpecula</i> (Common Brushtail Possum)			
417.	24206 <i>Vespadelus regulus</i> (Southern Forest Bat)			
Reptile				
418.	42368 <i>Acritoscincus trilineatus</i> (Western Three-lined Skink)			
419.	25241 <i>Antaresia stimsoni subsp. stimsoni</i> (Stimson's Python)			
420.	24990 <i>Aprasia pulchella</i> (Granite Worm-lizard)			
421.	24991 <i>Aprasia repens</i> (Sand-plain Worm-lizard)			
422.	42380 <i>Brachyurophis fasciolatus subsp. fasciolatus</i> (Narrow-banded Shovel-nosed Snake)			
423.	42381 <i>Brachyurophis semifasciatus</i> (Southern Shovel-nosed Snake)			
424.	43380 <i>Chelodina colliei</i> (Oblong Turtle)			
425.	24980 <i>Christinus marmoratus</i> (Marbled Gecko)			
426.	25456 <i>Crenadactylus ocellatus</i> (Clawless Gecko)			
427.	24918 <i>Crenadactylus ocellatus subsp. ocellatus</i> (Clawless Gecko)			
428.	30893 <i>Cryptoblepharus buchananii</i>			
429.	30899 <i>Ctenophorus adelaidensis</i> (Southern Heath Dragon, Western Heath Dragon)			
430.	24883 <i>Ctenophorus ornatus</i> (Ornate Crevice-Dragon)			
431.	25027 <i>Ctenotus australis</i>			
432.	25035 <i>Ctenotus delli</i> (Dell's Ctenotus, Darling Range Heath Ctenotus)		P4	
433.	25039 <i>Ctenotus fallens</i>			
434.	25040 <i>Ctenotus gemmula</i> (Jewelled South-west Ctenotus (Swan Coastal Plain pop P3), skink)			
435.	25047 <i>Ctenotus impar</i>			
436.	25049 <i>Ctenotus labillardieri</i>			
437.	25766 <i>Delma fraseri</i> (Fraser's Legless Lizard)			
438.	24999 <i>Delma grayii</i>			
439.	25296 <i>Demansia psammophis subsp. reticulata</i> (Yellow-faced Whipsnake)			
440.	25469 <i>Diplodactylus granariensis</i>			
441.	24929 <i>Diplodactylus granariensis subsp. granariensis</i>			
442.	24939 <i>Diplodactylus polyophthalmus</i>			
443.	24940 <i>Diplodactylus pulcher</i>			
444.	25251 <i>Echiopsis curta</i> (Bardick)			
445.	25096 <i>Egernia kingii</i> (King's Skink)			
446.	25100 <i>Egernia napoleonis</i>			
447.	25250 <i>Elapognathus coronatus</i> (Crowned Snake)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
448.	24959 <i>Gehyra variegata</i>			
449.	25474 <i>Hemiergis initialis</i>			
450.	25115 <i>Hemiergis initialis</i> subsp. <i>initialis</i>			
451.	25119 <i>Hemiergis quadrilineata</i>			
452.	25131 <i>Lerista distinguenda</i>			
453.	25133 <i>Lerista elegans</i>			
454.	25148 <i>Lerista lineopunctulata</i>			
455.	25165 <i>Lerista praepedita</i>			
456.	25005 <i>Lialis burtonis</i>			
457.	25184 <i>Menetia greyii</i>			
458.	25240 <i>Morelia spilota</i> subsp. <i>imbricata</i> (Carpet Python)		S	
459.	25191 <i>Morethia lineoocellata</i>			
460.	25192 <i>Morethia obscura</i>			
461.	25248 <i>Neelaps bimaculatus</i> (Black-naped Snake)			
462.	25249 <i>Neelaps calonotos</i> (Black-striped Snake)		P3	
463.	25252 <i>Notechis scutatus</i> (Tiger Snake)			
464.	25253 <i>Parasuta gouldii</i>			
465.	25255 <i>Parasuta nigriceps</i>			
466.	25007 <i>Pletholax gracilis</i> subsp. <i>gracilis</i> (Keeled Legless Lizard)			
467.	24907 <i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
468.	25261 <i>Pseudechis australis</i> (Mulga Snake)			
469.	25345 <i>Pseudemydura umbrina</i> (Western Swamp Turtle, tortoise)		T	
470.	25511 <i>Pseudonaja affinis</i> (Dugite)			
471.	25259 <i>Pseudonaja affinis</i> subsp. <i>affinis</i> (Dugite)			
472.	42416 <i>Pseudonaja mengdeni</i> (Western Brown Snake)			
473.	25008 <i>Pygopus lepidopodus</i> (Common Scaly Foot)			
474.	25271 <i>Ramphotyphlops australis</i>			
475.	25273 <i>Ramphotyphlops bituberculatus</i>			
476.	25285 <i>Ramphotyphlops pinguis</i>			
477.	25288 <i>Ramphotyphlops waitii</i>			
478.	25266 <i>Simoselaps bertholdi</i> (Jan's Banded Snake)			
479.	24943 <i>Strophurus spinigerus</i> subsp. <i>inornatus</i>			
480.	24942 <i>Strophurus spinigerus</i> subsp. <i>spinigerus</i>			
481.	25203 <i>Tiliqua occipitalis</i> (Western Bluetongue)			
482.	25519 <i>Tiliqua rugosa</i>			
483.	25207 <i>Tiliqua rugosa</i> subsp. <i>rugosa</i>			
484.	24983 <i>Underwoodisaurus milii</i> (Barking Gecko)			
485.	25218 <i>Varanus gouldii</i> (Bungarra or Sand Monitor)			
486.	25526 <i>Varanus tristis</i> (Racehorse 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 wholly 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: 28/12/14 15:00:55

[Summary](#)

[Details](#)

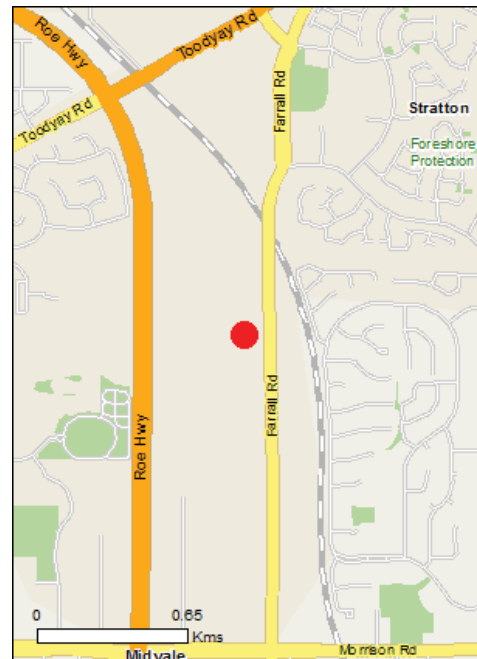
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

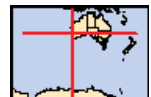
[Acknowledgements](#)



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Buffer: 0.0Km



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:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	13
Listed Migratory Species:	6

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 and the heritage values of a place on the Register of the National Estate.

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.

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:	7
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.

Place on the RNE:	None
State and Territory Reserves:	None
Regional Forest Agreements:	1
Invasive Species:	35
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat may occur within area
Calyptorhynchus baudinii Baudin's Black-Cockatoo, Long-billed Black-Cockatoo [769]	Vulnerable	Roosting known to occur within area
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	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
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Centrolepis caespitosa [6393]	Endangered	Species or species habitat likely to occur within area
Darwinia foetida Muccha Bell [83190]	Critically Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may occur within area
Eucalyptus balanites Cadda Road Mallee, Cadda Mallee [24264]	Endangered	Species or species habitat may occur within area
Thelymitra manginii K.Dixon & Batty ms. [67443]	Endangered	Species or species habitat may occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat likely to occur within area

Listed Migratory Species [[Resource Information](#)]

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

Name	Threatened	Type of Presence
------	------------	------------------

Migratory Marine Birds

Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
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Migratory Terrestrial Species

Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
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[Merops ornatus](#)

Rainbow Bee-eater [670]		Species or species habitat may occur within area
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Migratory Wetlands Species

Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
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[Ardea ibis](#)

Cattle Egret [59542]		Species or species habitat likely to occur within area
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[Rostratula benghalensis \(sensu lato\)](#)

Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
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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

Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
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[Ardea alba](#)

Great Egret, White Egret [59541]		Species or species habitat known to occur within area
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[Ardea ibis](#)

Cattle Egret [59542]		Species or species habitat likely to occur within area
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Name	Threatened	Type of Presence
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

Regional Forest Agreements [\[Resource Information \]](#)

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

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 Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		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
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur

Name	Status	Type of Presence
Sturnus vulgaris Common Starling [389]		within area 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
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		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		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
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
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species

Name	Status	Type of Presence
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		habitat likely to occur within area Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to 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
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area

Coordinates

-31.87564 116.03242

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 Heritage and Register of National Estate properties, Wetlands of International 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.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

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.

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:

- [Department of Environment, Climate Change and Water, New South Wales](#)
- [Department of Sustainability and Environment, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment and Natural Resources, South Australia](#)
- [Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [Environmental and Resource Management, Queensland](#)
- [Department of Environment and Conservation, Western Australia](#)
- [Department of the Environment, Climate Change, Energy and Water](#)
- [Birds Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Museum Victoria](#)
- [Australian Museum](#)
- [SA 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, Atherton and Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence](#)
- [State Forests of NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- 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.

APPENDIX D

BLACK COCKATOO HABITAT TREE & FORAGING EVIDENCE DETAILS

Habitat Trees
Datum = GDA 94

Waypoint Number	Zone	mE	mN	Tree Species	Tree Height (m)	Number of Hollows	Hollow Type 1	Hollow Size 1 (cm)	Hollow Type 2	Hollow Size 2 (cm)	Hollow Type 3	Hollow Size 3 (cm)	Hollow Type 4	Hollow Size 4 (cm)	Hollow Type 5	Hollow Size 5 (cm)	Occupancy	Chew Marks	Potential Cockatoo Nest Hollow	Comments
wpt002	50J	408456	6472493	Marri	15-20	0											No Signs	No Signs	No	
wpt003	50J	408417	6472504	Marri	10-15	0											No Signs	No Signs	No	
wpt004	50J	408370	6472500	Marri	10-15	0											No Signs	No Signs	No	
wpt005	50J	408330	6472490	Flooded Gum	15-20	0											No Signs	No Signs	No	
wpt006	50J	408289	6472521	Marri	15-20	0											No Signs	No Signs	No	
wpt007	50J	408475	6472681	Flooded Gum	15-20	0											No Signs	No Signs	No	
wpt008	50J	408556	6472801	Flooded Gum	15-20	0											No Signs	No Signs	No	
wpt010	50J	408586	6473011	Coastal Blackbutt	10-15	1	Knot Hole	5-12									No Signs	No Signs	No	
wpt011	50J	408584	6473122	Marri	20+	2	Branch	5-12	Spout Branch	12-20							Bees	No Signs	No	Too low
wpt012	50J	408592	6473131	Marri	15-20	0											No Signs	No Signs	No	
wpt013	50J	408609	6473155	Marri	15-20	0											No Signs	No Signs	No	
wpt014	50J	408595	6473190	Marri	15-20	0											No Signs	No Signs	No	
wpt015	50J	408588	6473227	Jarraah	15-20	1	Spout Trunk	5-12									No Signs	No Signs	No	
wpt016	50J	408586	6473230	Marri	15-20	0											No Signs	No Signs	No	
wpt017	50J	408558	6473260	Marri	15-20	0											No Signs	No Signs	No	
wpt018	50J	408554	6473200	Marri	15-20	0											No Signs	No Signs	No	
wpt019	50J	408525	6473209	Marri	15-20	0											No Signs	No Signs	No	
wpt020	50J	408562	6473132	Marri	20+	1	Knot Hole	5-12									No Signs	No Signs	No	
wpt022	50J	408220	6473132	Marri	15-20	0											No Signs	No Signs	No	
wpt023	50J	408211	6473123	Marri	15-20	0											No Signs	No Signs	No	
wpt024	50J	408510	6473303	Marri	20+	2	Knot Hole	<5	Branch	5-12							Bees	No Signs	No	
wpt025	50J	408346	6473297	Marri	15-20	0											No Signs	No Signs	No	
wpt026	50J	408400	6473222	Flooded Gum	15-20	0											No Signs	No Signs	No	
wpt027	50J	408375	6473198	Flooded Gum	20+	5+	Knot Hole	<5	Branch	<5	Branch	5-12	Branch	<5	Branch	5-12	No Signs	No Signs	No	
wpt028	50J	408574	6472056	Flooded Gum	15-20	0											No Signs	No Signs	No	
wpt029	50J	408571	6472060	Flooded Gum	15-20	0											No Signs	No Signs	No	
wpt030	50J	408331	6472038	Flooded Gum	15-20	0											No Signs	No Signs	No	
wpt031	50J	408318	6472040	Flooded Gum	15-20	0											No Signs	No Signs	No	
wpt032	50J	408454	6472826	Flooded Gum	15-20	2	Branch	5-12	Branch	5-12							No Signs	No Signs	No	
wpt033	50J	408454	6472826	Flooded Gum	15-20	0											No Signs	No Signs	No	

APPENDIX E

SIGNIFICANT SPECIES PROFILES

Unnamed scorpionfly *Austromerope poultoni*

Status and Distribution: Listed as Priority 2 by the DPaW. Distribution is poorly documented. NatureMap database contains widely scattered records from Eneabba to Walpole (DPaW 2014b).

Habitat: Occurs predominantly in dense understorey vegetation in high rainfall forest where it has been collected from beneath forest debris (logs, rocks) and in pitfall traps. Most NatureMap records are in the Jarrah forest belt.

Likely presence in study area: Preferred habitat absent and there are no records of this species from the coastal plain. Not listed as a potential species.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Graceful Sun Moth *Synemon gratiosa*

Status and Distribution: Listed as Priority 4 by the DPaW.

The GSM was up until a few years ago thought to be confined to a small number of bush reserves in the northern suburbs of Perth. Targeted survey work since that time by a number of consultants and the DPaW have extended the known range of the species north to Leeman and south as far as Binningup (Bishop *et al.* 2010b).

Survey work carried out in 2010 expanded the previously document area of occupancy of the GSM from 18km² to 43 km² and the extent of occurrence from 230km² to 2,015km². The area of occupancy is potentially a conservative estimate at this stage and if habitat anticipated to be occupied by GSM is included, the area of occupancy may be as high as 119 km² (Bishop *et al.* 2010b). Additional surveys have been carried out in 2011 north and south of the known range and these may also expand the species range (results not as yet publically available).

The conservation status of the graceful sun-moth was change at a state level in 2012 from Schedule 1 to Priority 4 as a consequence of the additional information illustrating the species much greater range and abundance.

Habitat: The graceful sun-moth is currently only known from two general vegetation types:

- *Banksia* woodland/woolly bush on deep sands, in the northern suburbs of Perth on the Swan Coastal Plain. In these sites the GSM breeds on *Lomandra hermaphrodita*, which often occurs in low numbers.
- Open areas of herbland, heathland and shrubland on Quindalup soils (sand and limestone) close to the coast where it breeds on *Lomandra maritima*, which is often present in reasonable numbers and may even be a dominant understorey herb. Sites on limestone may have both *Lomandra* species present.

The presence of *Lomandra* species therefore provides a good indication of prospective habitat, however, sufficient numbers and densities of these plants are thought to be necessary to sustain a viable breeding colony of Graceful Sun-Moths.

Likely presence in study area: Most of the study area is cleared of native vegetation and would therefore be unsuitable for this species to utilise. *Lomandra* appears to be absent from the remaining remnants. This information would suggest that a population of this species would be unlikely to be present. Not listed as a potential species.

Potential impact of development: No impact on this species or its preferred habitat will occur as a consequence of development at the site occurring.

Carter's Freshwater Mussel *Westralunio carteri*

Status and Distribution: Listed as Schedule 1 under the *WC Act* and as Vulnerable (A2c+4c) by the ICUN. Carter's freshwater mussel is the only freshwater mussel species endemic to south-western WA, ranging from the Moore River south to the Frankland River (Morgan *et al.* 2011).

Habitat: Occurs in greatest abundance in slower flowing streams with stable sediments that are soft enough for burrowing amongst woody debris and exposed tree roots. Salinity tolerance quite low (Morgan *et al.* 2011).

Likely presence in study area: While the study area contains two creeks lines their seasonal nature and/or degraded state make them unsuitable habitat for this species and it is therefore considered as unlikely to occur. Not listed as a potential species.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Pouched Lamprey *Geotria australis*

Status and Distribution: Listed as Priority 1 by the DPaW. Status is secure but abundance has decreased due to proliferation of obstacles to upstream spawning migration such as dams and weirs. A southern hemisphere species. Western Australian distribution includes coastal drainages of the south west from Perth to Albany (Allen *et al.* 2003).

Habitat: This species lives in mud burrows in the upper reaches of coastal streams for the first 4 years of life until migrating to the sea. Adults migrate up to 60km upstream during spawning (Allen *et al.* 2003).

Likely presence in study area: While the study area contains two creeks lines their seasonal nature and/or degraded state make them unsuitable habitat for this species and it is therefore considered as unlikely to occur. Not listed as a potential species.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Western Swamp Tortoise *Pseudemydura umbrina*

Status and Distribution: Listed as Scheduled 1 under the *WC Act* and as Critically Endangered under the *EPBC Act (1999)*. Confined to a small number of sites near Bullsbrook.

Habitat: Clay based ephemeral swamps (Bush *et al.* 2002).

Likely presence in study area: Outside of well documented distribution and it is therefore considered as unlikely to occur. Not listed as a potential species.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Darling Range Heath Ctenotus *Ctenotus delli*

Status and Distribution: Listed as Priority 4 by DPaW. Main distribution is in the Darling Range from the Darlington/Mundaring area to near Collie (Storr *et al.* 1999).

Habitat: Humid zone, mainly laterite and clays (Storr *et al.* 1999) supporting jarrah/marri woodland with a shrub dominated understorey, sheltering in dense vegetation, inside grass trees and beneath rocks, sometimes in burrows (Nevill 2005). Occasionally found on granite outcrops (Bush *et al.* 2010).

Likely presence in study area: The study area is outside of this species current documented range and it contains no suitable habitat for this species to utilise. Not listed as a potential species.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Black-striped Snake *Neelaps calonotos*

Status and Distribution: Listed as Priority 3 by DPaW. Found in the lower west coast from Lancelin to Mandurah. It is locally abundant but is under threat due to land clearing (Storr *et al.* 1999).

Habitat: This species of snake favours sandy soils supporting heath and *Banksia/eucalypt* woodland (Nevill 2005).

Likely presence in study area: Habitat appears to be fragmented and degraded to support a population of this species. Also, There are no records of this species from the immediate vicinity of the study area despite several intensive surveys (e.g. Perth Airport) having been carried out in the past and it is therefore considered unlikely to be present. Not listed as a potential species

Potential impact of development: No impact on this species or its preferred habitat will occur.

Southern Carpet Python *Morelia spilota imbricata*

Status and Distribution: The south western population is classified Schedule 4 under the *WC Act*. This subspecies has wide distribution within the south west but is uncommon. Occurs north to Geraldton and Yalgoo and east to Pinjin, Kalgoorlie, Fraser Range and Eyre (Storr *et al.* 2002).

Habitat: This species has been recorded from semi-arid coastal and inland habitats, *Banksia* woodland, Eucalypt woodlands, and grasslands. Most often found utilising hollow logs in addition the burrows of other animals for shelter. Often arboreal and will use tree hollows for refuge. Near Perth, this species is more often found in areas of substantial undisturbed bushland such as catchment areas and rocky outcrops of the Darling Range (Bush *et al.* 2010).

Likely presence in study area: Habitat within and near the study area appears too fragmented for a population of this species to persist. Near Perth, this species is more often found in areas of substantial undisturbed bushland such as catchment areas and rocky outcrops of the Darling Range (Bush *et al.* 2010). This species is therefore considered to be very unlikely to occur. Not listed as a potential species

Potential impact of development: No impact on this species or its preferred habitat will occur.

Malleefowl *Leipoa ocellata*

Status and Distribution: This species is listed as Schedule 1 under the *WC Act* and as Vulnerable and Migratory under the *EPBC Act*. Originally common, but now generally rare to uncommon and patchily distributed.

Current distribution mainly southern arid and semi-arid zones, north to Shark Bay, Jingemarra, Colga Downs and Yeelirrie, east to Earnest Giles Range, Yeo Lake, lower Ponton Creek and to Eucla and west and south to Cockleshell Gully, the Wongan Hills, Stirling Range, Beaufort Inlet, Hatters Hill, Mt Ragged and Point Malcolm (Johnstone and Storr 1998).

Habitat: Mainly scrubs and thickets of mallee *Eucalyptus* spp., boree *Melaleuca lanceolata* and bowgada *Acacia linophylla*, also dense litter forming shrublands.

Likely presence in study area: This species is regionally extinct and would never, under normal circumstances, occur anywhere on the Swan Coastal Plain/Darling Range. Not listed as a potential species.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Great Egret *Ardea alba*

Status and Distribution: This species of egret is listed as migratory under the *EPBC Act* and under international agreements to which Australia is a signatory. The Great Egret is common and very widespread in any suitable permanent or temporary habitat (Morcombe 2004).

Habitat: Wetlands, flooded pasture, dams, estuarine mudflats, mangroves and reefs (Morcombe 2004).

Likely presence in study area: The constructed lakes, creek lines and other seasonally inundate areas onsite represent suitable habitat for this species. Unlikely to breed onsite.

Potential impact of development: Loss or modification of a small areas of marginal man-made habitat. No significant impact on this species will occur.

Cattle Egret *Ardea ibis*

Status and Distribution: This species of egret is listed as migratory under the *EPBC Act* and under international agreements to which Australia is a signatory. The Cattle Egret is common in the north sections of its range but is an irregular visitor to the better watered parts of the state (Johnstone and Storr 1998). The population is expanding (Morcombe 2004).

Habitat: Moist pastures with tall grasses, shallow open wetlands and margins, mudflats (Morcombe 2004). As its name suggests, most often seen in association with cattle.

Likely presence in study area: The constructed lakes, creek lines and other seasonally inundate areas onsite represent suitable habitat for this species but frequency of occurrence would be very low. Unlikely to breed onsite.

Potential impact of development: Loss or modification of a small areas of marginal man-made habitat. No significant impact on this species will occur.

Migratory Shorebirds/Wetland Species

A number of migratory shorebirds/wetland species are listed as potentially occurring in the general area. Specific species are not discussed.

Status and Distribution: Migratory shorebirds are listed under the *EPBC Act 1999* and under international agreements to which Australia is a signatory. All species are either widespread summer migrants to Australia or residents. State and Federal conservation status varies between species.

Habitat: Varies between species but includes 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.

Likely presence in study area: The constructed wetlands onsite may be very occasionally visited by some species of wader but the frequency of occurrence would be very low and then only for very brief periods. Other areas of the study area are considered unsuitable for any species. None are listed as potential species for this reason.

Potential impact of development: No impact on migratory waders/wetland species or their preferred habitat is considered likely.

Australasian Bittern *Botaurus poiciloptilus*

Status and Distribution: Classified as Schedule 1 under the *WC Act* and as Endangered under the *EPBC Act (1999)*. The species is uncommon to rare (Morcombe 2004), but locally common in wetter parts of south west (Johnstone and Storr 1998). Occurs north to Moora and east to Mt Arid (Johnstone and Storr 1998).

Habitat: Freshwater wetlands, occasionally estuarine; prefers heavy vegetation (Morcombe 2004) such as beds of tall dense *Typha*, *Baumea* and sedges in freshwater swamps (Johnstone and Storr 1998).

Likely presence in study area: The constructed wetlands onsite may be very occasionally visited by this species but given the marginal quality of these area the frequency of occurrence would be very low and then only for very brief periods. Not listed as potential species for this reason.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Black Bittern *Ixobrychus flavicollis*

Status and Distribution: Listed as Priority 1 by DPaW. Occurs north to Yanchep and Northam and east to Albany (Johnstone and Storr 1998).

Habitat: Freshwater pools, swamps and lagoons, well screened with trees. Shelters in dense waterside vegetation (Johnstone and Storr 1998).

Likely presence in study area: The constructed wetlands onsite may be very occasionally visited by this species but given the marginal quality of these area the frequency of occurrence would be very low and then only for very brief periods. Not listed as potential species for this reason.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Little Bittern *Ixobrychus minutus*

Status and Distribution: Listed as Priority 4 by DPaW. Occurs north to Moora and east to Two Peoples Bay; accidental or on migration further north and east and on Rottneest Island and central district (Condungup district) (Johnstone and Storr 1998).

Habitat: 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 (Johnstone and Storr 1998).

Likely presence in study area: The constructed wetlands onsite may be very occasionally visited by this species but given the marginal quality of these area the

frequency of occurrence would be very low and then only for very brief periods. Not listed as potential species for this reason.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Osprey *Pandion haliaetus*

Status and Distribution: This species is listed as Migratory under the *EPBC Act* and under international agreements to which Australia is a signatory. Moderately common to very common in sheltered seas around the north and west coast islands south to 31°S; uncommon to common on mainland coasts, estuaries and large rivers north of tropic, rare to uncommon elsewhere (Johnstone and Storr 1998).

Habitat: Coasts, estuaries, bays, inlets, islands, and surrounding waters, coral atolls, reefs, lagoons, rock cliffs and stacks. Ascends larger rivers (Pizzey & Knight 2012). Construct nests on prominent headland, large trees, communication towers (Simpson & Day 2010).

Likely presence in study area: The study area contains no suitable habitat for this species to utilise. Not listed as potential species.

Potential impact of development: No impact on this species or its preferred habitat will occur as a consequence of development at the site occurring.

White-bellied Sea Eagle *Haliaeetus leucogaster*

Status and Distribution: This species is listed as Schedule 3 under the *WC Act* and as migratory under the *EPBC Act* and under international agreements to which Australia is a signatory. White-bellied sea eagles are moderately common to common on Kimberley and Pilbara islands, coasts and estuaries, on Bernier, Dorre and Dirk Hartog Is., in Houtman Abrolhos and in the Archipelago of the Recherche; rare to uncommon elsewhere (Johnstone and Storr 1998). Also found in New Guinea, Indonesia, China, southeast Asia and India. Scarce near major coastal cities (Morcombe 2004).

Habitat: They nest and forage usually near the coast over islands, reefs, headlands, beaches, bays, estuaries, mangroves, but will also live near seasonally flooded inland swamps, lagoons and floodplains, often far inland on large pools of major rivers. Established pairs usually sedentary, immatures dispersive (Morcombe 2004). White-bellied Sea-Eagles build a large stick nest, which is used for many seasons in succession.

Likely presence in study area: The study area contains no suitable habitat for this species to utilise. Not listed as potential species.

Potential impact of development: No impact on this species or its preferred habitat will occur as a consequence of development at the site occurring.

Peregrine Falcon *Falco peregrinus*

Status and Distribution: This species is listed as Schedule 4 under the *WC Act*. Individuals of this species are uncommon/rare but wide ranging across Australia. Moderately common at higher levels of the Stirling Range, uncommon in hilly, north west Kimberley, Hamersley and Darling Ranges; rare or scarce elsewhere (Johnstone and Storr 1998).

Habitat: Diverse from rainforest to arid shrublands, from coastal heath to alpine (Morcombe 2004). Mainly about cliffs along coasts, rivers and ranges and about wooded watercourses and lakes (Johnstone and Storr 1998). The species utilises the ledges, cliff faces and large hollows/broken spouts of trees for nesting. It will also occasionally use the abandoned nests of other birds of prey.

Likely presence in study area: The species potentially utilises some sections of the study area as part of a much larger home range. No potential nest sites observed.

Potential impact of development: Loss/modification of a very small area of natural habitat. No significant impact likely.

Painted Snipe *Rostratula benghalensis*

Status and Distribution: This species is listed as Schedule 1 and 3 under the *WC Act* and as Endangered and Migratory under the *EPBC Act*. Sparsely distributed in better watered regions: Kimberley, North West and South Western divisions. Also eastern Australia and Tasmanian (Johnstone and Storr 1998).

Habitat: Well vegetated shallows and margins of wetlands, dams, sewerage ponds, wet pastures, marshy areas, irrigation systems, lignum, tea tree scrub, open timber. Requires dense low cover (Morcombe 2004).

Likely presence in study area: This species is rarely recorded in the southwest. The constructed wetlands onsite may be very occasionally visited by this species but the frequency of occurrence would be very low and then only for very brief periods. Habitat appears very marginal at best. Not listed as potential species for this reason.

Potential impact of development: No impact on this species or its preferred habitat will occur as a consequence of development at the site occurring.

Glossy Ibis *Plegadis falcinellus*

Status and Distribution: This species is listed as Migratory under the *EPBC Act* (1999) and under international agreements to which Australia is a signatory. The Glossy Ibis frequents swamps and lakes throughout much of the Australian mainland, but is most numerous in the north. It is a non-breeding visitor to Tasmania and the south-west of Western Australia. The Glossy Ibis is both migratory and nomadic. Its range expands inland after good rains, but its main breeding areas seem to be in the Murray-Darling Basin of New South Wales and Victoria, the Macquarie Marshes in New South Wales, and in southern Queensland. Glossy Ibis often move north in

autumn, then return south to their main breeding areas in spring and summer (Pizzey & Knight 2006).

Habitat: Well vegetated wetlands, wet pastures, rice fields, floodwaters, floodplains, brackish or occasionally saline wetlands, mangroves, mudflats, occasionally dry grasslands (Pizzey & Knight 2012).

Likely presence in study area: This species is only infrequently recorded in the southwest. The constructed wetlands onsite may be very occasionally visited by this species but the frequency of occurrence would be very low and then only for very brief periods. Habitat appears very marginal at best. Not listed as potential species for this reason.

Potential impact of development: No impact on this species or its preferred habitat will occur as a consequence of development at the site occurring.

Muir's Corella *Cacatua pastinator pastinator*

Status and Distribution: Listed as Scheduled 4 under the *WC Act* and as Vulnerable under the *EPBC Act*. Locally common in farmlands but generally uncommon and patchily distributed. Now confined to small part of the subhumid south western interior from Boyup Brook and Qualeup south to the Perup River, Lake Muir and Cambellup. Casual further east (Johnstone and Storr 1998).

Habitat: Mainly partly cleared eucalypt forests. Attracted to bulbs of guildford grass, *Drosera* spp, orchids, seeding oats and clover. Largely dependent on farming (Johnstone and Storr 1998).

Likely presence in study area: The project area is outside of this species current documented range. Not listed as potential species.

Potential impact of development: No impact on this species or its preferred habitat will occur as a result of the any development proceeding.

Major Mitchell's Cockatoo *Cacatua leadbeateri*

Status and Distribution: Classified as Schedule 4 under the *WC Act*. Sedentary, generally uncommon and of patchy occurrence. Widespread but disjunct in arid and semi arid zones. Found across the arid and semi-arid inland, from south-western Queensland south to north-west Victoria, through most of South Australia, north into the south-west Northern Territory and across to the west coast between Shark Bay and Jurien Bay south to Queen Victoria Spring (Johnstone and Storr 1998).

Habitat: Lightly or sparsely wooded country near water and tall eucalypts (Johnstone and Storr 1998).

Likely presence in study area: The project area is outside of this species current documented range. Not listed as potential species.

Potential impact of development: No impact on this species or its preferred habitat will occur as a result of the any development proceeding.



Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*

Status and Distribution: Listed as Scheduled 1 under the *WC Act* and as Vulnerable under the *EPBC Act*. Found in the humid and subhumid south west, mainly hilly interior, north to Gingin and east to Mt Helena, Christmas Tree Well, North Bannister, Mt Saddleback, Rock Gully and the upper King River (Johnstone and Storr 1998).

Habitat: Eucalypt forests, feeds on marri, jarrah, blackbutt, karri, sheoak and snottygobble. The forest red-tailed black cockatoo nests in the large hollows of marri, jarrah and karri (Johnstone and Kirkby 1999). In marri, the nest hollows of the forest red-tailed black cockatoo range from 8-14m above ground, the entrance is 12 – 41cm in diameter and the depth is one to five metres (Johnstone and Storr 1998).

Breeding commences in winter/spring. There are few records of breeding for the forest red-tailed black cockatoo (Johnstone and Storr 1998), but eggs are laid in October and November (Johnstone 1997; Johnstone and Storr 1998).

J	F	M	A	M	J	J	A	S	O	N	D


 Period in which breeding is most likely to commence

 Period in which fledging/weening could extend through

Recent data however indicates that breeding in all months of the year occurs with peaks in spring and autumn–winter (Ron Johnstone pers comms). Incubation period 29 – 31 days. Young fledge at 8 to 9 weeks (Simpson and Day 2010).

Likely presence in study area: May occur on occasions though no evidence of recent use found. Larger trees (>50cm DBH) can be considered potential breeding habitat though the probability of any ever being used for this purpose can be considered to be very low. Foraging habitat present but limited in extent. No evidence of roosting found.

Potential impact of development: Loss/modification of small areas of natural habitat.



Baudin's Black-Cockatoo *Calyptorhynchus baudinii*

Status and Distribution: Listed as Scheduled 1 under the *WC Act* and as Vulnerable under the *EPBC Act*. Confined to the south-west of Western Australia, north to Gidgegannup, east to Mt Helena, Wandering, Quindanning, Kojonup, Frankland and King River and west to the eastern strip of the Swan Coastal Plain including West Midland, Byford, Nth Dandalup, Yarloop, Wokalup and Bunbury (Johnstone and Storr 1998). On the southern Swan Coastal Plain this cockatoo is in some areas resident but mainly a migrant moving from the deep south-west to the central and northern Darling Range. Between March and September most flocks move north and are concentrated in the northern parts of the Darling Range. During this period birds forage well out onto the southern Swan Coastal Plain to areas such as Harvey, Myalup, Bunbury, Capel, Dunsborough and Meelup. While generally more common in the Darling Range this species can also be common on parts of the southern Swan

Coastal Plain especially in mid-August – September when flocks begin to return to their breeding quarters (Johnstone 2008).

Habitat: Mainly eucalypt forests where it feeds primarily on the Marri seeds, (Morcombe 2004), *Banksia*, Hakeas and *Erodium* sp. Also strips bark from trees in search of beetle larvae (Johnstone and Storr 1998). This species of cockatoo nests in large tree hollows, 30–40 cm in diameter and more than 30 cm deep (Saunders 1974).

J	F	M	A	M	J	J	A	S	O	N	D

 Period in which breeding is most likely to commence
 Period in which fledging/weening could extend through

Baudin's black-cockatoo breeds in late winter and spring, from August to November or December (Gould 1972; Johnstone 1997; Saunders 1974; Saunders et al. 1985). Eggs laid in October (Johnstone and Storr 1998). Based on observations at currently known nest sites breeding mainly occurs within the October-December period (Ron Johnstone pers. comms.). Incubation is 28 – 30 days. Young fledge at 8 to 9 weeks (Simpson and Day 2010).

Likely presence in study area: This species is only rarely recorded in this section of the coastal plain but it may occur on occasions. Larger trees (>50cm DBH) can be considered potential breeding habitat though the probability of any ever being used for this purpose can be considered to be very low. Foraging habitat present but limited in extent. No evidence of roosting found.

Potential impact of development: Loss/modification of small areas of natural habitat.

Carnaby's Black-Cockatoo *Calyptorhynchus latirostris*

Status and Distribution: Carnaby's black cockatoo is listed as Scheduled 1 under the *WC Act* and as Endangered under the *EPBC Act*. Confined to the south-west of Western Australia, north to the lower Murchison River and east to Nabawa, Wilroy, Waddi Forest, Nugadong, Manmanning, Durokoppin, Noongar (Moorine Rock), Lake Cronin, Ravensthorpe Range, head of Oldfield River, 20 km ESE of Condingup and Cape Arid; also casual on Rottnest Island (Johnstone and Storr 1998).

Habitat: Forests, woodlands, heathlands, farms; feeds on *Banksia*



, Hakeas and Marri. Carnaby's cockatoo has specific nesting site requirements. Nests are mostly in smoothed-barked eucalypts with the nest hollows ranging from 2.5 to 12m above the ground, an entrance from 23-30cm diameter and a depth of 0.1-2.5m (Johnstone and Storr, 1998).

Breeding occurs in winter/spring mainly in eastern forest and wheatbelt where they can find mature hollow bearing trees to nest in (Morcombe 2004). Judging from records in the Storr-Johnstone Bird Data Bank, this species is currently expanding its breeding range westward and south into the Jarrah – Marri forest of the Darling

Scarp and into the Tuart forests of the Swan Coastal Plain including the region between Mandurah and Bunbury.

Carnaby's black cockatoo has been known to breed close to the town of Mandurah, as well as at Dawesville, Lake Clifton and Baldivis (pers. comm., Ron Johnstone, WA Museum) and there are small resident populations on the southern Swan Coastal Plain near Mandurah, Lake Clifton and near Bunbury. At each of these sites the birds forage in remnant vegetation and adjacent pine plantations (Johnstone 2008).

J	F	M	A	M	J	J	A	S	O	N	D

 Period in which breeding is most likely to commence
 Period in which fledging/weening could extend through

Carnaby's black-cockatoo lays eggs from July or August to October or November, with most clutches being laid in August and September (Saunders 1986). Birds in inland regions may begin laying up to three weeks earlier than those in coastal areas (Saunders 1977). The female incubates the eggs over a period of 28-29 days. The young depart the nest 10–12 weeks after hatching (Saunders 1977; Smith & Saunders 1986).

Likely presence in study area: A small flock of Carnaby's black-cockatoo was observed during the field survey flying overhead and foraging evidence attributed to this species was also found (chewed marri and coastal blackbutt fruits). Larger trees (>50cm DBH) can be considered potential breeding habitat though the probability of any ever being used for this purpose can be considered to be very low. Foraging habitat present but limited in extent. No evidence of roosting found.

Potential impact of development: Loss/modification of small areas of natural habitat.

Fork-tailed Swift *Apus pacificus*

Status and Distribution: The fork-tailed swift is listed as Schedule 3 under the *WC Act* and as migratory under the *EPBC Act* and under international agreements to which Australia is a signatory. It is a summer migrant (Oct-Apr) to Australia (Morcombe 2004).

Habitat: Low to very high airspace over varied habitat from rainforest to semi desert (Morcombe 2004).

Likely presence in study area: The fork-tailed swift is potentially a very occasional summer visitor to the south west but is entirely aerial and largely independent of terrestrial habitats. It would only occur rarely and for very short periods of time and therefore has not been listed as a potential species.

Potential impact of development: No impact on this species will occur.

Rainbow Bee-eater *Merops ornatus*

Status and Distribution: This species is listed as Schedule 3 under the *WC Act* and as Migratory under the *EPBC Act* and under international agreements to which Australia is a signatory. The Rainbow Bee-eater is a common summer migrant to southern Australia but in the north they are resident (Morcombe 2004).

Habitat: Open country, of woodlands, open forest, semi arid scrub, grasslands, clearings in heavier forest, farmlands (Morcombe 2004). Breeds underground in burrows where areas of suitable soft soil, firm enough to support tunnel building exist.

Likely presence in study area: This species is a common seasonal visitor to south west and during summer months a small number of individuals of this species may possibly forage and roost onsite. Some areas may be suitable for breeding where soil conditions permit.

Potential impact of development: Loss/modification of a very small areas of natural habitat. No significant impact likely given that only a small number of individuals would ever be present at any one time.

Chuditch *Dasyurus geoffroii*

Status and Distribution: Listed as Scheduled 1 under the *WC Act* and as Vulnerable under the *EPBC Act*. Formerly occurred over nearly 70 per cent of Australia. The Chuditch now has a patchy distribution throughout the jarrah forest and mixed karri/marri/jarrah forest of southwest Western Australia. Also occurs in very low numbers in the Midwest, Wheatbelt and South Coast Regions with records from Moora to the north, Yellowdine to the east and south to Hopetoun.

Habitat: Chuditch are known to have occupied a wide range of habitats from woodlands, dry sclerophyll (leafy) forests, riparian vegetation, beaches and deserts. Riparian vegetation appears to support higher densities of Chuditch, possibly because food supply is better or more reliable and better cover is offered by dense vegetation. Chuditch appear to utilise native vegetation along road sides in the wheatbelt (CALM 1994). The estimated home range of a male Chuditch is over 15 km² whilst that for females is 3-4 km² (Sorena and Soderquist 1995).

Likely presence in study area: This species required relatively large continuous areas of vegetation to persist and as a consequence it is rarely recorded on any section of the coastal plain given the extent of clearing and fragmentation that has occurred. Occasional records in the Perth area are transient individuals that have originated from the Darling Range where it is known to persist. Not listed as potential species.

Potential impact of development: No impact on this species or its preferred habitat is anticipated.

Southern Brush-tailed Phascogale *Phascogale tapoatafa ssp*

Status and Distribution: Listed as Scheduled 1 under the *WC Act*. Present distribution is believed to have been reduced to approximately 50 per cent of its

former range. Now known from Perth and south to Albany, west of Albany Highway. Occurs at low densities in the northern jarrah forest. Highest densities occur in the Perup/Kingston area, Collie River valley, and near Margaret River and Busselton (DPaW information pamphlet). Records are less common from wetter forests. Can also persist in floristically degraded areas such as relatively dense and continuous, but parkland cleared woodland in farmland (G. Harewood pers. obs.).

Habitat: This subspecies has been observed in dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover. A nocturnal carnivore relying on tree hollows as nest sites. The home range for a female brush-tailed phascogale is estimated at between 20 and 70 ha, whilst that for males is given as twice that of females. In addition, they tend to utilise a large number (approximately 20) of different nest sites throughout their range (Soderquist 1995).

Likely presence in study area: Current status in the wider area uncertain but fragmented nature of the vegetation remnants and limited number of hollow trees would suggest it is unlikely to occur. Not listed as potential species

Potential impact of development: No impact on this species or its preferred habitat is anticipated.

Western Ringtail Possum *Pseudocheirus occidentalis*

Status and Distribution: Listed as Scheduled 1 under the *WC Act* and as Vulnerable under the *EPBC Act*. Common in suitable habitat (de Tores 2008). The highest densities of this species are recorded in Peppermint habitat near Busselton area; relatively high densities are found in Jarrah/Marri forest at Perup (de Tores 2008).

The Western Ringtail Possum (WRP) has a restricted distribution in south-western Western Australia. Most known populations (natural and translocated) are now restricted to near coastal areas of the south west from the Dawesville area to the Waychinicup National Park. Inland, it is also known to be relatively common in a small part of the lower Collie River valley, the Perup Nature Reserve and surrounding forest blocks near Manjimup.

Habitat: The Western Ringtail Possum was once located in a variety of habitats including Coastal Peppermint, Coastal Peppermint-Tuart, Jarrah-Marri associations, Sheoak woodland, and eucalypt woodland and mallee. Coastal populations mostly inhabit Peppermint-Tuart associations with highest densities in habitats with dense, relatively lush vegetation. Inland, the largest known populations occur in the Upper Warren area east of Manjimup (Wayne *et al* 2005). In this area the peppermint tree is naturally absent and jarrah-marri associations constitute the species refuge and foraging habitat. In areas where Peppermint is absent or rare WRPs have been observed feeding predominately on young Jarrah, *Nuytsia floribunda* and *Allocasuarina fraseriana* (G Harewood pers. obs.).

Likely presence in study area: This species is locally extinct. Not listed as potential species.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Southern Brown Bandicoot *Isodon obesulus fusciventer*

Status and Distribution: Listed as Priority 5 by DPaW. Widely distributed in the south west from near Cervantes north of Perth to east of Esperance, patchy distribution through the Jarrah and Karri forest and on the Swan Coastal Plain, and inland as far as Hyden. Has been translocated to Julimar State Forest, Hills Forest Mundaring, Tutanning Nature Reserve, Boyagin Nature Reserve, Dongolocking Nature Reserve, Leschenault Conservation Park, and Karakamia and Paruna Sanctuaries (DEC information pamphlet) and Nambung and Yalgorup National Parks (DPaW pers. comm.).

Habitat: Dense scrubby, often swampy, vegetation with dense cover up to one metre high, often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover. Populations inhabiting Jarrah and Wandoo forests are usually associated with watercourses. Quendas can thrive in more open habitat subject to exotic predator control (DPaW information pamphlet ND).

Likely presence in study area: Possibly present in the areas containing dense groundcover including thick grasslands in cleared areas.

Potential impact of development: Loss/modification of small areas of natural habitat.

Bilby *Macrotis lagotis*

Status and Distribution: The Bilby is listed as Schedule 1 under the *WC Act* and as Vulnerable under the *EPBC Act*. Current distribution in suitable habitat from Tanami Desert west to near Broome and south to Warburton. Former distribution extended south to Margaret River, though apparently absent from the coastal plain (Burbidge 2004).

Habitat: Current habitat included Acacia shrublands, spinifex and hummock grassland (Menkhorst *et al.* 2011).

Likely presence in study area: This species is locally extinct. Not listed as potential species.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Woylie *Bettongia penicillata ogibyi*

Status and Distribution: Listed as Schedule 1 under the *WC Act* and as Endangered under the *EPBC Act*. Restricted to remnant habitat patches in south west WA where populations are managed by way of fox control and reintroduction programs (e.g. Avon Valley, Walyunga National Park and Paruna Sanctuary).

Habitat: Open forest and woodland with a low, dense, understorey of tussock grasses or woody scrub. Formerly occurred in a wider range of habitats including spinifex hummock grasslands.

Likely presence in study area: This species is locally extinct. Not listed as potential species.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Western Brush Wallaby *Macropus irma*

Status and Distribution: Listed as Priority 4 by DPaW. The Western Brush Wallaby is distributed across the south-west of Western Australia from north of Kalbarri to Cape Arid (DEC information pamphlet).

Habitat: The species optimum habitat is open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. It is also found in some areas of mallee and heathland, and is uncommon in karri forest (DPaW information pamphlet).

Likely presence in study area: Vegetation in the area is too small and fragmented to maintain a population of this species. Not listed as potential species.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Western False Pipistrelle *Falsistrellus mackenziei*

Status and Distribution: Listed as Priority 4 by DPaW. Listed as Near Threatened by the ICUN. Confined to south west W.A. south of Perth and east to the wheat belt. Most records from Karri forests but also recorded in wetter stands of jarrah and tuart and woodlands on the Swan Coastal Plain (Menkhorst and Knight 2011). Range appears to be contracting southwards, presumably due to drying climate. Not recorded north of Collie in recent times (Bob Bullen 2010, pers. comm.)

Habitat: This species of bat occurs in high forest and coastal woodlands. It roosts in small colonies in tree hollows and forages at canopy level and in the cathedral-like spaces between trees.

Likely presence in study area: Rarely recorded in this area in recent times and possibly locally extinct. Not listed as a potential species.

Potential impact of development: No impact on this species is anticipated.

Water Rat *Hydromys chrysogaster*

Status and Distribution: Listed as Priority 4 by DPaW. The water rat is widely distributed around Australia and its offshore islands, New Guinea and some adjacent islands. It occurs in fresh brackish water habitats in the south-west of Western Australia, but occurs in marine environments along the Pilbara coastline and offshore

islands. Previous survey work in the south west suggested this species was relatively common and widespread though difficult to capture (Christensen *et al.* 1985, How *et al.* 1987).

Habitat: The water rat occupies habitat in the vicinity of permanent water, fresh, brackish or marine. Likely to occur in all major rivers and most of the larger streams as well as bodies of permanent water in the lower south west (Christensen *et al.* 1985).

Likely presence in study area: While the study area contains two creeks lines their seasonal nature and/or degraded state make them unsuitable habitat for this species and it is therefore considered as unlikely to occur. Not listed as a potential species.

Potential impact of development: No impact on this species or its preferred habitat will occur.

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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.

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